



Nursing

in interdisciplinary
healthcare

University of Rzeszow Publishing House

**NURSING
IN INTERDISCIPLINARY
HEALTHCARE**

NURSING IN INTERDISCIPLINARY HEALTHCARE

edited by

**Anna Bartosiewicz, Małgorzata Nagórska
and Paweł Więch**



UNIVERSITY OF RZESZÓW
PUBLISHING HOUSE
RZESZÓW 2023

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Layout and interior design
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Layout and interior design correction
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Project financed by
a Visegrad Fund Grant



DOI: 10.15584/978-83-8277-143-5

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Rzeszów 2023

ISBN 978-83-8277-143-5

2069

WYDAWNICTWO UNIwersYTETU RZESZOWSKIEGO
35-959 Rzeszów, ul. prof. S. Pigoń 6, tel. 17 872 13 69, tel./fax 17 872 14 26
e-mail: wydaw@ur.edu.pl; <https://wydawnictwo.ur.edu.pl>
wydanie I; format B5; ark. wyd. 13; ark. druk. 13,625; zlec. red. 82/2023

Druk i oprawa: Drukarnia Uniwersytetu Rzeszowskiego

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Foreword

The concept of nursing has exceeded its traditional boundaries and has become an essential element of interdisciplinary care. The constantly evolving healthcare sector, in the face of increasingly complex patient needs and medical advancements, has necessitated a paradigm shift in this profession. Nursing, which combines patient care, education, and advocacy, plays a pivotal role in this transformation.

The works presented in the monograph demonstrate the dynamic changes in interdisciplinary nursing as an approach that integrates knowledge and skills from various fields to provide patients with the highest quality of care. Interdisciplinary nurses see each patient as a whole and tailor their care to their needs. They recognize the interrelationships between the physical, psychological, social, and spiritual aspects of a patient's health to provide holistic and patient-centered care.

Interdisciplinary nursing care and the changing roles and responsibilities of nurses emphasize their contributions to care coordination, health promotion, and patient education. The research conducted covers all aspects of modern health care and its impact on the well-being of patients and the health care system.

The work highlights the challenges of implementing and maintaining interdisciplinary health care models and the need for ongoing education and professional development.

It introduces readers to the dynamic world of interdisciplinary nursing care.

50 years of midwives training (1971–2021) in Rzeszow, Poland

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Introduction

The education of midwives in Poland has undergone a major transformation in recent years. Until 2005, midwifery training was implemented by Vocational Medical Schools as a five semesters full-time program (2.5 years), on graduation of which a midwife was qualified to care for a mother and neonate. At the Vocational Medical School in Rzeszow, in 1971 the faculty of midwifery was established. By 2005, 1,214 midwives had graduated from the school.

The aim of the study was to present a history of midwifery education in Rzeszow in period 1971 - 2021.

Pre-academic education

Pre-academic education at the Faculty of Midwifery began in 1971. The education in this field lasted 5 semesters, and upon graduating, the students were awarded a diploma of a midwife. However, in order to obtain the desired diploma, future students had to pass an entrance examination in biology with elements of hygiene and an interview (fot.1), [1,2].

Theoretical education at the Faculty of Midwifery mainly included vocational subjects, such as the basics of nursing, specialist nursing and clinical subjects. Clinical subjects from the basic fields of health care were initially taught by doctors, and then by teachers who had completed higher nursing studies. Practical training consisted in mastering the skills of treatment techniques in school laboratories, constituting the basis for practical vocational training mastered directly in health care institutions [1].

The new curricula at the Faculty of Midwives initially functioned as implementation, later as binding ones. The content of education was blocked, which resulted

in changes in the nomenclature of subjects, such as: nursing in obstetrics, gynaecological nursing, public health and prophylaxis, and in the 1990s, the curricula included additional subjects i.e. foreign languages and Information Technology [2].



Photo 1. 1971. The first year of students of the Faculty of Midwifery of the Medical Vocational College in Rzeszow (private collection of Barbara Zych)

The theoretical education of midwives in the first year of training included subjects on the basis of specialist nursing: anatomy, physiology and pathology, psychology, public health, pharmacology, nursing, nursing and obstetrics so called anatomical model, internal diseases, paediatrics and midwifery together with specialist nursing in this field [1,2].

In the second year, they developed and improved knowledge in specialist nursing, i.e., obstetrics, paediatrics, gynaecology and obstetrics and gynaecology laboratories. After two years of theoretical and practical training, in the 5th semester, the students improved their skills during practical classes at the hospital. The obstetric practical placement conducted by teachers at the Vocational Medical School took place in the Provincial Hospital No. 2 (currently St. Hedwig Clinical Provincial Hospital no. 2 in Rzeszów), Frederic Chopin Provincial Specialist Hospital (currently Frederic Chopin Clinical Provincial Hospital No. 1 in Rzeszow), John Paul II City Hospital and primary health care facilities [1,2].

Education at the Faculty of Midwifery was very popular. This field of study continued operating from the beginning of the Vocational Medical School (1971) until June 2005. During these years, 8,826 graduates of various specialties left the school, including 1214 certified midwives [2]. Over the past years, practical training at the Faculty of Midwives was conducted under the supervision of: Romana Ziąber MSc,

Table 1. Summary of the total number of graduates and the number of graduates of the Faculty of Midwifery in the Medical Vocational College in Rzeszow [2].

Management of midwifery training	Education cycle vs. number of graduates
Director: Halina Gut -Wróbel MSc Training manager: Romana Ziąber MSc	Education cycle 1971- 1973: 43 graduates
Director: Alfred Smuszkiewicz MD Training manager: Helena Darecka MSc	Education cycle 1972 - 1975: 33 graduates
Director: Aleksander Ziemba MSc Training manager: Helena Darecka MSc	Education cycle 1973 - 1976: 33 graduates
Director: Wanda Mossoń MSc Vice-director: Halina Bartyzel MSc Training manager: Helena Darecka MSc	Education cycle 1974 - 1977: 39 graduates Education cycle 1975 - 1978: 31 graduates Education cycle 1976 - 1979: 50 graduates Education cycle 1977 - 1980: 41 graduates Education cycle 1978 - 1981: 43 graduates Education cycle 1979 - 1982: 51 graduates Education cycle 1980 - 1983: class „A” 43 graduates; class „B” 42 graduates
Director: Zbigniew Kalimański MSc Vice-director: Halina Bartyzel MSc, Ewa Dziuba MSc Training manager: Natalia Bać MSc	Education cycle 1981 - 1984: class „A” 39 graduates; class „B” 43 graduates
Director: Zbigniew Kalimański MSc Vice-director: Sylwia Maliczowska MSc Training manager: Zofia Huss MSc	Education cycle 1982 - 1985: class „A” 49 graduates; class „B” 32 graduates Education cycle 1983 - 1986: 52 graduates Education cycle 1984 - 1987: class „A” 35 students; class „B” 35 graduates Education cycle 1985 - 1988: 39 graduates Education cycle 1986 - 1989: 49 graduates Education cycle 1987 - 1990: 40 graduates Education cycle 1988 - 1991: not opened
Director: Zbigniew Kalimański MSc Vice-director: Zofia Huss MSc Training manager: Emilia Miąsik MSc	Education cycle 1989 - 1992: 41 graduates Education cycle 1990 - 1993: 47 graduates
Director: Grażyna Ferenc-Szczygieł MSc Vice-director: Zofia Huss MSc Training manager: Emilia Miąsik MSc	Education cycle 1991 - 1994: not opened Education cycle 1992 - 1995: 44 graduates
Director: Grażyna Ferenc-Szczygieł MSc Vice-director: Krystyna Lech MSc Training manager: Emilia Miąsik MSc	Education cycle 1993 - 1996: 43 graduates Education cycle 1994 - 1997: 35 graduates Education cycle: 1995 - 1998: not opened Education cycle: 1996 – 1999: 31 graduates Education cycle: 1997 – 2000: 20 graduates Education cycle: 1998 – 2001: 26 graduates Education cycle: 1999 – 2002: 1 graduate Education cycle: 2000 – 2003: 19 graduates Education cycle 2001 - 2004: 20 graduates Education cycle 2003 - 2005: 25 graduates

Helena Darecka MSc, Natalia Bać MSc, Zofia Huss MSc and Emilia Miąsik MSc. The merits of the entire faculty are not to be overlooked, the students of the Faculty of Midwifery took their first steps and improved their skills under the supervision of: Danuta Bajgier MSc, Elżbieta Dereń MSc, Anna Dulla MSc, Stanisława Gerula MSc, Grażyna Mistergazi-Kocaj MSc, Irena Lewandowska MSc and Teresa Podolska MSc and Grażyna Ferenc-Szczygieł MSc (Medical School Director from 1991 until her retirement) [1, 2]. The list of the number of graduates, broken down by the education cycle and the management of the Faculty of Midwives at that time, is presented in Table 1 [2].

One of the first crucial professional celebrations in the history of midwifery training was the so-called “capping”. It consisted in the symbolic putting on of a white cap and was the end of the first stage of preparation for professional “initiation”. From that moment on, a student of the Faculty of Midwifery acquired the right to wear a cap during classes in practical training institutions [2].

Another equally important ceremony was the symbolic awarding of the professional title of a midwife after successfully passing a professional diploma. On that day, all the graduates of the Faculty of Midwifery were wearing a cap with a red stripe, which was an “act of conferring the title” and received a diploma of a midwife, which they accepted with respect and reverence, solemnly promising: *“That throughout their lives they will most reliably fulfil all obligations arising from work in this profession. The greatest good in midwife’s work is the good of the human being, the good of the sick (...) always help a woman and her child, regardless of their race, nationality and religion (...), protect the dignity of an employee of the Health Service and always observe the applicable professional secrecy (...), and by systematically broaden own knowledge, use it for the benefit of the profession (...) and the good of a mankind”* [2].

The tradition of “clapping” and the celebration of diploma awarding has become a tradition in the 34-year tradition of education at the Faculty of Midwives (fot. 20, [2]).

Academic education

“I solemnly vow that I will persistently strive for knowledge gain and personality development, respect academic laws and customs and I will observe dignity and honour of a student at the University of Rzeszow with all my conduct” [3].

In order to meet the expectations resulting from the adaptation of Polish law to the Directives of the Council of the European Union and the demand of the community for well-trained medical staff, in 2002 the University of Rzeszow made an endeavour to launch studies in the field of Midwifery [4, 5]. In December 2003, by the decision of the Ministry of National Education and Sport, after obtaining a positive opinion of the State Accreditation Committee, approval was obtained for

the establishment of the Midwifery field of study within the structures of the University of Rzeszow [6].



Photo 2. Graduates of the Faculty of Midwifery from the 1996-1999 education cycle together with their tutor: Stanisława Gerula, MSc. The ceremony of awarding the diploma of a midwife (private collection of B. Zych)

Initially, education of midwives at first-cycle studies (from the academic year: 2004/2005) [6-9] and second-cycle studies (from the academic year: 2008/2009) [10] was held at the Institute of Nursing and Midwifery [11,12], and from September 1, 2010, in the newly established Institute of Obstetrics and Emergency Medicine [13]. To meet the needs of the local community of midwives who already had a diploma of a midwife, extramural university studies, the so-called bridging studies for certified midwives (path "B") was launched [8,9].

Training of midwives was initially carried out in the structures of the Faculty of Pedagogy (from April 1, 2004), then the Faculty of Health Sciences and the Faculty of Medicine (since April 1, 2006), and now it is carried out within the structures of the College of Medical Sciences (from October 1, 2019) [14-17].

Initially, the seat of the Department of Midwifery was the Medical Vocational College in Rzeszow at Warzywna Str. 1 (2004 - 2009), then the premises of the

former Faculty of Biology at St. Pigoń St. 6, which are the seat of the Obstetrics and Gynaecological Care Department of the Institute of Health Sciences, until now and where midwives are trained in obstetrics and physical examination laboratories [5, 18].

First-cycle studies are conducted in a full-time and part-time mode. Education at full-time studies lasts 6 semesters and is carried out in a total of 4,820 hours [23]. In part-time studies, for midwives who already have a diploma of the Medical Vocational School or Medical College, and the right to practice the profession of a midwife, there are 2 semesters of supplementary education, totalling 1,086 hours. In both cases, graduates of the studies are conferred BSc degree in midwifery and have the opportunity to continue their education at second-cycle studies (the so-called complementary, master's studies). MSc studies last 4 semesters and cover 1,300 hours of education [18–22]. Since 2012, training in the above-mentioned education paths in the field of obstetrics is conducted based on the standards of vocational education [19,20,23,24].

The profile of midwifery studies is practical implementing the content of education in the field of medical sciences and health sciences. In the first-cycle studies, theoretical and practical education is carried out in the scope of 4 groups of classes covering: basic sciences, social sciences and humanities, the basics of obstetric care and specialist care in the area of 339 learning outcomes in the field of knowledge, skills and social competences. Second-cycle studies expand competences with another 175 learning outcomes in the area of selected social sciences and humanities, advanced obstetric practice, research and development of obstetric practice [23,24].

The basis of theoretical education and mastering practical skills in the field of obstetrics at the University of Rzeszów are 4 hospitals (St Hedvig Provincial Clinical Hospital No. 2 in Rzeszów, Frederic Chopin Provincial Clinical Hospital No. 1 Hospital in Rzeszów, John Paul II Municipal Hospital, Medical Centre in Łańcut) and 3 Medical Centres providing primary healthcare services [18,25–27].

Education at the first and second cycle studies ends with the Diploma Examination verifying theoretical knowledge and practical skills and the defence of the thesis (BSc or MSc). The practical part of the exam for first-cycle students is a “test of work” which until 2019 took place at the departments of the Gynaecology and Obstetrics at Clinical Hospitals in Rzeszow, and from 2020 it has been carried out at the Medical Simulation Centre of the University of Rzeszow [18,23,28]. 1900 people completed their studies during 17 years of academic education in the field of Midwifery [18]. A detailed list of individual education cycles with the number of graduates is presented in Table 2.

Table 2. Summary of education cycles, number of graduates in the field of Midwifery at the University of Rzeszow [18].

Level and form of studies	Education cycle vs. number of graduates
1 st cycle full-time studies (BSc)	Education cycle 2004 - 2007: 22 graduates Education cycle 2005 - 2008: 37 graduates Education cycle 2006 - 2009: 33 graduates Education cycle 2007 - 2010: 28 graduates Education cycle 2008 - 2011: 30 graduates Education cycle 2009 - 2012: 40 graduates Education cycle 2010 - 2013: 39 graduates Education cycle 2011 - 2014: 38 graduates Education cycle 2012 - 2015: 36 graduates Education cycle 2013 - 2016: 69 graduates Education cycle 2014 - 2017: 62 graduates Education cycle 2015 - 2018: 51 graduates Education cycle 2016 - 2019: 49 graduates Education cycle 2017 - 2020: 69 graduates Education cycle 2018 - 2021: 35 graduates
1 st cycle extramural (BSc) studies for certified midwives, the so-called bridging studies	Education cycle 2004-2005: 74 graduates Education cycle 2005 - 2006: 55 graduates Education cycle 2006 - 2007: 46 graduates Education cycle 2007 - 2008: 43 graduates Education cycle 2008 - 2009: 41 graduates Education cycle 2009 - 2010: 49 graduates Education cycle 2010 - 2011: 36 graduates Education cycle 2011 - 2012: 47 graduates Education cycle 2012 - 2013: not opened Education cycle 2013 - 2014: 52 graduates Education cycle 2014 - 2015: 113 graduates Education cycle 2015 - 2019: not opened Education cycle 2019 - 2020: 33 graduates Education cycle 2020 - 2021 and 2021 - 2022: not opened
2 nd cycle full-time studies (MSc, complementary)	Education cycle 2008 - 2010: 29 graduates Education cycle 2009 - 2011: 30 graduates Education cycle 2010 - 2012: 36 graduates Education cycle 2011 - 2013: 32 graduates Education cycle 2012 - 2014: 44 graduates Education cycle 2013 - 2015: 37 graduates Education cycle 2014 - 2016: 47 graduates Education cycle 2015 - 2017: 44 graduates Education cycle 2016 - 2018: 50 graduates Education cycle 2017 - 2019: 71 graduates Education cycle 2018 - 2020: 35 graduates Education cycle 2019 - 2021: 36 graduates
2 nd cycle extramural studies (MSc, complementary)	Education cycle 2008 - 2010: 58 graduates Education cycle 2009 - 2011: 32 graduates Education cycle 2010 - 2012: 21 graduates Education cycle 2011 - 2013: 19 graduates Education cycle 2012 - 2018 and 2017 - 2019: not opened Education cycle 2018 - 2020: 25 graduates Education cycle: 2019 - 2021: 27 graduates

During the eighteen years of operation of the Midwifery course, the group of lecturers amounted to several dozen people. Most of them engaged professionally in this field of study for longer, putting their heart, many years of experience and professional skills into work with future midwives. However, the main burden of organization and responsibility for the efficient functioning of the faculty rested with the full-time teachers. Many of them have been working in the field of midwifery since it has been launched, creating and equipping training rooms and laboratories of obstetric skills from scratch [5,18].

Among the people associated with the emerging course were: Anna Basiaga (MSc, midwife), Andrzej Kawecki (prof., physician), Tomasz Kluz (MD, PhD, physician), Roman Kluza (MD, physician), Marian Ołpiński (MD, PhD, physician), Elżbieta Piontek (prof., physician), Radosław Ramotowski (MD, PhD, physician) and Józef Rusin (MD, PhD, physician), Jerzy Socha (prof., physician), Natasza Tobiasz (MSc., midwife), Katarzyna Wardak (MSc., midwife), Barbara Zych (MSc., midwife) and Andrzej Skręt (prof., physician) who had been managing the newly established Department of Midwifery till retirement (2006-2008), and later taking the position of Vice-Dean for Science at the Faculty of Medicine (2008-2010) [5,18].

Until 2018, the structure of the Department of Midwifery included three departments and two laboratories: Department of Maternity Care with the Laboratory of Midwifery Skills and the Laboratory of Obstetric Techniques; Department of Gynaecological Care and Prophylaxis and Department of Perinatology [18]. The full-time staff of the field of midwifery consisted of 20 people, including: Edyta Barnaś (assoc. prof., midwife); Joanna Skręt-Magierło (prof., physician), Grzegorz Panek (assoc. prof., physician) and Grzegorz Raba (Prof. UR, physician). The group of scientific and teaching staff of the department consisted of 11 midwives, 1 nurse and 3 doctors [18].

Current state

Education in the field of Midwifery is currently carried out in the structures of the College of Medical Sciences, Institute of Health Sciences (from October 1, 2019) [3]. The teaching staff are full-time employees of the faculty from the Department of Midwifery and Gynaecology under the supervision of Edyta Barnaś (assoc. prof., midwife), Joanna Błajda (PhD, midwife), Katarzyna Ignac (MSc, midwife), Elżbieta Kraśnianin (PhD, midwife), Anna Kremska (PhD, midwife), Aldona Miazga (MSc, midwife), Anna Pieniążek (PhD, midwife), Katarzyna Wardak (PhD, midwife), Romana Wróbel (PhD, midwife), Barbara Zych (PhD, midwife) [18].

Currently, 302 students are studying Midwifery [18], who have the opportunity to pursue their interests in three Student Research Clubs, as well as by participating

in free certified specialist courses in cardiotocography and basics of ultrasound for midwives. The extensive didactic offer of the field of study enables students to improve their practical skills during domestic and foreign internship trips (Leonardo DaVinci, Erasmus+, Most program) and during the offered three-month paid internships throughout Poland [18]. After completing the second cycle studies, graduates of Midwifery may continue their research interests at the Doctoral School [29].

Conclusions

The dynamic development of health care and medical science institutions required improvement of the content and forms of teaching in institutions that train future medical staff. The higher and higher requirements of future employers and society mean that the demand for midwife's care in the present and future form will increase. Thus, the demand for quantity and the variety of midwives trained will increase. However, the real development of education in the profession of a midwife will undoubtedly depend on the number and quality of candidates for studies, social mood as well as the priorities and economic and financial possibilities of the country.

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9. Resolution No. 239/2005 of the Presidium of the State Accreditation Committee of June 16, 2005 on the application of the University of Rzeszow for the establishment of the Faculty of Health

Sciences and conducting education in the fields of study: “physiotherapy” at the professional and graduate level, and “nursing” and “midwifery” at the vocational level.

10. Regulation of the Minister of Health of 11 May 2004 on the detailed conditions of conducting professional studies in the field of nursing or midwifery intended for nurses and midwives with a secondary school-leaving examination certificate and graduates of medical secondary schools, and medical vocational schools educating in the profession of a nurse and a midwife (Journal 110, item 1170).
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Contemporary Nursing – opportunities, and challenges from a Polish and Lithuanian Perspective

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Introduction

For more than 160 years, nursing as a profession has been developing internationally to a significant extent, defining new tasks, roles, and competencies resulting from changing living conditions and environments. All aimed to provide the best care to patients, without whom this profession would have no meaning. Nurses play a crucial role in the healthcare system around the world. Modern nursing is a dynamic field that evolves along with advances in medicine, technology, and societal needs. In the contemporary healthcare landscape, nurses are equal partners, along with physicians and other equally vital medical professions, within the therapeutic team. Without them, the patient's healing process cannot proceed properly. Nursing has now become an independent scientific discipline [1,2].

Purpose and methods of the study

This article is narrative in nature. The objective of this review is to illustrate the evaluation of the nursing profession over the years, focusing on the examples of Poland and Lithuania. The study employed analytical and synthetic methods. The inclusion criteria encompassed the most up-to-date scientific articles, relevant legal acts, reports, and guidelines pertaining to nursing education standards in Poland and Lithuania.

Historical Overview of Nursing in Poland

Polish nursing has a rich history. Over the past two decades, it has not only become an important component within the realm of medical professions, but it has also established its scientific foundations. The origins of Polish nursing date back to the 19th century. The first nursing school was opened in 1911 in Krakow, dedicated to Saint Vincent de Paul. The important roles in the establishment of the school were played by individuals such as Maria Epstein and Anna Rydlówna [3]. In 1925, the first nursing organisation (*Polish Association of Nurses*), was formed, which collaborates with numerous academic institutions and international organisations as part of its statutory and project-based activities [4-6].

In 1935, the parliament passed the first ever legislation in Poland regulating the principles concerning the work of nurses [7]. Subsequent legislation in 1996 progressively expanded the rights and autonomy of nurses, culminating in the current legal state (2011), which clearly defines professional autonomy and the scope of new competencies in accordance with the requirements of the Bologna education system [8-10]. The shortage of qualified medical personnel after World War II led to a series of urgent measures, leading to accelerated forms of nursing education. The involvement and work of pioneers played a pivotal role in shaping contemporary nursing in Poland. The establishment of a three-year nursing programme in 1969 at the Medical University of Lublin marked a significant milestone for the development of nursing in Poland, launching higher education for Polish nurses [10].

Historical Overview of Nursing in Lithuania.

The first nursing school in Lithuania was established at the end of the 18th century in 1775-1842 at Vilnius University [11]. An important institutional stage in the training of nurses in Lithuania is associated with the establishment of the Red Cross Society in 1876, one of whose tasks was the training of nurses. In 1888, the Sisters of Mercy Department of the Red Cross Society was established in Vilnius, later reorganised into the Sisters of Mercy Organisation. The Sisters of Mercy provided assistance in military and civilian hospitals, other medical institutions, and private individuals. The training lasted two years [12]. At the beginning of the 20th century, during the period of Lithuanian independence until the Second World War, seven nursing training programmes were run (in Vilnius, Kaunas, Klaipėda, Panevėžys, Šilutė, Druskininkai and Švenčionys), and two national nurses' organisations were founded - the Lithuanian Nurses' Union (1921), the Lithuanian Red Cross Nurses'

Society (1936) and the International Nurses' Organisation - the Nurses' Committee for Lithuania, Latvia and Estonia (1925). These organisations have had a major impact on improving nurse education. These organisations started the first principles of the legal regulation of the nursing profession and discussed the competences of nurses and the quality of the curriculum.

Before the Second World War, Lithuanian nurses' organisations sought membership of the International Council of Nurses (ICN), but war and occupation delayed these plans for more than 50 years [11]. After the Second World War, the development of nursing in Lithuania slowed down during the period of Soviet occupation. Nurses were trained in six medical schools. Nurses were assistants to doctors and their education was limited to professional skills. Nurse recruitment was centralised and the working conditions were poor. By the end of the twentieth century, the foundations of modern nursing science and practise were still not in place in Lithuania [12]. New opportunities for nursing education and nurse training emerged at the end of the 20th century after Lithuania regained its independence. The first 3.5-year programme of higher education nurse's specialist 3.5-year programme was established in 1990 at the Faculty of Nursing of Kaunas Medical University. Currently, nurses are trained in 11 Lithuanian higher education institutions. The Lithuanian Nursing Specialists' Organisation (LNSO) was founded in 1992 and is involved in the processes of healthcare transformation, influences health policy, protects the interests of nursing professionals and patients, takes care of the progress of professional development, and organises and unites nurses. It has been a member of the International Council of Nurses (ICN) since 1994, and a member of the European Federation of Nurses Associations (EFN) since 1996. Currently, Lithuanian nurses are well educated healthcare professionals who provide high-quality nursing services to patients and actively participate in social activities [11].

Legal foundations for practising nursing in Poland

The legal foundations for practicing nursing in Poland are regulated by the following legal acts, including laws, regulations, and professional standards.

- The Act on the Professions of Nurse and Midwife: This is the main document that regulates the legal status and professional rights of nurses and midwives [13].
- Regulation of the Minister of Health and Higher Education on the standards of education for nurses [14].
- Code of Ethics for Nurses and Midwives: This document sets the ethical and moral principles that nurses and midwives should follow in their work [15].

- Professional Standards for Nurses and Midwives: These are official standards that define the professional competencies of nurses and midwives at various levels of education and experience [15].
- European Union Regulations: Polish nurses are also subject to regulations derived from European Union legislation, particularly in the context of the free movement of healthcare workers within the European Union [16].
- Regulation of the Minister of Health on the list of nursing fields, in which specialisation and courses can be conducted [17].
- Regulation of the Minister of Health on post-graduate education of nurses [18].
- Regulation of the Minister of Health on the type and scope of preventive, diagnostic, therapeutic, and rehabilitation services provided by a nurse or a midwife independently without a medical order [19].
- Regulation of the Health Minister on the list of drugs for which nurses can issue prescriptions [20].

The Nurses and Midwives Council represents nurses and midwives and contributes to professional policy making. The council plays an advisory and regulatory role, contributing to raising nursing standards in Poland [21].

Legal foundations for practising nursing in Lithuania

The legal foundations for practising nursing in Lithuania are regulated by the following legislation, including laws, national nursing policy guidelines, and orders of the Minister of Health:

- The Law on Nursing Practice and Midwifery Practice of the Republic of Lithuania, which regulates the acquisition of professional qualifications for general nurses, advanced practice nurses and midwives, the conditions of practice, the rights, duties and responsibilities of general nurses, as well as the management of nursing practice and midwifery practice [22].
- List of specialised nursing fields approved by order of the Minister of Health. Specialised areas of nursing in which a general nurse with a relevant nursing specialisation may practise: anaesthesia and intensive care, community nursing, operating room nursing, mental health nursing, emergency nursing [23].
- Lithuanian medical norms regulating the rights, duties, and competences of nurses, as well as aspects related to the acquisition and recognition of professional qualifications [24-30].
- Regulations of the Minister of Health, which specify aspects of nursing practice: on outpatient home nursing services, on palliative care and hospice services,

and on requirements for the provision of inpatient and outpatient palliative care services for adults and children. These regulations cover topics such as requirements for professionals, recommended workload, procedures for service provision, and training curriculum requirements for professionals [31-33].

- European Union Regulations: Lithuanian nurses are also subject to regulations derived from the legislation of the European Union, particularly in the context of free movement of healthcare workers within the European Union [34].
- National Nursing Policy Guidelines 2016-2025, which set out the aim, directions, issues, evaluation criteria, implementation and coordination of the national nursing policy to improve access to and quality of nursing care. The implementation of the guidelines is evaluated by a Nursing Committee established by the Minister of Health in accordance with the established criteria [35].

Education Standards for Nurses in Poland

The approach of nursing training in Poland has undergone significant changes in the last 25 years. Many of these changes were influenced by political shifts in the 1990s, while others emerged after Poland's accession to the European Union in 2004. Since 2005, the right to practise as a nurse can only be obtained after completing a bachelor's degree in nursing [36,37]. The condition to obtain a permit to educate nurses is the accreditation of the Minister of Health [38]. According to current education standards in Poland (2019), first-cycle studies (bachelor) in nursing last for a minimum of 6 semesters (3 years). The duration of the classes must not be less than 4720 hours (the number of ECTS points required for the first cycle studies cannot be less than 180). Theoretical classes comprise at least one third of the minimum education period, while practical education constitutes at least half of the minimum education period. Currently, studies (depending on the university) are offered in both full- and part-time modes. The subsequent stage of education is second-cycle studies (master's degree), which can be pursued in either full-time or part-time modes. According to the current education standards in Poland, these studies last for a minimum of 4 semesters (2 years). The number of hours dedicated to classes and practices must not be fewer than 1300 (the number of ECTS points required for second cycle studies cannot be fewer than 120). Teaching practice amounts to around 160 hours. Studies conclude with the defence of a master's thesis. Academic education can also be continued with third-cycle studies (doctoral studies). Doctorate programmes for nurses typically last 6 to 8 semesters. Doctoral studies are concluded with the submission of a doctoral dissertation

[14]. According to the Act of 15 July 2011, on the professions of nurses and midwives, nurses are obligated to keep their knowledge up-to-date. In the context of post-graduate education for nurses, the following types are distinguished: specialisation training (specialisation), qualification course, specialist course, and refresher course. Qualification, specialist, and refresher courses aim to deepen knowledge and skills in specific nursing fields, spanning from several days to several weeks or months. Specialisation, the most significant form of postgraduate education, culminates in a state examination, and nurses obtain the title of specialist in a particular nursing field. Specialisation training lasts 2 years. A specialisation requirement is to have the right to practise and to have a minimum of two years of work experience within the last 5 years [13,17,18].

Education Standards for Nurses in Lithuania

Nursing practice - general, advanced, and/or specialised nursing practice is a licenced activity. General nursing practice in Lithuania can only be carried out with a valid general nursing practice licence. A general nurse who holds a valid general nursing practice licence and has acquired the relevant nursing specialisation may practise specialised nursing practice. The specialisation in nursing shall be acquired at a higher education institution by general nurses or midwives who have completed a nonformal education programme in a specialised field of nursing of their choice. A general practice licence shall be issued upon completion of the professional qualification of general nurse. The general nurse professional qualification is obtained by completing a nursing degree programme in a higher education institution. Lithuania has a binary system of nurse training. Nurses are trained at 3 universities and 8 colleges/higher education institutions. Holders of a matriculation certificate or equivalent qualification are eligible. General nurse training must comprise 180 or 210 credits of study (3 to 3.5 years) in colleges and 240 credits (4 years) in universities, comprising at least 4600 hours of theoretical and clinical internship, at least one third of which must be theoretical and at least half of which must be clinical (2300 hrs). The clinical practical internship for general nurses and/or midwives at different levels of personal health care and/or other institutions must be at least 2300 hours. The internship is necessary to qualify for the regulated profession. The practical internship will be carried out during the training leading to the award of the diploma. Completion of first cycle studies leads to the award of a professional bachelor's degree in health sciences (upon completion of collegiate studies) or a bachelor's degree in health sciences

(upon completion of first cycle university studies), and a professional qualification as a nurse practitioner in general practice, which corresponds to the Lithuanian Qualifications Framework (LQF) level 6, which is in line with level 6 of the European Qualifications Framework (EQF), as well as to the European Qualifications Framework (EQF), the European Qualifications Framework (EQF), Level I of the European Higher Education Area (EHEA) [39]. Since 2015, according to the established legal regulation and the provisions of the Law on Science and Studies of the Republic of Lithuania, it has been established that professional bachelor's and bachelor's degrees confer the right to continue studies at master's level. The duration of studies is 90-120 credits (1.5-2 years). The studies are completed by the defence of the Master's thesis. Upon completion of the second cycle of studies, the Master's degree in Health Sciences is awarded, corresponding to level 7 of the Lithuanian Qualifications Framework, which corresponds to level 7 of the European Qualifications Framework (EQF).

Academic study can also be continued at the third level (doctoral studies). Completion of the third cycle of doctoral studies and defence of the dissertation lead to the award of a Ph.D. Research degrees are classified under level 8 of the Lithuanian Qualifications Framework, which corresponds to level 8 of the European Qualifications Framework (EQF) [40].

Nursing workforce situation in Poland

Demographic changes within societies, leading to a high demand for care and nursing services, coupled with the accompanying shortage of nurses, pose a challenge to the healthcare sector in Poland. According to the report, there are 307,832 registered nurses in Poland, of which 234,117 are professionally active. A significant problem is the continuously increasing average age of Polish nurses, currently 53.2 years (Figure 1). In addition, nearly 7,000 nurses eligible for retirement benefits remain professionally active. According to the 2021 crash report, if nurses eligible for retirement stopped working, 272 hospitals would lack professional nursing care [41]. The National Chamber of Nurses published this so-called crash report. Looking ahead to 2030, the forecast is even more dire, with the number of hospitals without nursing staff nearly doubling, reaching a projected 415 according to forecasts [42].

Furthermore, the lack of interest among young people in pursuing this profession results in a natural generational replacement gap. According to the latest report of the Supreme Chamber of Nurses and Midwives of Poland (April 2022),

the number of nurses eligible for retirement benefits is significantly higher than the number of young nurses at the beginning of their career [41], (Figure 2).

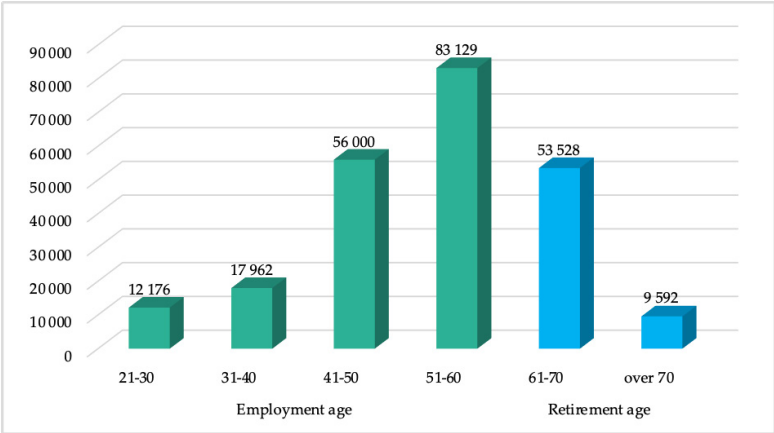


Fig.1. Age structure of Polish nurses [41].

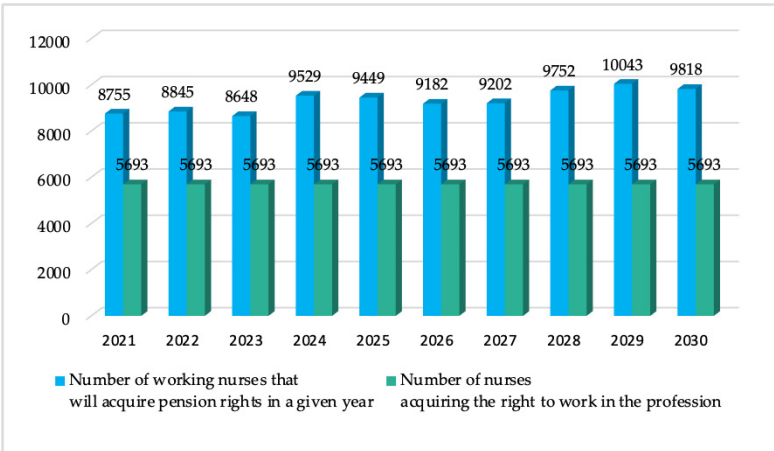


Fig. 2. Number of nurses acquiring retirement rights and nurses acquiring the right to work - Forecast by 2030 [41].

Nursing workforce situation in Lithuania

Lithuania’s population is ageing rapidly. At the same time, a global trend that affects the structure of the population is increasing life expectancy. When looking at the demand for health care services by age groups and categories of services, it

is observed that the demand for inpatient health care services increases from the age of 50, for outpatient health care services from the age of 70, and for nursing services from the age of 75 [43]. In Lithuania, there are currently 24,889 persons holding valid general nursing practice licences, which entitle them to practise nursing according to the professional qualification of a general nurse, but the number of nurses in practise is 21,233, or 74 nurses per 100,000 population. According to the annual analysis of healthcare resources carried out by the Lithuanian Institute of Hygiene, a decrease in the number of actively practising nurses is observed from 26,706 nurses in 2000 to 21,233 nurses in 2022 [44]. It is of great concern that the shortage of nurses will increase, since the average age of general nurses working, who make up the largest proportion of the nursing workforce, is currently 45.3 years, and nursing is not a popular profession among school leavers [35]. Despite the demand for nurses, the number of nursing graduates has been declining since the first decade of the twentieth century, with 881 nurses graduating in 2005 and 768 nurses graduating in 2021 [45]. By 2030, the demand for the largest health professional group, general nurses, is projected to increase significantly. The retirement of nurses, the increase in the number of services for an ageing population, and the increase in time spent with patients are among the most commonly cited reasons for the shortage of nurses. Other reasons for future shortages of nurses include the emigration of professionals abroad, the shortages of professionals in regions where working conditions are less attractive, and the growing need for professionals with new skills due to technological developments [43].

Enrichment of new competences

Modern nursing in Poland is the result of various transformations and legislative actions aimed primarily at introducing changes to the nursing education system and improving the quality of education within this professional group [46]. Due to dynamic changes in the healthcare system, greater emphasis is placed on improving the safety and quality of care. This requires systemic solutions combined with a qualified medical workforce.

In the past decade, Polish nursing has undergone significant evolution. From January 1, 2016, Polish nurses were granted the right to prescribe medicines, both as part of self-prescription and as part of continuing treatment prescribed by a doctor. In March the same year, the scope of these rights was expanded to include the ability to prescribe drugs to patients over 75 years of age. A year later, these rights were further extended to include referrals for diagnostic tests and the possibility of

conducting comprehensive physical examinations. In 2019, a new service was introduced in the field of specialist outpatient care, known as nursing advice, which was expanded to primary care in 2020 [47-49].

The COVID-19 pandemic situation underscored the importance and irreplaceable role of nurses in healthcare systems around the world. Therefore, from June 2021, Polish nurses are authorised to provide qualified patients with COVID-19 vaccinations. According to the new law, nurses working in hospital emergency departments and medical rescue teams are allowed to confirm deaths during rescue operations, i.e., in cases of death during medical interventions. The nursing community proposes to extend these competencies to nurses with a master's degree and specialisation in palliative care, long-term care, and hospice care. Another demand from the Supreme Chamber of Nurses is the proposal to allow nurses to issue temporary incapacity-to-work certificates, which are equivalent to medical sick leave certificates [50-52].

Enrichment of new competences in Lithuania

The 2016-2025 National Nursing Policy Guidelines outline the following areas for improving the nursing system: improving quality of care and patient safety; nurse demand, development of competencies, and competency enhancement; and the implementation of evidence-based solutions in nursing science [35].

Since 2015, advanced practice nurses have been trained in Lithuania. These are general nurses with a bachelor's degree and an additional master's degree in advanced nursing practice. An advanced practice nurse has a broader and more complex range of competences and greater autonomy. Within their scope of competence, these nursing professionals make autonomous decisions at the primary care level, in emergency care, anaesthesia, and intensive care [30]. In 2017, the law defined the competences, duties, and responsibilities of the advanced practice nurse, including the right to prescribe within the defined scope [30].

As of 2019, the legislation gives general nurses the right to prescribe and administer medical aids according to the procedure established by the Minister of Health, and to independently prescribe medicinal products included in the list of medicinal products that a nurse can independently prescribe for the purpose of providing medical assistance in the case of medical emergency. This list does not include medicinal products prescribed for the treatment of chronic diseases and for continuous use [25].

Current legislation limits the ability of general nurses to extend the treatment previously prescribed by a doctor and to prescribe to patients for the treatment of chronic diseases according to previous prescriptions [22]. To expand the competencies of general nurses, the current aim is to give general nurses the right to prescribe medicines for chronic diseases, so that the patient can continue with the prescription medicines prescribed by the doctor (without changing the generic name, pharmaceutical form, and strength of the medicine). The aim is to extend the rights of nurses to make referrals for specialised services, to assess a person's state of health and ability to work, and to issue sickness certificates. It should be noted that in the context of early diagnosis programmes, preventive check-ups, and monitoring of chronically ill patients, nurses could also make referrals [53].

From January 1, 2024, nurses will have the right to provide autonomous consultations to patients. Under the nurse consultation procedure, nurses will be able to assess the patient's health status, provide advice and recommendations, monitor the health status of chronically ill patients, prescribe tests and evaluate their results, perform preventive check-ups for children and adults, provide immunoprophylaxis, neonatal care and other services, and refer the patient to a general practitioner if necessary, within the scope of the nurse's competence [54]. This will encourage the autonomy of nurses, develop their competences, and raise the profile of the profession. The introduction of autonomous nurse consultations will allow patients to access easy-to-use primary outpatient personal health care services more quickly. Nurses will be able to provide face-to-face or remote consultations, choosing the method of service delivery that best suits the patient's needs, but will not be able to provide only remote consultations. The Ministry of Health will strive to further improve the working conditions of nurses, raise the prestige of the profession, and improve the quality of services by implementing the National Nursing Policy Guidelines 2016-2025 and taking into account the Global Strategic Directions for Nursing and Midwifery 2021-2025 of the World Health Organisation [35].

The challenges and prospects for the future

The challenges facing nursing in Poland and Lithuania depend largely on changes in living conditions and changes in the functioning of the healthcare system in each country. Nursing research plays an essential role in improving healthcare, advancing nursing practice, and contributing new insights into patient care. Such research allows for a better understanding of complex health issues and

evidence-based practice (EBP) is an approach where nurses base their decisions and practices on current and credible scientific evidence and best clinical practices. EBP integrates scientific knowledge with professional experience and patient preferences to ensure the highest quality of nursing care [55].

An important aspect of long-term policy for nursing development in Poland is increasing the number of nursing graduates to bridge the generational gap and effectively manage human resources. Furthermore, a systematic approach to specialised education at the second degree level may be the first and crucial step toward introducing and shaping the role of the advanced practice nurse. Standardising care in terms of electronic documentation of nursing activities using an international standard of nursing terminology, the obligation to apply nursing practice classification, including the ICNP® terminology, will facilitate the implementation of medical documentation, the creation of care plans, and care plan management based on unified terminology [56,57]. In a changing society, the knowledge and skills needed by nurses are also changing. Advances in information and communication technologies, as well as the COVID-19 pandemic, have expanded healthcare services to include web-based applications and increased the availability and use of technology. In Lithuania, further development of eHealth is planned until 2030, moving to a higher level of maturity of eHealth services. Advanced integrated digital health services are being designed and developed [43]. The professionalism of health professionals is increasingly extending to online behaviour. The content of the skills needed by nurses is changing. Artificial intelligence technologies, virtual and augmented reality, robots, telemedicine are being introduced into healthcare and nurse training. Working with these technologies will require an open mind, seeing them as opportunities rather than threats, and the ability to adapt to change by using new tools as they emerge.

Ultimately, the proper use of knowledge and the vast potential of a well-qualified nursing workforce will be the guarantor of nursing development success.

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Current state of advanced practice nurse education in Hungary

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Introduction

The essence of the Advanced Practice Nursing (APN) model in Hungary

In many developed countries, APN role was implemented as part of the health care model in several fields, such as practice-oriented advanced professional training in nursing, ensuring a real scope of professional activity (competence) and level of responsibility (accountability) [1]. In addition to prioritizing the safe recovery of patients, the greatest challenge of the healthcare sector is ensuring patients' access to care and equal opportunities. In order to achieve these goals, the "extended competence" of Advanced Practice Nurse program and job is already being used in the majority of the countries of the Organization for Economic Co-operation and Development (OECD) [2-4]. In addition to nursing, similar trends and "good practices" are already clearly visible at the international level in imaging diagnostic (radiographer BSc, MSc), laboratory medicine (medical laboratory analytical training BSc, MSc), physical therapy and midwifery [5-8].

Background

In addition to the creation of renewed training system, the introduction of the new care model must be preceded by the expansion and rethinking of health

service options. The first phase of the introduction was the development and acceptance by the universities of a 'professional' joint master's program after familiarizing themselves with the literature and the systems used in practice. The second phase included the enrolment of students and the implementation of the courses based on the new curriculum in September 2017 and February 2018 at the four authorized universities (University of Debrecen, University of Pecs, Semmelweis University, University of Szeged).

Purpose

The purpose of the research was to summarize and to present the challenges of the introduction of the advanced practice nurse model in Hungary.

Methods

As a research design descriptive research was applied with using qualitative and quantitative data. Universities offering MSc nursing programs in Hungary and National Directorate General for Hospitals provided data on enrolment and registration of nurses with MSc degree between 2017-2022. Descriptive statistics were used for analyses.

Results

The healthcare and higher education sectors and governing bodies were involved throughout the process reforming the MSc nursing program, as were professional organizations. In parallel with the national education development program (Hungarian National Qualification Framework) launched in 2016, the healthcare sector also monitored the renewing the former masters' program for nurses and generated additional government support for the program. This educational reform was focusing on the learning outcomes of the new programs satisfying the needs and expectations of the national labour markets. In June 2018, 151 candidates (nurses, paramedics) participated in the "extended competence" advanced practice nursing (MSc) model program in Hungary, in the following distribution by institution: University of Debrecen 27 students, University of Pecs 80 students, Semmelweis University 27 students, University of Szeged 17 students. The training program

took place on the basis of the same curriculum at each universities containing the subject topics of which were agreed upon previously (Ministerial Decree 18/2016 (VIII.5), [9]. Regarding the specializations taken by the students, the distribution between the institutions is illustrated in the following tables (Table 1-2).

Table 1. The distribution of APN by specializations in Hungarian language 2019-2022 Source: NDGH

APN master program Full-time Hungarian language	The number of students enrolled currently				The number of graduated students			
	I. academic year (term 1-2)		II. academic year (term 3-4)		2019	2020	2021	2022
	active	passive	active	passive				
anaesthetist nurse	1	0	0	0	7	4	0	2
geriatric nurse	3	0	0	2	6	11	4	2
intensive nurse	7	1	3	1	9	8	7	3
community nurse	20	2	4	1	24	19	23	12
perioperative nurse	0	0	0	0	4	5	2	1
emergency nurse	59	0	16	1	34	20	21	28
Sum	90	3	23	5	84	67	57	48

Table 2. The distribution of APN by specializations in English language 2019-2022 Source: NDGH

APN master program Full-time English language	The number of students enrolled currently				The number of graduated students			
	I. academic year (term 1-2)		II. academic year (term 3-4)		2019	2020	2021	2022
	active	passive	active	passive				
anaesthetist nurse	0	0	0	0	0	0	0	0
geriatric nurse	0	0	0	0	0	0	0	0
intensive nurse	6	2	0	2	0	0	3	4
community nurse	0	0	0	0	0	0	0	6
perioperative nurse	0	0	0	0	0	0	0	0
emergency nurse	0	0	1	1	0	0	0	0
anaesthetist nurse	0	1	0	0	0	0	0	0
Sum	6	3	1	3	0	0	3	10

To advance the training and make it attractive for more and more nurses, a new governmental decree has been initiated and introduced (160/2017 on the Michalicza scholarship) [10]. On the basis of a government decree, students can receive an increased study scholarship, a replacement fee can be obtained by the employer, and a mentor fee can be available for the internship supervisors with the cooperation

of the National Directorate General for Hospitals (NDGH), which was previously provided by the state budget. From the available official data so far, it can be established that the number of applicants for special student scholarships available for APN specialization in short supply has changed hectically over the past 6 years, and the impact on the budget was around HUF 200 million (appr. 525,000 Euro) on average based on NDGH data [11-13].

In the meantime, educational program development, with the first practical training experiences, was modified and completed. The previous three-semester master's program was increased to four semesters, focusing on clinical practices extensively.

At the same time, a review of the Program and Outcome Requirements and the creation of a new Expected Learning Outcomes system (ELO) was launched in Hungarian higher education in 2022, which affected all national higher educational programs, including the medical and health sciences training system, as well. With the involvement of experts, the Ministry of Culture and Innovation, the Hungarian Rectors' Conference and the Hungarian Higher Education Accreditation Committee reviewed the descriptions of the core competencies of the basic programs and undivided master's programs in the field of medicine and health sciences, too. The results of this ELO system, if codified, can strengthen the competency-based training approach. In the case of regulated professions, the program descriptions according to the new templates must, like the previous system, ensure the mandatory enforcement of European Council expectations in order to be recognized at the European level. During the reform the Directive on Mutual Recognition of Professional Qualifications (2005/36/EC) and an amended version (Directive 2013/55/EU) was adopted in 2013, were also taken into consideration [14-15]. It includes in article 31 a set of 8 competences that set the minimum educational requirements for nurses responsible for general care. But these APN programs should go beyond this covering a wide range of competences for APN.

The human resources situation of APN in Hungary

Currently, the number of APN with a valid basic register in the system is 464, of which 394 also have a valid operating license. Maintaining a valid operating license/register is a prerequisite of working in the Hungarian health care system officially. It should be noted here, however, that before 2019, 167 of them obtained a MSc degree based on the old training program, which was not focusing on professional practical skills deeply, but the main core competences were on research, education and management. Thus, the number of people with renewed APN qualifications and valid operating records is actually 227 since 2019. (Table 3.)

Here, it should be considered that the person who previously obtained an APN qualification before 2017 could acquire the specialized knowledge according to the

new specializations in a shorter time in one of the current six specializations, thus it would be easier to adapt their knowledge to the new roles. Expanding the number of APN this way is under discussion at the moment.

Table 3. The distribution of APN by specializations in operational register 2018-2022
Source: NDGH

Major	The number of APN in operational register					
	2018	2019	2020	2021	2022	Sum
APN with anaesthetist nurse specialization	0	6	4	0	1	11
APN with geriatric nurse specialization	0	6	7	4	1	18
APN with intensive therapy nurse specialization	0	8	8	8	3	27
APN with community nurse specialization	0	20	15	20	7	62
APN with perioperative nurse specialization	0	4	5	2	0	11
APN with emergency nurse specialization	0	33	21	21	23	98
Nurse MSc	52	18	95	1	1	167
Sum	52	95	155	56	36	394

The practical application in the healthcare system

Adequate communication of the new APN jobs that will be created along the lines of the professional consensus to society as well as patients/clients with the involvement of professional and patient organizations is essential. This requires the construction of a communication strategy and requires additional measures in addition to sectoral coordination. Still there is a room for rethinking professional roles of APN within the current Hungarian healthcare delivery system. There is a need for creating a clear and strong legal background for health care activities for nurses with extended powers in accordance with 6 specializations: community (basic) care, emergency care, geriatric care, perioperative area, anaesthesiology, intensive care. In this regard, consultation working groups were started with the involvement of the relevant departments and trainers, as well as professional organizations, but these consultations need to be accelerated and sectoral supervision is necessary. It is fortunate that from 2019, the Advanced Practice Nurse title has been named in the legislation for the first time in the personal conditions of the Acute Care Unit affiliated to Emergency Department in Hungary [16]. Since then, the most important step has been the introduction of the new call on duty service in primary care from February 1, 2023, in the county of Hajdú-Bihar, where APNs with extended roles can also take up work. By the end of this year uniform introduction of this type of care will be expected to introduce gradually throughout the country. At the request of the Hungarian National Ambulance Service (HNAS), in April 2023, experts from universities were asked for consultation regarding the

clarification of the professional tasks that can be performed within this framework. In this regard, the internal regulation of the HNAS can provide a good basis for further professional development, and its focus may well be specifically on primary care on-call. At the same time, the reorganization of primary care and the enhancement of its efficiency still require the clarification of the role of APNs. In the past couple of years several EU-supported programs have been launched to develop and focus the practical activities of the APN program and the practical activities of the graduated colleagues in domestic practice, but their practical results have been limited so far (SRSP, etc.). In parallel with this, it is also important to deal with the competence of colleagues working in the geriatric and community fields. The emergency care system is also waiting for the creation of unified fields of activity for nurses with extended roles. On the part of the intensive field, there is an increasing openness to the presentation of new roles, but there is still no uniform consensus here. Several sections of the Healthcare Professional College (advisory body to Minister of Health), especially the Nursing and Midwifery Section, have dealt with the issue many times in the past and are open to contributing to the creation of independent legislation in the field of nursing.

Conclusions

To maintain the new education program for APN needs further effective measure beside the scholarship supportive program. Communication with nurses and with society in general might be key factors to get to understand the new function and competences of newly graduated nurses. On the other hand, the health policy makers have to define new roles in the health care system for APN in a wider context, covering community and geriatric care, intensive and emergency fields in the first row. This should include clear legal background, responsibility, and accountability for the predefined new tasks. Professional evidence-based guidelines and protocols helping APNs should be adopted and implemented in the health care system nationwide [17]. Budgeting and reimbursement for the services related to nursing care might play an important component in this question, too.

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Nurse Prescribing in Polish and International Perspective

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Introduction

The prescribing of nurses in some regions of the world has a long tradition [1,2]. It started in the United States of America (USA) in the 1970s and now covers almost all countries in the regions of the World Health Organisation (WHO) [3,4]. Traditionally, prescribing medications was considered the domain of physicians, and the term “medical prescribing” has always been associated with a doctor with appropriate qualifications and authorisations in this field [5,6]. However, the dynamic development of medical sciences has made nursing a more complex profession, requiring specialised knowledge and skills to professionally manage patient care [7]. This influenced the development of nurses’ professional independence and led to the practice of a new professional qualification. A new term “nonmedical prescribing” has been defined, which comes from the UK and refers to medical professions other than doctors, mainly nurses, optometrists, pharmacists, physiotherapists, podiatrists, and radiologists, working within their clinical competences carrying out independent or complementary prescribing drugs [1,5].

The international trend with a growing demand for care and treatment services, combined with growing budget and staff constraints, had a major impact on this issue. The need to reserve doctors’ qualifications for more complex cases and the underutilised competences of well-educated nurses were also pointed out [1,8,9]. Long-term efforts of the nursing community to expand nursing qualifications were also important [10,11]. All this resulted in the successful incorporation of prescriptions into the competencies of a modern nurse [215]. This is an example of changes

taking place in the nursing profession in recent times, because in many countries nurses are given new and more responsible tasks [5].

Expanding nurse prescribing authority plays an important role in improving health care outcomes by:

- improving the effective and efficient delivery of health care services;
- providing more integrated patient care, thereby improving the overall quality of health care;
- increased professional prestige, increased self-confidence, and professional satisfaction [11].

The scope of powers related to nursing prescriptions varies from country to country, as it is based on different jurisdictions and regulations that regulate different levels of legislation in individual countries and cover many aspects of the operation of the subject area of nursing work in a given country and are adapted to the qualifications held and competences [1,12,13]. Furthermore, the prescription of nurses is sensitive to the context of the country and the health care culture in which it is developed. Therefore, the approach to defining and implementing nurse prescribing varies from country to country. Cultural traditions and the status and prestige of the profession shaped in a given country also have influence. These models usually differ in the level of competence of the nurse and the depth of decision-making and responsibility [2,5].

New legal regulations on nurses' prescriptions in Poland were introduced in January 2016 and authorised them to issue prescriptions for medications and food-stuffs for particular nutritional uses, to issue referrals for a number of specific diagnostic tests, and to issue orders and prescriptions for reimbursements for medical devices [14,15]. In Poland, the extension of the above-mentioned rights for nurses was a 'novelty', but in many countries it has been a long-established competence assigned to the nursing profession (Fig. 1), [1,2,5,6,16].



Fig.1. Implementation of nurse prescribing throughout the world over the years [1,2,5,6,16].

Prescribing is a complex process, and the successful implementation of expanded powers requires a favourable regulatory and political environment, management structures, organisational culture, appropriate education, and professional development. The guidelines of the International Council of Nurses (ICN) on the authorisation to issue prescriptions to nurses indicate the importance of appropriate regulations and systemic solutions as the main supporting and helpful factors in eliminating emerging barriers. The ICN therefore calls on governments to ensure appropriate levels of education and regulation of the profession to provide the basis for expanding nurse prescribing around the world [1].

The power to prescribe should be treated as continuous. As nurse independence and responsibility for prescribing authority increases, so does the need for higher levels of education, continuing professional development, and regulatory mechanisms to confirm the achievement of a baseline level of competence [5,6].

Methodology

The purpose of the study was to analyse the legal and educational documents to expand nurses' prescription writing rights from both the Polish perspective and that of other countries. The following search engines and databases were used: Web of Knowledge, Web of Science, PubMed Central, Medline, Scopus, and Google Scholar, as well as the Internet Legal Act System. Words and phrases were input into the aforementioned databases, producing sentences aligned with the content and objectives of this research, both in Polish and English. The literature review was conducted on the basis of existing scientific publications in this domain.

Legislation on Nurse Prescriptions

Prescribing authority for nurses is most often granted by national or regional laws or by other government bodies (e.g. Ministry of Health) [1]. The expanding scope of practice reflects the ongoing evolution of nursing practice, primarily in response to national needs to improve efficiency or alleviate physician shortages [1,5,11]. The ICN literature review identified 44 countries in five WHO regions that have formal laws or regulations that allow nurses to prescribe medications. Of these, 31 countries (70%) formally allow nurses to prescribe medications after obtaining a diploma in nursing (bachelor's degree) and 13 countries (30%) only allow nurses to prescribe medications at the advanced practice level. 25% of countries allow both the diploma and advanced practice levels [1].

Throughout the world, regulations on nurse prescribing have been evolving over the last decades. In the United States, prescribing increased significantly in the late 1980s and early 1990s and was associated with an increase in the scope of nursing practice and the need to establish activities to support nurse prescribing. In the UK, the 1992 Act allowed nurses to prescribe medicines after completing post-basic education. At the turn of the 21st century, prescribing by nurses continued to develop in Canada, Europe, Australia, and New Zealand, and legal regulations were established at the state or government level of a given country. This also applied to Africa and was mainly related to the need to conduct antiviral therapy among HIV/AIDS patients. In Spain, nurse prescribing was incorporated by a law in 2009 [1,17,18]. When developing the legal basis for the extension of nursing rights, the shortage of health care workers and the desire to improve the financial and organisational efficiency of the health care delivery system in a given country were taken into account [1].

Countries of North and South America

These countries have a long history of statutory prescribing powers for nurses, primarily for nurse practitioners. In the USA nurses acquire qualifications at the state, not the federal level, and each state has its own legal acts in this area. Nurse prescribing is associated with the rise of the Advanced Practice Registered Nurse (APRN). Currently, all 50 states and the District of Columbia allow independent prescribing by advanced practice nurses. Canada also has extensive rights in this area, but only for practising nurses, while in the provinces of Alberta and Ontario they are also granted to registered nurses [1,9,17,19]. It is similar in Latin America. Brazil, Colombia, and Mexico allow nurse practitioners to prescribe medicines, mainly in primary care and public health settings, while the Caribbean allows advanced practice family nurses in primary care. In Belize, the prescribing authority is applied to psychiatric nurses and is limited to psychotropic medications. The situation is completely different in Jamaica, where, despite a developed educational programme, practice nurses cannot still legally prescribe drugs [1,20].

European countries

As far as the countries of the present and former European Union are concerned, the pioneer was the United Kingdom about 30 years ago, then other countries joined, where most of the scope of drug prescribing is limited to varying degrees. Only

Ireland, the Netherlands, and the United Kingdom have granted nurses full powers in this area [1,5]. In Great Britain, the initiator of expanding nursing practice to include prescribing medicines was the nursing community. The first act on the possibility of prescribing medicinal products came into force in 1994 and referred to medications from the formulary for district and community nurses. These rights were extended in 2002 to a larger group of nurses and also included the list of medications and the number of therapeutic indications [1,8,16,18]. In Ireland, in 1998, attention was first drawn to the need to introduce the power to prescribe medicines to nurses and midwives. In 2001, a review of international regulations regarding the prescribing of drugs by nurses/midwives was prepared to examine the possibilities of introducing such a solution in Ireland. In addition to the obvious benefits related to easier access to health services, additional factors were identified that favoured the adoption of legal solutions in the field of prescribing by nurses, e.g., diabetes care, improvement of the level of medical services, and sociodemographic changes, an ageing society [1, 5,18,21]. Changes in the Dutch legal system that have been taking place for several decades have led to an amendment to the Health Act on Individual Professions. As a result of the changes, nurses gained the right to perform medical services previously reserved for physicians. From January 2012, they obtained the right to prescribe drugs in their professional areas, and in February 2014, nurses specialising in the care of patients with diabetes and lung diseases also obtained these rights. Since September 2014, this law also covers nurses caring for oncology patients [16,18]. In Sweden, the main justification for giving nurses the ability to prescribe drugs was to improve the quality of care for patients, reduce the workload of doctors, and facilitate access to physicians for patients in remote areas of the country. A pilot programme for Swedish nurses was conducted in 1988, and since 1994 all community nurses have been authorised to prescribe [1]. In Sweden, the drug list contains approximately 230 drugs. In the UK, this depends on the nurse's qualification category. In the initial period, as in Poland, they could only prescribe drugs from a limited list. Currently, nurses with independent qualifications can prescribe drugs from the full British National Formula for all therapeutic indications in their area of competence (over 250 active substances, including controlled substances) [22,23]. In Ireland it is similar, and the most commonly prescribed medications are painkillers and anti-inflammatory medicines, vaccines, and antibiotics for adults. Dutch nurses are authorised to prescribe medicines in their area of expertise. The demographic changes in Dutch society and the large number of people with diabetes mean that nurses are highly involved in the care and prescribing of medications for these patients. However, countries such as Spain, Norway, Estonia, and France have limited lists of drugs that nurses can prescribe [1,5,21].

Western Pacific countries

Both Australia and New Zealand have established regulations that allow post-basic and practice nurses to prescribe medications. In Australia, as in other countries, the main factor that was taken into account when extending nurses' licences was to improve the efficiency and effectiveness of providing medical services to patients, especially those who live in remote areas where access to a doctor is difficult. The New Zealand government has implemented nurse prescribing powers, allowing nurses specialising in the care of elderly patients, as well as in family medicine and paediatrics, to prescribe medicines in their area of expertise based on an approved list of medicines. New Zealand initially allowed the prescription of medications in diabetes clinics, but this was expanded over time [1]. Singapore and South Korea allow the prescribing of advanced practice nurses [1,24].

African countries

About ten countries in Africa have laws that allow nurses to prescribe medications. In countries with limited resources in the health care system and underfinancing of the health care sector, nurses assign prescriptions with basic qualifications in this field [1]. This situation occurs in poor African countries due to staff shortages, high population growth, and spreading diseases - especially HIV/AIDS. Therefore, an initiative that has developed significantly over the last 20 years and has been adopted on a large scale is Nurse-Initiated and Managed Anti-Retroviral Therapy (NIMART). For the most part, post-basic nurses can legally prescribe medications, while Botswana and South Africa allow this privilege for APNs. Regulations that allowed the prescription of antiviral drugs by nurses in Malawi, Tanzania, Ethiopia and Zambia resulted in an increase in the number of patients receiving antiviral treatment and a decrease in mortality, which confirms the regulations adopted in this area [1,26]. In turn, in Uganda, nurses prescribe morphine due to the large number of cancer patients and difficult access to a doctor [1,11,22,23,25].

Poland

The legal basis for granting nurses the right to write prescriptions is specified by the Act of 15 July 2011, on the professions of nurse and midwife [27]. The issue is regulated by Art. 15a-15b, which were added to the above Act by the Act of July

22, 2014, amending the Act on the professions of nurse and midwife and certain other acts [14]. The Act to amend the Act on the professions of nurse and midwife (parliament paper no. 2504/VII cad.) was a project introduced by the Council of Ministers and, at the draught stage, received a positive opinion from the President of the Supreme Court of the Republic of Poland, the Prosecutor General and the Inspector General for Personal Data Protection [28]. This project was submitted to the Sejm on June 18, 2014, was voted on three times, and after the approval of the President of the Republic of Poland, the act was published in the Journal of Laws on August 27, 2014 (Journal of Laws, item 1136) and entered into force on September 11, 2014. The legal act in question extended the professional rights of nurses and midwives with a second cycle diploma to independently prescribe certain medications, including preparing prescriptions for them. Article 4 of the Act amending the Act on the professions of nurse and midwife regulated prescriptions for medicines containing specific active substances and for foodstuffs intended for particular nutritional uses, prescriptions and orders for specific medical devices, and referrals for specific diagnostic tests referred to in Art. 15a of the amended Act may be issued by authorised nurses and midwives no earlier than January 1, 2016 [14].

The new entitlement for Polish nurses can be exercised in two forms. As independent prescribing by a nurse and as issuing a prescription as a continuation of treatment previously ordered by a doctor. According to Art. 15a Section 1 of the Act on the professions of nurse and midwife, as part of the independent provision of preventive, diagnostic, therapeutic, and rehabilitation services, a nurse and midwife have the right to independently:

- prescribe medicines containing specific active substances, excluding medicines containing strong substances, narcotic drugs, and psychotropic substances, as well as foodstuffs for particular nutritional uses, including issuing prescriptions for them;
- prescribe specific medical products, including issuing orders or prescriptions for them [14,29].

A nurse who has a master's degree in nursing and has completed a specialist course in this field, or a nurse who has a specialist title in nursing and has completed a course in this field, is authorised to independently prescribe prescriptions in Poland. A nurse with at least a first-cycle diploma, after completing a specialist course in this field, can write prescriptions as a continuation of treatment previously ordered by a doctor. In this case, the requirement to complete the course does not apply to orders for medical devices. However, in the case of independent prescription of drugs and medical devices, it is mandatory to perform a physical examination and document its results in the patient's medical record [14,15].

The extension of nursing qualifications resulted in the need to introduce changes in education standards in the field of nursing. The obligation to complete a specialist course does not apply to nurses and midwives who acquired the knowledge during study (according to the announcement by the Ministry of Health, started first-cycle studies from the 2016/2017 academic year or started second-cycle studies from the 2017/2018 academic year) [15,30]. In most Western European and Anglo-Saxon countries, nurses acquire a deep knowledge of drug prescribing during undergraduate and postgraduate studies, but related issues are included mainly in regular curricula at the master's level [6,31]. In Ireland and the United Kingdom, nurses obtain appropriate qualifications through independent bachelor's level courses, but in the United Kingdom the range of drugs that a nurse can legally prescribe depends on the category of qualifications held [2,5,32].

Generally, prescribing nurses in Poland can prescribe medicines containing specific active substances, excluding medicines containing very potent substances, narcotic drugs and psychotropic substances, foodstuffs for particular nutritional uses, and medical devices. However, the term "specific active substances" applies only to drugs and products indicated in the list of the Minister of Health, which concerns 31 active substances (anti-emetics, anti-infectives for local use, gynaecological anti-infectives, drugs for anaemia, some antibiotics, local anaesthetics, analgesics), anxiolytic, antiparasitic, bronchodilator, vitamin D3, and fluid infusions) [33].

At this moment, the regulation of the Ministry of Health of January 18, 2018, is still in force, indicating in detail the list of active substances for which nurses and midwives can issue prescriptions independently [33]. However, there is already a draught regulation of the Health Minister, which introduces an extension of the list of active substances contained in drugs and medical devices prescribed by nurses and midwives, as well as the list of diagnostic tests for which nurses and midwives have the right to issue referrals. The new version of the regulation expands the list of substances that nurses and midwives can prescribe in their independent practise to include furazidone, trometamol-containing fosfomycin, silver sulfathiazole, and octenidine with phenoxyethanol. In their comments on the project of the Ministry of Health, nurses and midwives ask for a very significant extension of the list of medicinal products for self-use. An example is the position of the Polish Society Nurses of Palliative Care (Annex No. 5 to the Regulation of the Minister of Health of January 18, 2018, item 299, tab.1), [34].

Table 1. List of active substances contained in medicines that may be prescribed by nurses as referred to in article 15a paragraph 1 of the act of July 15, 2011, on the professions of nurse and midwife, and for which nurses have the right to issue prescriptions upon obtaining the title of

palliative care nursing specialist.

No	Group of medicines	Active substances	Form and route of administration
1.	Opioid painkillers	Morphine Oxycodone Oxycodone + naloxone Buprenorphine Fentanyl Tapentadol Dihydrocodeine Tramadol	All available forms of the medication
2.	Non-opioid painkillers	Metamizole Paracetamol Ibuprofen Ketoprofenum Dexketoprofen Celecoxibum	All available forms of the medication
3.	Spasmolytic drugs	Hyoscine butylbromide Drotaverine hydrochloride	All available forms of the medication
4.	Anti-edematous drugs used in compression syndromes	Dexamethasone	All available forms of the medication
5.	Antiepileptic drugs used as coanalgesics	Pregabalin Gabapentin	Oral application forms
6.	Drugs used to prevent gastrointestinal ulcers and active bleeding from the upper gastrointestinal tract	Pantoprazole Dexlansoprazole Esomeprazole	All available forms of the medication
7.	Antihemorrhagic drugs	Etamsylate Tranexamic acid	All available forms of the medication
8.	Antiemetics with prokinetic effects	Metoclopramide hydrochloride Itopride hydrochloride	All available forms of the medication
9.	Antipsychotics	Haloperidol Quetiapine Chlorpromazine Levomepromazine	All available forms of the medication
10.	Anti-anxiety medications	Lorazepam Alprazolam	All available forms of the medication
11.	Sedatives, anxiolytics, anticonvulsants.	Midazolam Diazepam	All available forms of the medication
12.	Antidepressants used as coanalgesics	Amitriptyline hydrochloride Duloxetine Trazodone hydrochloride	Only oral forms
13.	Appetite stimulants	Megasterol acetate	Only oral forms
14.	Diuretics	Furosemide	All available forms of the medication
15.	Minerals	Potassium	Only oral forms

The new competencies for nurses are undoubtedly a great honour and prestige for the profession, but they are also a great responsibility. They require substantive and organisational knowledge and skills from nurses. The new powers oblige us to perform all procedures with due diligence and in accordance with the principles of professional ethics, respecting the patient's rights, protecting his safety, and using current medical knowledge. In the event of an error while prescribing prescriptions, civil liability applies, and, in the event of committing a crime, even criminal liability. In addition, nurses are subject to professional liability in the court of nurses and midwives [1,11,14].

The issue of "nursing prescriptions" aroused many concerns and controversies in the public debate long before they were legalised. Nurses themselves initially approached the new authorisations with great reservations [10,35,36]. According to data from the National Health Fund (NFZ), in 2016, nurses issued less than 100 prescriptions in Podkarpacie. However, the number of nursing prescriptions increased steadily from month to month. By June 2020, 2,523 nurses and 321 midwives applied to the National Health Fund for unique prescription identification numbers. By October 2020, nurses issued 1,972,620 prescriptions and midwives 50,012 as follow-ups to medical recommendations, while nurses issued 25,837 prescriptions and 621 midwives as independent orders. Furthermore, under *pro-familiae* and *pro-auctore* prescriptions, nurses and midwives issued more than 12,000 prescriptions in total. Data from the Ministry of Health at the end of 2020 show that a total of nearly eight thousand nurses and midwives in Poland issue prescriptions for reimbursed drugs [10,37]. Furthermore, the authors of the study indicate that two years after legalising nursing prescriptions, a five-fold increase in the number of nursing prescriptions was observed [11].

Since the beginning of 2020, electronic prescriptions have been a common mandatory form of prescription in Poland. In justified cases, it is also possible to issue a prescription in paper form. This also applies to nurses and midwives. The rights of nurses to provide advice through IT channels and issue prescriptions in electronic form have been accepted by patients and widely used during the COVID-19 epidemic [38]. In 2022 (based on information from the Centre for e-health), nurses and midwives issued 6,628,447 e-prescriptions [39]. In Poland, supervision over the writing of prescriptions by nurses and the validity of prescriptions are regulated by the Chamber of Nurses and Midwives, while the National Health Fund supervises the justification for reimbursement of prescriptions.

Summary

Although regulatory approvals vary widely by region and country, it is clear that nurse prescribing is an important and constantly evolving phenomenon. And importantly, it is not limited only to high-income countries, but also allows the above rights in low- and middle-income countries, where most of us deal with nursing at a general level [1].

The role of nurses in health care in acquiring competences in prescribing drugs is described as an investment that brings tangible benefits for patients, nurses, and the entire health care system.

The granted authorisations should be considered as a specific continuum, independence and responsibility, which require appropriate levels of education, continued professional development, and the provision of mechanisms to verify the level of competence achieved.

The introduction of prescription writing by nurses is not a one-off solution, but an evolving practise that requires continuous supervision, appropriate legal regulation, appropriate selection of teaching staff, and an appropriately developed education system. New authorisations are the basis for greater autonomy and prestige of the profession [1,10,11].

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Analysis of Nurse Prescribing of APRN's in Anglo-Saxon countries

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Introduction

The trend in healthcare worldwide is now towards cost savings. Many governments see a possible policy solution to this challenge as delegating specific previous medical duties to nurses [1-3]. Delegation aims to deliver health services well and efficiently while improving the quality of care. It is also an effective strategy to alleviate the worldwide shortage of doctors [1-3]. However, in recent decades, there has been an academization of the nursing profession, with the emergence of APRNs at a professional level in several countries outside the USA, which has led to a significant expansion of competencies [3-4].

The two processes mentioned above - the substitution of specific previous medical duties and the academicization of the nursing profession - have resulted in nurses emerging in a completely new role compared to the previous ones, e.g., Clinical Nurse Specialists (CNS) or Nurse Practitioners (NP) within the group of Advanced Practice Nurses. There are now clinics where professional management and practice are carried out exclusively by Nurse Practitioners (NPs) [4-5]. Since there will continue to be a growing shortage of doctors worldwide and demographic indicators clearly point to the problem of an ageing society, we must expect that the delegation of physician

duties will continue in the future [6-7]. One of the critical stages in the delegation of responsibilities has been the sharing of the right to prescription/medication ordering with nurses, which was previously the exclusive responsibility of physicians. Implementing this change was initially particularly noticeable in primary care, as in practices and clinics run by Nurse Practitioners (NPs), prescribing is essential to efficient and effective comprehensive patient care [7-8].

Prescribing medication

Prescribing is a central component of modern medicine [8-11].

Since prehistoric times, humanity has tried to avoid, treat, and combat diseases using substances from their immediate environment. The risks associated with the use of medication - addiction and adverse side effects - have only multiplied with the increase in the number of pharmaceuticals, made possible by the rapid development of modern chemistry [12].

Inappropriate prescribing can cause serious health harm to the patient and carries a significant fiscal risk to society [13-14]. Given its significant role in medicine, it is associated with considerable prestige, and society looks up to those authorized to prescribe [15].

From the publications of Van der Geest et al. [16], and Britten [17], we understand that prescribing is a delicate matter, both from patient safety and a demonstration of power perspective; the authors' publications describe how prescribing confers a specific power and authority on the prescriber in the eyes of society, which thus provides the "uninitiated" with an opportunity to obtain what they desire.

Aim: The aim of this study is to provide an overview of nurse prescribing practices in Anglo-Saxon countries.

Methods

The literature research for the current review about the nurse prescribing practice was conducted using multiple databases (PubMed, Embase, CINAHL, Web of Science, EBSCO Academic Search Elite) to find relevant articles published between January 2000 and December 2022.

Inclusion criteria: Scientific publication about the legal possibilities of Bachelor and Master level nurses prescribing practice in Anglo-Saxon countries. **Exclusion criteria:** publications, which focussed on legal nurse prescribing in countries other

than Anglo-Saxon countries, were conducted about prescribing of medical equipment or supplies or focussed on the grey zone of nurse prescribing.

The following keywords were used to search for relevant publications: “nurse prescribing”, “independent (nurse) prescribing”, “autonomous prescribing” “supplementary (nurse) prescribing”, “dependent (nurse) prescribing”, “collaborative prescribing”, “nurse prescribing based on patient group” written in English language.

Results

Non-doctor (paramedical) prescribing

From the second half of the 19th century, most medications became prescription-only, with prescribing being the privilege of doctors [18-20]. The growing trend towards sharing medical responsibilities with other healthcare professionals (mainly nurses) has also led to the privilege of prescribing medication being shared with non-doctor (paramedical) professionals [21]. Non-doctor or paramedical prescribing defines the practice of prescribing whereby healthcare professionals, but not physicians, prescribe medications and devices that are subject to prescribing requirements [22-23]. This type of prescribing is becoming increasingly common in the healthcare practice of countries and is mainly understood as prescribing by nurses, pharmacists, physiotherapists, and midwives [24-25].

Nurse prescribing

Over the past 20-30 years, nurse prescribing has emerged in a growing number of countries, yet to this day, no definition encapsulates the concept in a well-defined way, but rather an ‘umbrella’ term that refers to a variety of practices. For example, when we talk about nurse prescribing, we mean a nurse with a BSc qualification or a nurse with an MSc or PhD qualification authorised to prescribe certain medications.

In addition, based on related literature, three separate types of nurse prescribing can be distinguished [26-28].

1. Nurses authorized to undertake independent prescribing, legally licensed to practice autonomously, are usually responsible for activities such as physical examination of the patient, establishing the diagnosis, making responsible clinical decisions about the choice of medication and dosage, and then issuing the

prescription [29-30]. Independent prescribing can occur from a specific, defined list of medications (a limited number of medications) or in a so-called “open” form, where all elements of the list of medicines are subject to prescribing rights. Its related terms (synonyms) are: ‘initial prescribing,’ ‘autonomous prescribing,’ ‘substitutive prescribing,’ and ‘open prescribing’ [30-31].

2. Supplementary prescribing

Supplementary prescribing is a voluntary collaborative practice between an independent prescriber (usually a physician or dentist) and a nurse or pharmacist with supplementary prescribing rights. Once the patient’s condition has been assessed and the diagnosis established by an independent prescriber, the nurse or pharmacist with supplementary prescribing rights may prescribe a medicine from a restricted or unrestricted list of medicines and collaborate and consult with the independent prescriber before issuing a prescription, even if direct supervision is not required. [26-27,30-32].

3. Nurse prescribing based on patient group

Previously known as prescribing under group protocols, this refers to a specific medicine being prescribed in a well-defined, identifiable situation based on the written instructions of an independent prescriber.

This practice of prescribing is carried out according to a protocol designed by a multidisciplinary team specifically for a group of patients with a particular condition, thus excluding independent prescribing [33].

United States of America

Nurse prescribing has been in place in the USA since the 1960s. Its development was initiated to reduce the burden on physicians and to address the needs of patients in remote areas with low population density [30].

In the US, nurse prescribing has evolved with the role of the Nurse Practitioner (NP) and the Nurse Midwife (NM), with NPs being granted prescribing privileges in 1969 and the Board of Nursing for the state regulating prescribing practices in each state. Initially, they were only authorized to provide supplemental prescribing, and since then, there have been states that have changed this practice to allow independent prescribing, however, there are some states where supplemental prescribing practices remain in place today. The right to prescribe has been extended over time to prescribe addictive medications [34].

The following figure analyses the independent prescribing privileges of Nurse Practitioners (NPs) in all 50 US states [35].

The data in the figure shows that Nurse Practitioners (NPs) are authorised to practice independent prescribing in about half of the Member States, with the other 25 or so Member States retaining supplementary prescribing, but all states grant some form of prescribing privileges for NPs.

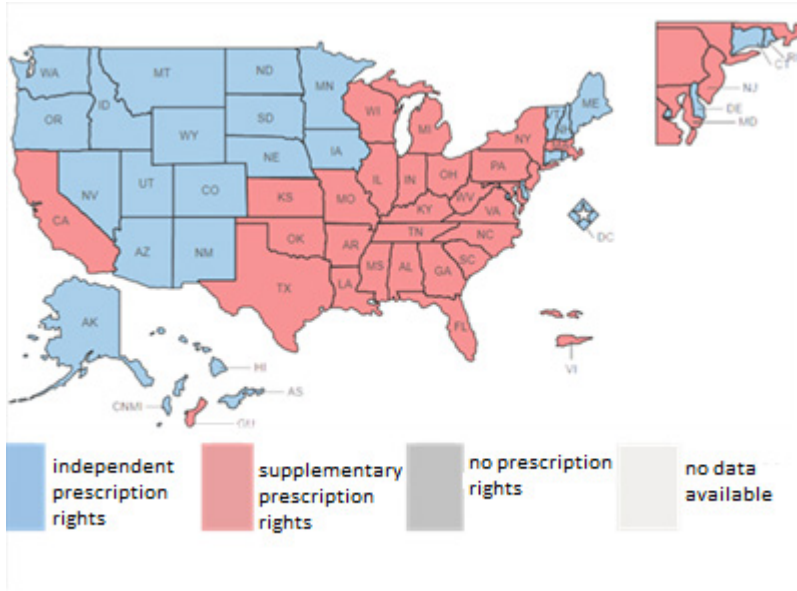


Figure 1 Nurse Practitioners (NPs), Independent Prescribing Privileges in the 50 US Member States

Australia

In Australia, Nurse Practitioners (NPs) have been involved in providing care since 1998, and by 2001, legislation had been passed to grant nurses prescriptive authority [36].

Nurse Practitioners (NP) with a master's degree will automatically receive the license to prescribe medication with their education. The license must be annually renewed before the Nursing and Midwifery Board of Australia, which is authorized to issue the license. 20 hours of continued professional development must be completed per year to maintain their license, 10 hours of which must include prescribing and administration of medications, diagnostic investigation, and referral.

As of September 1, 2010, nurse professionals required by state or provincial law, i.e., Nurse Practitioners (NPs), may act as independent prescribers.

Medications that can be prescribed by Nurse Practitioners (NPs) are marked "NP" in the Pharmaceutical Benefits Scheme (PBS).

No other medications can be prescribed by nurses, whose activities may be limited by state and territorial prescribing requirements.

The list of medications that can be prescribed by Nurse Practitioners (NPs) is thus contained in the Pharmaceutical Benefits Scheme, from which - due to its length (over 1000 pages) - it was not feasible to extract the list of medications that NPs can prescribe.

Canada

APN role was introduced in the 1970s. At the same time, the recognition of the APN role in Canada began to be developed and promoted. Their role was marginal until the 1990 health care reform when the number of APNs grew in Canada. The role was initially designed to assist and meet the needs of community care in the country (as in England, it first emerged in community care). Since then, the APN role in Canada has been represented by the Nurse Practitioners (NPs) and the Clinical Nurse Specialists.

In Canada, the most common and growing APRN role is the role of Nurse Practitioners (NPs). They have extended authority and can diagnose, order, and interpret diagnostic tests.

While Nurse Practitioners (NPs) are not limited to prescribing medications from predetermined lists, even for certain controlled substances, but can independently prescribe the full spectrum of medications, Clinical Nurse Specialists can only prescribe medications in isolated cases.

One of the reasons for the expansion of competencies was the country's geography, as Canada is a large country with many sparsely populated parts, and the role of Nurse Practitioners (NPs) with the prescriptive authority of controlled medications is essential for the pain management of the people living there.

The other main reason cited in the literature is that in Canada, Nurse Practitioners (NPs) can practice most effectively and cost-efficiently when they can practice in the full scope of their competencies, including prescribing medications.

The Canadian Nurse Practitioner Core Competency Framework (CNA 2010) for educating Nurse Practitioners (NPs) needs to address the practice of prescribing adequately. Many believe there is a need for a comprehensive, national protocol that could help university lecturers prepare students for prescribing competency in a safe way, regardless of where they work in Canada.

Further recommendations for expanding the curriculum include the practice of prescription safety, the composition of medicines and

ethnopharmacology, and the study of how genetic and cultural factors influence the use of and response to pharmacological treatments. Education is also aimed at preventing the adverse effects of drugs. In particular, it would be essential to incorporate it into the curriculum of Canadian Nurse Practitioners (NPs) because of the ethnic and cultural diversity of the Canadian population. Recommendations have been made to United Nations educational programs to incorporate prescribing education as part of their curricula. This strategy has yet to be implemented; consequently, there is no quantitative data on its potential benefits [36-37].

New Zealand

In New Zealand, it is not only Nurse Practitioners (NPs) who can prescribe medicines; prescribing has been enabled at several levels nationally to ensure that patients have the most accessible possible access to their medication [38].

Prescribing eligibility is divided into 3 groups:

1. Nurse Practitioners (NPs) are authorized to prescribe any medicine or type of medicine as independent prescribers without any regulatory restrictions.
2. Registered nurses in primary care and special teams may prescribe medicines from a predefined formulary for patients with chronic conditions.
3. Registered nurses in community care can prescribe medicines from a specific formulary since 2017.

1. According to the legislation for the first category, the educational requirement is an MSc-level Nurse Practitioners (NPs) degree

2. For a nurse with at least a BSc degree to be enabled with the authority to prescribe medications, they will need to do the following:

- At least 3 years of full-time professional experience in the field of practice in which they wish to undertake their pharmaceutical prescribing practice in New Zealand,
- Completion of an approved postgraduate course in prescribing (minimum 1200 hours of theory and 150 hours of practical training)
- Completion of a prescribing internship with a person with prescribing authority and demonstration of competence by a mentor and 12 months of formal or informal supervision by a person with independent prescribing rights
- prescribable classes of medicines: DM, hypertension, respiratory conditions e.g., asthma, COPD, anxiety, depression, cardiac problems, palliative care medicines, contraceptives, vaccines, infections, skin problems, gout

3. Registered nurses in community care must meet the following educational requirements. Pilot project since 2017, planned for a year pilot period, after which they would like to conclude.

- At least three years of full-time professional experience in the field of practice in which they wish to undertake their pharmaceutical prescribing practice in New Zealand,
- Completion of an approved postgraduate course in prescribing (minimum 1200 hours of theory and 150 hours of practice), completion of a prescribing internship with a person with prescribing authority and demonstration of competence by a mentor and 12 months of formal or informal supervision by a person with independent prescribing authority
- prescribable classes of medicines: general dermatological problems, ear infections, sore throats, general sexually transmitted infections, contraceptives, low-acting analgesics, and chronic medicines for rheumatism [38].

United Kingdom

In the United Kingdom, the scope of nurse prescribing for Nurse practitioners (NPs) was extended in the late 1990s, although the roots of nurse prescribing date back to the late 19th century.

There are two types of nurse prescribers in the United Kingdom, together with a category of nurse prescribers whose primary qualification and area of practice is midwifery (registered midwives) [39].

1. Community Practitioner Nurse Prescribers (CPNPs)

This term refers to registered nurses at the BSc level who have successfully completed the relevant course (so-called v100 or v150 course), mainly community nurses, district nurses, and public health nurses, previously known as health visitors and school nurses.

These prescribers can prescribe medications independently (without a physician's collaboration) but only from a specific formulary. The list is called the Nurse Prescriber's Formulary Community Practitioners (the name is misleading; these nurses are Practitioners but not so-called Nurse Practitioners (NPs)). The most striking difference between the two groups being that while Registered Nurses with the right to prescribe medications in community nursing have a BSc degree, for Nurse Practitioners (NPs), the minimum qualification is an MSc level).

2. Nurse Independent Prescribers (NIP)

To obtain the qualification, the NMC Independent Nurse Prescribing Course (also known as v200 or v300 course) must be completed, which costs around £1,700 and is a 4-month course comprising 90 hours of direct contact hours at the university, 18 days of home preparation with e-learning modules and 12 days (78 hours)

of supervised practice with a doctor or nurse/midwife already working as an independent prescriber.

Professionals who have completed the course (entry only with MSc level (6 or 7 level course) will be entitled to use the full British National Formulary, including the controlled substances Schedules II-V. (Schedules II. (Vicodin), cocaine, methamphetamine, methadone, hydromorphone (Dilaudid), meperidine (Demerol), oxycodone (OxyContin), fentanyl, Dexedrine, Adderall, and Ritalin, Schedule III.: substances containing less than 90 milligrams of codeine per dose (Tylenol with codeine), ketamine, anabolic steroids, testosterone, Schedule IV. lower risk of addiction than the first three categories, Xanax, Soma, Darvon, Darvocet, Valium, Ativan, Talwin, Ambien, Tramadol, Schedule V. with relatively low addiction index: cough suppressants containing less than 200 mg codeine/100 ml (Robitussin AC), Lomotil, Motofen, Lyrica, Parepectolin) [40-43].

Conclusion

As shown in the Latter and Courtenay study [44], patients also prefer nurse prescribing. However, an essential message to nurses and policymakers is that nurses with prescribing privileges were more satisfied with their profession because of their increased autonomy, reducing the career abandonment rate [44-47], so the legislative provision of prescribing practices would be worth considering for any country facing a shortage of nurses.

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Directions of Development and Potential Use of Larval Therapy in Vascular Etiology Wounds Located in the Lower Extremities

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Introduction

The advancement of medicine and access to advanced treatment methods present an interdisciplinary challenge for healthcare professionals in providing comprehensive care to patients with hard-to-heal wounds. Predictions regarding the epidemiology of lifestyle-related diseases such as diabetes, cardiovascular diseases, and obesity are highly unfavourable. The incidence of these diseases, especially diabetes, which may affect over 500 million individuals worldwide, poses a significant medical and socio-economic problem [1]. Skin and subcutaneous tissue destruction in the lower extremities due to vascular diseases such as chronic venous insufficiency (CVI), diabetic foot ulcer (DFU), and peripheral artery disease (PAD) is a global issue affecting an increasing number of chronically ill patients. Venous leg ulcers (VLU) are the most common type of hard-to-heal wounds in the lower extremities. They are identified as damage to the dermis located between the knee and ankle joints. The etiopathogenesis is primarily associated with chronic venous insufficiency, although it may also have a mixed component related to ischemia, corticosteroid therapy, and diabetes. Prolonged healing times and a high risk of recurrence increase treatment costs, absenteeism from work, and contribute to pain and suffering. This significantly impacts healthcare and its resources, accounting for approximately 23–50% of nurses' work in primary healthcare settings [2,3]. Wound treatment is a multi-stage process that begins with a comprehensive diagnosis based on biochemical,

microbiological, imaging, and, in selected cases, histopathological examinations conducted by a prepared interdisciplinary team in which nurses play specific roles [4,5]. Experts emphasize the need for the implementation of comprehensive interdisciplinary care to improve the quality of life of patients and expand knowledge about prevention. Broadly understood primary prevention, a developed network of highly specialized facilities dedicated to treatment using compression therapy, pharmacotherapy, surgical methods for removing superficial veins, and closing obstructed connecting veins, as well as specialists providing care and education for individuals with hard-to-heal wounds, are recommended. Local treatment of venous leg ulcers should follow the TIMERS strategy, which includes tissue development, wound infection control, maintenance of proper moisture, and epidermal stimulation [6,7]. Concepts of local wound treatment (TIMERS and wound hygiene consensus) emphasize wound debridement, which should be performed as quickly as possible to reduce bacterial load and stimulate the physiological formation of granulation tissue [8,9]. Both Polish [10,11] and global reports [12,13] recommend this method. The use of biodebridement is gaining increasing recognition among experts dealing with chronic wound issues in the era of “antibiotic resistance.” Maggot Debridement Therapy (MDT) is used to treat hard-to-heal wounds of various aetiologies. The method was approved by the U.S. Food and Drug Administration (FDA) in 2004 [13]. In recent years, there has been growing interest in this treatment method in Poland, where many doctors and nurses see greater potential for faster, safer, and more cost-effective wound cleansing and revitalization. It is acknowledged that R.A. Sherman, who opened a laboratory at the Veteran Administration Hospital Medical Centre in Long Beach, California, in 1990, is a pioneer in larval therapy in its current application. His team conducted a prospective study involving patients with pressure ulcers following spinal cord injury, demonstrating that wound debridement was more effective and required less time compared to conservative methods, while maintaining safety measures and a sterile larval culture [14,15]. In the last decade, medical maggots of *Lucilia sericata* have been referred to as “medical miracle maggots” due to various biochemical properties that stimulate wound healing processes.

The key issue arising from the concept of wound debridement is the wound cleansing process, defined as the removal of foreign contaminants and dead or devitalized tissue [16]. Medical personnel authorized to treat wounds (doctors, nurses) may employ various methods in clinical practice, including autolytic, sharp, physical, and surgical methods. One of the “old” wound treatment techniques involves the use of medical maggots. Maggot Debridement Therapy (MDT) is also referred

to as biodebridement. In 2023, the expert team of the Polish Wound Management Association (Polskie Towarzystwo Leczenia Ran - PTLR) developed the first national recommendations for the use of medical maggots, and the method was formally named Larval Wound Therapy - LWT (Terapia Larwalna Rany - TLR) in Poland [10,11]. The indications specified in the recommendation pertain to open wounds and ulcers containing necrotic or gangrenous tissues with signs of infection or without. Larval therapy is limited to *Lucilia sericata* larvae as a medical product. It allows for highly selective wound cleansing of dead tissue and the stimulation of reparative processes through physical contact with the wound surface and the release of growth factors [17,18]. The method is relatively straightforward and can be effectively and safely conducted by medical personnel in various settings: at home, in outpatient clinics, and in hospitals.

The purpose of this study was to explore the potential use of larval therapy in the local treatment of venous aetiology wounds.

Materials and methods

A literature review was conducted for the last decade (2013-2023), with a focus on the use of maggots in the process of cleansing and treating leg ulcers. PubMed databases and Cochrane libraries were searched. The analysis was performed on English-language publications. In the preselection phase, 357 records were extracted based on the keyword's *maggot debridement therapy* and *leg ulcer*. Manuscript evaluation concentrated on issues related to cleansing, larval defensin activity, reduction of antibiotic therapy, wound healing processes, and healing time. A total of 345 volumes were excluded, including case studies, genetic research, studies on animals, and works addressing the topics of ischemic and atypical ulcers. For the main analysis, 12 volumes were selected, including four randomized studies and eight systematic reviews and meta-analyses that met the inclusion criteria. Among the selected studies, four randomized trials underwent detailed analysis, and the data are presented in Table 1.

Larval therapy in the treatment of vascular aetiology wounds

Larval therapy is based on three mechanisms: mechanical and autolytic debridement of necrotic tissue, secretion of anti-inflammatory, antibiofilm, bactericidal, and wound healing-enhancing substances [12-14]. The larvae, residing

in the wound, selectively eliminate devitalized tissue by liquefying it through digestive enzymes, resulting in a distinctive brownish discharge, and subsequently, they externally absorb the softened dead tissue without damaging the granulation tissue.

In each of the four analysed randomized controlled trials (RCTs), larval therapy was evaluated as a method of wound debridement, but the method of application and the observation period of the larvae differed in individual studies [20-23]. The studies were designed for a group of individuals with leg ulcers, ABI ≥ 0.5 (ankle-brachial index), where the wound area ranged from 20-80 cm², and the time from the onset of the skin damage did not exceed 12 months. Loose larvae were used in one study [20], while in the remaining three, they were applied in biobags [21-23]. The observation period varied in each group, ranging from 2 weeks to 12 months. The average sample size was 63 (a total of 252 participants), with the largest study including 105 participants and the smallest including 19 participants (Table 1). Only one study assessed the percentage of necrotic tissue on the fourth day, then on the fourteenth day, and the wound healing process for a maximum of 12 weeks [23]. Taking into account that compression therapy is the gold standard, authors in two studies followed the recommendations [20,22], implementing this method and specifying the duration and degree of compression, whereas in one study, larval application was ceased after a period of controlled pressure [23], and in Opletalová's study, compression therapy was not employed [21]. The control group also varied depending on the study concept. In three studies, larvae were compared with the standard method of autolytic wound debridement, using hydrogel and viscose dressings [22,23], whereas in two studies, larvae were compared with surgical (sharp) wound debridement followed by local treatment with active dressings [20,21]. In one study, no sharp wound debridement was used in the control group [23]. The methods of measuring the effectiveness of wound debridement were not uniform. In two studies, larvae were measured by providing the percentage reduction of necrosis [21,22]. Contreras-Ruiz *et al.* measured granulation tissue growth [20]. Opletalová *et al.* [21] and Mudge *et al.* [22] reevaluated the wound bed after the study to determine the long-term effects of larval debridement. All four studies [20-23] indicate that the use of larval therapy in chronic venous aetiology wounds accelerates the debridement process compared to autolytic methods using hydrogels and active dressings; however, it does not shorten the wound healing process. The authors of the above studies also noted an increase in pain during therapy and the appearance of a specific odour, but no complications related to wound infection or bleeding were reported.

Table 1. List of analysed randomized studies.

Author	Population	Main group	Control group	Debridement	Conclusions
Contre-ras-Ruiz <i>et al.</i> (2016) [20] Mexico.	19 patients with leg ulcers.	10 patients. Loose maggots. Dressing: hydrocolloid, gauze, and adhesive bandage for 48 hours. Compression therapy with a bandage for 5 days. This cycle was repeated 5 times for each patient.	9 patients. Sharp debridement (surgical instruments). Silver sulfadiazine (SSD) dressing for 48 hours. Compression therapy with a bandage for 5 days. This cycle was repeated 5 times for each patient.	Observation period: 12 months. Increased granulation tissue in the central part of the wound (wound depth reduction) from 25% to 90%. Control group: granulation area increased from 30% to 60%.	MDT was more effective compared to SSD in wound debridement and reducing its size. A significant difference in bacterial load reduction was observed in favor of the MDT group. Odor and discomfort increased in the MDT group with no difference in pain intensity between the groups.
Opletalová <i>et al.</i> (2012) [21] France.	105 patients with leg ulcers, ABI ≥ 0.8 .	51 patients treated with maggots for 2 weeks without compression therapy.	54 patients underwent sharp debridement plus hydrogel and secondary dressing for 2 weeks without compression therapy.	Observation period: 14 days. Increased fetor. Reduced wound size in the maggot group: 24.3%. Control group: 24.9%.	MDT does not show significant benefits on the 15 th day compared to conventional treatment; wound cleansing with MDT is much faster and occurs in the first week of treatment. Another type of dressing should be used after 2 or 3 applications of MDT. Pain assessment was similar and low in both groups.
Mudge <i>et al.</i> (2014) [22] England.	88 patients with venous and mixed ulcers, ABI ≥ 0.5 .	46 patients. Closed larval therapy plus compression therapy. Assessed every 3–4 days for debridement.	42 patients. Hydrogel dressings plus compression therapy.	Observation period: 21 days. 67.4% of patients treated with larvae had completely debrided wounds, 26.2% of patients treated with hydrogel were fully debrided.	Larval therapy cleans venous leg ulcers significantly more rapidly than hydrogel. Individuals in the larval group experienced greater pain or discomfort related to wound cleansing compared to those using hydrogel.
Davies <i>et al.</i> (2015) [23] England.	40 patients with vascular ulcers, ABI > 0.8 .	20 participants. Bagged maggots. Continued compression therapy after larval removal.	20 participants. Viscous dressing plus compression therapy.	Observation period: 12 weeks. Wound reduction: 84% of participants had completely debrided ulcers. Control group: 50% reduction with dressings.	Larval therapy improves the debridement of chronic venous leg ulcers treated with multi-layer compression bandages. However, there was no subsequent improvement in wound healing.

Discussion

The frequency of hard-to-heal wounds varies and depends on various factors related to the observed group (sample), especially age, self-care capabilities, and clinical condition [24]. The costs of wound treatment are high, especially in cases of infectious complications requiring hospitalization, accounting for approximately 1-3% of total healthcare expenditures in developed countries. Comprehensive treatment of venous ulcers, in addition to invasive treatment for patients without contraindications to surgery, includes numerous elements of conservative therapy and broad-spectrum education. The primary goal of conservative treatment is to improve local circulation, restore proper tissue nutrition and oxygenation, minimize oedema, and the risk of infection. Increased venous pressure predisposes to oedema formation, thereby increasing the amount of exudate, which, in turn, increases the risk of contamination and wound infection by skin-colonizing bacteria [19]. The main cause of delayed wound healing is microorganisms forming a three-dimensional colony known as biofilm. The formation of the biofilm system is a multi-stage process, dependent on the structure and physicochemical properties of the colonized surface. Empirical and routine use of antibiotics in the wound treatment process is not recommended and unjustified because every hard-to-heal wound, in terms of time, will be colonized by microorganisms [8,9]. The risk of resistance development is high, which has consequences related to limiting treatment options and creating multi-resistant forms. Available antibiotics may be ineffective in treating such infections due to higher minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values that can induce *in vivo* toxicity [25]. Fundamental local actions resulting from the wound hygiene concept include systematic cleansing (scraping) and the application of locally antiseptic substances with the addition of a surfactant, as well as medical dressings recommended by scientific societies [19]. The gold standard for the treatment of venous ulcers is compression therapy. Proper application minimizes or completely reduces venous pressure and creates favourable conditions for ulcer healing. Compression therapy involves generating graduated pressure on the limb to overcome gravitational forces and improve venous return. Its effectiveness depends on many factors, with the most crucial one being the external pressure opposing intravascular pressure [26]. The analysis of conducted studies [20-23] indicates that compression therapy protocols were not identical between the studies or were selective (control of pressure was withdrawn during larval application), and larvae were only used for wound cleansing. Although well-designed, it is challenging to evaluate the use of larval therapy, which was implemented during the wound cleansing phase. According to Sherman, the success

of wound treatment lies in the cyclic use of MDT (maintenance therapy), not only for wound cleansing but also for revitalization and stimulation of the wound healing process [27]. Larval secretions and excretions (ES) and the vibrating motion resulting from physical contact within the wound induce the migration of human keratinocytes and fibroblasts, stimulating repair processes [12,28]. The meta-analysis by Tian *et al.*, comparing the conventionally treated group with the group where MDT was implemented, indicated a significant difference in healing rate, highlighting the positive effect of larvae [29]. Sun *et al.* in a systematic review evaluated wound healing rates in diabetic foot ulcers in comparison to venous ulcers or pressure ulcers, showing an equivalent positive effect of MDT compared to conventional therapy, with a shorter healing time in the MDT group [30]. Shi and Sholer indicated that after the implementation of larval therapy, there is faster granulation tissue formation and a shorter healing time in the case of pressure ulcers and diabetic foot ulcers [31]. Skin sensations, paraesthesia, and pain are common symptoms reported by patients during larval therapy. Pain experienced during therapy is usually of minor intensity and typically occurs in patients who previously reported pain related to the wound. In patients where the discomfort mainly results from the presence of infection, larval therapy, which acts antibacterially, may reduce pain intensity. For patients expected to experience a pain reaction, it is recommended to use fewer larvae than the recommended number per cm², prefer dressing in the form of a bag instead of loose application, and provide precise protection of the surrounding skin with protective agents [27,28,30]. Exaggerated perceptions by patients, as well as general disgust, may indicate reluctance among both the staff and the patients to use the method. Researchers also present such observations [20-23]. In the conducted meta-analysis of seven RCTs, Syam *et al.* highlight the need for further rigorous, integrated health economic evaluation and concurrent qualitative research to understand the cost-effectiveness, acceptability, and patient experience associated with larval therapy [32]. Potential patient reluctance to larval therapy is usually easier to overcome than clinician scepticism. This is mainly due to the patient's trust in the recommending doctor or nurse and their determination to use the most effective local treatment method. Therapeutic communication and comprehensive support are fundamental actions to alleviate concerns and dispel feelings of disgust. Explaining the expected benefits and providing a detailed description of the therapy process with an emphasis on the fact that the patient does not perform any actions directly with the larvae and does not have to endure an unpleasant sight. The use of questionnaire methods related to acceptance allows for the design of educational activities and patient preparation for this form of therapy, which enhances its effectiveness while simultaneously reducing potential patient concerns.

Conclusions

Larval therapy of wounds promotes the rapid debridement of devitalized and necrotic tissues within the wound. The evidence from this review does not indicate that larval therapy improves the speed of the wound healing process. Skin sensations and pain may slightly increase during the therapy. Compression therapy is not contraindicated during larval wound therapy.

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Woman in Puerperium

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Introduction

A midwife has a crucial role in health counselling and education not only for women, but also for their families and communities. Borelli [1] states that a good midwife should have the following attributes: theoretical knowledge, professional competence, personal qualities, communication skills and moral/ethical values. A midwife can exercise her profession in any environment, at home, at emergency units or inpatient medical facilities [2]. Midwives are perceived as professionals equipped with knowledge and skills to provide support during pregnancy, labour, puerperium as well as support in the care for a physiological newborn. A midwife has an irreplaceable role in the care for women in puerperium not only in hospital, however, especially in the community environment. Hendrych Lorenzová et al. [3] state that the main goal of midwifery care during this period is the support of health and physiological events in the organism of women in childbed. This goal can be reached via holistic care that focusses on the evaluation of changes in the organism of women in childbed as well as their newborn, on the support of women's healthy lifestyle but also on the support of a healthy family environment [3].

Puerperium is a period that begins after the delivery of the placenta and lasts the following 6 to 8 weeks. This period is important from the perspective of the woman, the child as well as the whole family. It can be divided into postpartum period which lasts 2 hours after the delivery of the placenta, early puerperium that includes seven days after the labour and late puerperium that lasts for 2 to 6 or 8 weeks after the labour [4]. In case that during the puerperium no irregularities or pathologies appear, we speak about physiological puerperium. Hendrych Lorenzová et al. [3] describe complicated or pathological course of puerperium by 7% of women in childbed. During puerperium woman's body returns to its original pre-pregnancy state, although not 100%. In this period a woman experiences changes in the physical, mental, social as well as spiritual area [5].

Among somatic postnatal changes belong the involutional changes of the genitals. The biggest changes occur in the uterus due to gradual reduction of the uterine fundus (i.e., uterine contraction), approx. one centimetre per 24 hours [3]. The uterus releases early secretion, so called lochia, containing blood, blood clots, necrotic streaks of decidua, tissue fluid and secretions from the cervix, vagina, and vulva, which are characterized by mild sweet odour and is changing its colour and amount during the course of puerperium [5, 6]. During the delivery, the integrity of the perineum can be disturbed, which may lead to the occurrence of a birth injury – rupture or episiotomy. Also, the pelvic floor muscles return to its original position, however, its muscle tone is affected by the kind of the past birth [3, 5]. Changes occur also in other women's organ systems as well as in the mental area. Thanks to the hormonal and physical changes as well as due to the adaptation to the role of a mother, the women's psyche is exposed to a heavy load.[7]. Among the most frequent mental changes by women in the puerperium period belong postpartum blues which occur on the 3rd to 6th day after the delivery and appear by 26 – 85% of women. The symptoms include weepiness, irritability, emotional lability, anxiety, sleep disorders, etc. Postpartum blues usually goes away within 10 days [5, 8]. Puerperium is considered to be an extremely sensitive period; therefore, it is important to provide women with adequate care. Hendrych Lorenzová et al. [3] emphasizes individualised, continual, holistic care and respectful approach to the woman, her newborn baby as well as her whole family. It is necessary to perceive (evaluate) also the mutual relationship between the mother and her newborn baby as well as the father and the baby [3]. A midwife should support the undisturbed contact of the woman (the mother) and the newborn child, which is essential to enable them to fall in love with each other and to create a positive bond that is crucial for the physical as well as mental health of the woman and her newborn child.

Aim: The aim of this study is to monitor women's and childcare in maternity hospitals in South Bohemia from the perspective of the women.

Methods and materials

For the methodology of the qualitative research the SPQR - Standards for reporting qualitative research: a synthesis of recommendations) was used. The aim of the SPQR is to improve the transparency of all aspects of the qualitative research and to help the authors with the application and synthesis of the results of the study [9]. The qualitative research was conducted with women who were

after childbirth, were hospitalised at the puerperium care unit at selected hospitals in South Bohemian Region in the Czech Republic. To acquire the data from women in the qualitative part of the study, the technique of individual half-structured interviews and thematic data analyses were used. The research survey was realised in September and October 2022 after a previous consent of the hospital management to conduct the study. The informants were presented with the aim of this research and were informed of preservation of data anonymity. The data obtained (audio recording) from the interviews with informants were literally transcribed. For the qualitative data analyses the elements of embodied theory, technique of open and axial coding was used. In the framework of comparing and structuring the data were categorized. One main category and several subcategories were created.

The research file was created based on the use of the method of deliberate selection. We set up selection quotas, i.e., woman after delivery, hospitalization at the puerperium unit in selected hospitals in the South Bohemian Region in the Czech Republic (Hospital České Budějovice a. s., Hospital Tábor a. s., Hospital Písek a. s., Hospital Strakonice a. s., Hospital Jindřichův Hradec a. s.) and co-operation in conducting the interview. The interviews with the women after the labour took between 30 to 40 minutes. The informants from the research file were labelled P1 to P16. Inside the text there are direct speeches of the informants, these are printed in italics with quotation marks. The collection of data was completed with saturation of the research sample.

Results

The structure of the research sample of the women is illustrated in Table 1.

Main category Stay at the puerperium care unit

Part of the main category Stay at the puerperium care unit are subcategories Care for a woman in childbed, Environment and Neonatal care. The above-mentioned subcategories present how the informants perceived their transfer from the delivery room to the puerperium care unit, how they perceived the midwifery care provided to them, what was the care provided to their newborn child by the health staff from the neonatal care unit.

Table 1 Identification data of the women hospitalised at the puerperium unit

Inform.	Age (Years old)	Education	Marital status	Job	Grav./ parity	Maternity hospital	Labour, week of delivery
P1	34	university	married	grammar schoolteacher	2 nd grav. 1 st para	České Budějovice	spont., W 39
P2	28	university	married	ML	2 nd grav. 1 st para	Tábor	spont., W 43
P3	30	colleague	married	nurse	2 nd grav. 1 st para	České Budějovice	spont., W 41
P4	33	university	married	project manager	2 nd grav. 1 st para	Písek	spont., W 40
P5	32	university	married	dentist	1 st grav. 0 para	Písek	spont. W 40
P6	29	university	married	teacher	1 st grav. 0 para	České Budějovice	spont., W 42
P7	29	high school	married	clerk	3 rd grav. 2 nd para	Jindřichův Hradec	spont., W 40
P8	33	high school with diploma	married	worker	4 th grav. 2 nd para	Jindřichův Hradec	spont., W 36
P9	27	high school with diploma	single	worker	1 st grav. 0 para	Jindřichův Hradec	spont., W 40
P10	29	high school with diploma	married	operator at a call centre	1 st grav. 0 para	Strakonice	spont., W 38
P11	33	high school	married	office worker	1 st grav. 0 para	Jindřichův Hradec	spont., W 41
P12	27	high school with diploma	single	receptionist	2 nd grav. 1 st para	Strakonice	planned C. S.
P13	28	university	married	office worker	1 st grav. 0 para	Tábor	spont., W 37
P14	36	university	social worker	social worker	3 rd grav. 2 nd para	České Budějovice	spont., W 40
P15	24	university	single	office worker	1 st grav. 0 para	České Budějovice	spont., W 40
P16	25	university	married	invoice expert	2 nd grav. 1 st para	Písek	spont., W 40

Caption: Inform. - informant; ML - maternity leave; spont. - spontaneous C. S. - Caesarean session Grav. - gravidity W - week P - postpartum woman Based on the data analyses one main category was defined: Stay at the puerperium care unit and subcategories: Care for a woman in childbed, Environment, Neonatal care.

Subcategory Care for a woman in childbed

From the subcategory Care for a woman in childbed it is obvious how at the transfer from the delivery room to the puerperium care unit the informants P2 and P14 were informed by midwives about the necessity of supervision during the first

mobilization from bed carried out to satisfy the need for emptying and hygiene and about the possibility to use the signalling devices. After a spontaneous delivery, a woman should urinate within 6 hours after the labour. After the arrival at the puerperium unit the midwife ensures that the woman has sufficient amount of suitable fluids, she teaches her about the importance of drinking regime, and she recommends the women to urinate in the shower to reduce the discomfort during the first urination. P The informant Š7 was mobilized in the delivery room, so she was able to walk to the puerperium unit together with her husband, where the midwife taught her about the regime at the puerperium unit. The informant P11 reported on the transfer to the puerperium unit: *“Directly at the door they informed me about everything. About what will I need, about what and how I will do things. The first getting up from bed, they were getting up with me.”* After the transfer to the puerperium care unit the informant P15 the midwife provided her with food and then helped her into the shower to satisfy her need for personal hygiene. The education regarding hygiene in puerperium should include information on the suitability of showering, about the expelling of lochia and related frequent changing of maternity pads without foil and the use of breathable underwear (postpartum mesh panties). A woman should take a shower after each urination, defecation as well as breastfeeding. Personal hygiene should also include the hygiene of breasts, where after each breastfeeding it is suitable to leave a drop of maternity milch to dry. It is suitable to wash breasts only with lukewarm water and to use breast pads into the bra as an advantage for keeping breasts dry [3,6]. The other informants did not comment on the transfer from the delivery room to the puerperium unit. Baston and Hall [10] state that after the transfer of the woman from the delivery room to the puerperium care unit the midwife should welcome the woman, introduce herself, explain her role as well as in what way is she going to take care of the woman. Some women may feel lonely because they often do not know who is taking care of them. The woman should also obtain the information that enables them to call for help in case she is worried about something, and she should also be aware of what to expect in the upcoming hours [10].

Regarding the provided care the informant P1 in this category expressed satisfaction with the care provided by the midwife, the doctors as well as supporting staff. Midwifery care for a woman in the postnatal period should include efficient communication respecting the woman’s expectations and rights. Care should be provided with respect and women should be guaranteed intimacy, social and emotional support of their choice [11]. When providing care to the women after labour the midwife should focus on satisfying and saturating her needs. Among physiological needs belong emptying, woman’s hygiene, hydration, nutrition, physical

activity [3]. The informants P3, P4, P5, P8, P10 to P14, P16 were generally satisfied with midwifery care at the puerperium unit, they valued positively also the communication with the health professionals. The informant P4 mentioned regarding the provided women's care at the puerperium care unit: *"I spoke to other colleagues here, we don't understand where it comes from, we are actually such a great hotel and the care here. ...they explained, whenever we asked, they gave us an answer even to stupid questions, they were really nice."* The informant P4 adds: *"They always explain something, with lochia, birth injury. Information is understandable."* In relation to birth injury, involution of the uterus or breastfeeding with some women the issue of pain can come into question. The informant P2 reported that the midwife questioned her, if she does not feel pain around the birth injury and if she does not need to moderate it. A midwife should educate the woman in how to prevent pain or how to treat it. Women most often encounter pain related to contraction of the uterus, to birth injury or pain of breasts with the onset of lactation, etc. One of the possibilities how to treat pain is to use non-pharmacological methods. Hendrych Lorenzová et al. [3] claim to use lavender essential oil for the treatment of pain related to the contraction of the uterus, to use evening primrose oil or olive oil, to use cottage cheese coating or cabbage leaf for the tension in the breasts, to use sewing herbs for an injured perineum or cold coating on the swollen birth injury.

Additional results show the approach of women to food they were served during the hospitalization. The informant P8 expressed herself regarding the food in such terms that based on the discussion with other early mothers at puerperium care unit they had agreed that the food they are served does not comply with the requirements on food suitable for nursing mothers. That means that the woman considered inappropriate to eat fresh yeast, dumplings, very spicy soups, etc. The informants P10, P13 also complained about getting fresh, yeast bread for breakfast and dinner. The informant P13: *"...would imagine more nutritious food for breastfeeding mothers."* On the contrary, the informant P9 was satisfied with the food served to her: *"Well, food was good. I am not hungry at all (smile)."* The optimum consumption of food in the period after the birth is crucial for the nutrient intake while breastfeeding and also for reduction of the postpartum weight retention. Women want to return to their original weight before pregnancy. Unhealthy food after childbirth exposes women to the risk of cardiovascular diseases and also has an impact on their mental health. Nursing women need approximately by 500 kcal/day greater intake than non-pregnant women [12]. If a woman follows healthy eating habits, she does not need to change them during the period of nursing [13]. The diet of breastfeeding women should be varied and should contain all main food groups from the food pyramid [14]. Studníčková and Dorazilová [14] recommend

women in puerperium to consume food that is relevant for the area where they live and is preferably home-made, freshly cooked . They recommend avoiding exotic cuisine, hot spices, convenience food and fast food. Many authors [3, 6] mention avoiding irritating, acidic, flatulent foods as these can pass onto the mother's milk. On the contrary the study [13] describes that nursed babies rarely react to the food that mother eat and it is not wise to recommend all nursing women to avoid certain type of food. It further describes that warnings for the mothers to avoid food causing flatulence (such as cabbage, broccoli) is not justified as consumption of such food can cause flatulence in the intestines of the mother, however, gas does not pass into mother's milk. Similarly acidic food such as citrus fruits, pineapple or tomatoes do not influence mother's milk as these foods do not change the pH of the mother's plasma [13]. The intake of fluids should depend on how thirsty the woman is, it is not necessary to drink excessive amounts of fluids [15].

The informant P15 was satisfied with the care, however, she experienced an event related to peripheral venous catheter and a catheter to epidural analgesia, which she got removed first 2 days after the delivery.

Subcategory-Environment

The informants P1, P3, P6, P9, P11, P14 to P16 used the above-standard single room at the puerperium care unit, which they evaluated as nice, providing great comfort. At the puerperium unit the women are placed in the rooms together with their child, according to a so-called rooming-in system. Thanks to this system women can be with their children since the first hours after their birth and thus a solid bond between the mother and their newborn baby can be created [14]. The informant P6 used an above-standard room to share it together with her husband and she reported to it: *"My husband has been here with me, which helped me a lot."* The stay of the woman and her child (often also the child's father) in one room enables to react timely to the baby's needs and helps the mother to learn to understand baby's behaviour and provides support to the woman in her role of a mother [14]. The informant P15 in relation to the above-standard room added: *"I really positively value the fact that visitors could come directly to my room almost any time during the day. The room was clean, only in the bathroom and the toilet I noticed some deficiencies in cleaning. What bothered me a bit was that in the morning until lunch it was rather busy in the room – several cleaning ladies appeared, temperature and blood-pressure check-ups, etc."* The informants P2, P10, P13 were placed into double-bed rooms where they were alone and were satisfied with the environment at the puerperium care unit. Regarding her

room the informant P10 added: *“The equipment of the room is fine. It is newly painted. It is rather too hot in here.”* The informant P4 shared the room with 2 other women and their newborn babies, and she stated: *“Babies were waking up, but it was not a problem, we didn’t mind. One colleague wanted an above-standard room; however, it was not available and later we didn’t even want to change it.”* After the recovery after the labour a peaceful and supporting environment is important, i.e. dimmed lighting, peace, silence [3]. The informant P7 was also satisfied with the environment at the puerperium care unit, she had nothing to point out. The informants P5 and data Š9 were also satisfied with the environment on the puerperium care unit, as well as with the furnishing of the room and sufficient amount of accessories (pads) that they could use for their intimate hygiene. Regarding the supply of necessary accessories in the room informant P1 reported that she had sufficient information who she should ask to provide more in case she was running out. In relation to the environment at the puerperium care unit informant P12 stated: *“The environment – nice and clean. Regime – we like to sleep in, so when they come to check the temperature, give medication and all that, it is kind of too early around five in the morning. For me it is too early.”* After the recovery of the organism, it is important to also satisfy the women’s need for sleep and rest. Sleep is important not only for the recovery of the organism but also for the physical as well as mental health [16]. With regards to the fact that a woman in puerperium subordinates everything to the regime of her newborn baby, she should try to rest whenever possible [15].

Only informant P8 noted the following regarding the environment at the puerperium care unit: *“Now they have some problem with heating here, which is really unpleasant. Especially at the delivery room, it was really cold there. Here at the care unit, it is a bit better. They are trying to solve it with heaters and an extra blanket.”* As Hendrych Lorenzová et al. mention [3], suitable environment should be clean and should maintain an optimal temperature for the woman and her child.

Subcategory Newborn care

The subcategory Newborn care shows how the informants perceived the care that the hospital staff from the physiological infant unit was providing to their newborn baby and how they were educated regarding the infant care. A woman at the puerperium care unit should be educated about the infant care, i.e., changing nappies, umbilical stump care, genital care, correct and safe manipulation with the newborn baby, dressing and bathing [15]. The results of the research survey show that informants P1, P5, P8 did not see a problem with the care provided to their children. As

mentioned above, the woman spends 24 hours a day with her newborn baby thanks to the rooming-in system which is applied in all maternity hospitals in the South Bohemian Region in the Czech Republic included in our study. The mother takes care of her newborn child in case that her health condition allows her to [15]. In relation to the infant care informant P1 stated: *"Since my first stay in 2019 many things changed for the better regarding the attitude of the staff, especially paediatric nurses. To be honest I came here to give birth with the resolution that I will not give in. After the first birth I felt confused, I was often gaining contradictory information, the atmosphere was such that I even didn't want to ask about anything because I felt that I'm looked upon as an idiot. Now the change is significantly for the better, moreover even because I didn't need any help with breastfeeding, everything went really smoothly."* The informants P1, P5, P6, P13 positively valued that they were informed about all infant's examinations in advance, they had to give agreement with these, and they were also present when they were performed and informant P1 added: *"I remember that I liked that whoever approached my baby, they greeted him, called him by name and were really nice and competent. I mean paediatricians, nurses, orthopaedist, etc."* In relation to a safe manipulation with the newborn, informant P2 stated that the staff supposed that she is familiar with it from her previous birth of her older child, therefore they did not educate her much. On the contrary the informants P4, P11, P12, P15, P16 reported that from the staff taking care of the newborn they were informed about a safe manipulation, about bathing, the umbilical stump care. They were also instructed not to leave the infant in the room alone in case that they need to leave the room together with the child, they should always transport it in the bed. The informant P3 stated: *"I feel very well here, it just seems to me that some nurses are kind of feisty. Those who care about the kids."* When it comes to newborn infant care in the area of nutrition, the informant P3 noted: *"The older nurses kind of like to be strict. Women should do what they say. When I obey their instruction, it's OK. ...first here they checked my nipples, they are rather flat. First here they told me about the nipple shaper. My little girl was always pretty hungry, so my nipples were chewed up."* Regarding safe manipulation with the newborn infant, bathing, applying to the breast, the informant P3 did not get any information. She assumed that it is because she has a second child and thus the nurses did not consider informing her on these subjects important. The same assumption regarding the absence of information had also informant P7 regarding the nutrition of a child. The informant P10 stated: *"We are a bit struggling with breastfeeding. When they brought me from the delivery room, a nurse came here and spewed out all the information regarding the baby at me. I didn't like that much. After the birth I was still rather shocked. As for breastfeeding, when my mom comes, she tells me what to do. Tonight I did everything how I felt it and it was better."* On the contrary the informant Š14 had a different

experience with education in the area of child's nutrition and she stated: *"And for instance, yesterday a nurse taught me how to nurse while sitting. I would not think of that. She instructed me so nicely how to place my hands, that I should not let her munch on the nipple but that I should embrace the whole areola. She explained everything about breastfeeding to me."* An irreplaceable kind of nutrition that a mother can provide to her child is breastfeeding. For a child breastfeeding is an ideal way of nutrition for proper growth of bones, for the prevention against allergies and it also contributes to lowering the risk of developing various diseases. It is really important that the mother has relevant information and knowledge about nursing, which she can gain especially from a midwife or a nurse working at the physiological infant care unit [17].

Conclusion:

The research survey showed that all informants were fundamentally satisfied with the provided care. That was proved by the fact that most of the women would choose the same maternity hospital for their next labour. Only the informants P8, P10 were not sure if they would choose the same hospital and considered the possibility to choose a different maternity hospital and informant P15 will consider a different maternity hospital for her next labour. In conclusion it can be said that women from our research file did not complain about major insufficiencies in the care provided to them during their hospitalization in selected maternity hospitals in the South Bohemian Region in the Czech Republic and we can thus state that their need, so much emphasised by Dušová et al. [15], for security and safety, which is the expression of their desire for reliability, self-sufficiency, sufficient information, confidence, and stability, was saturated.

This publication was written with the use of institutional support for the long-term conception development of the research organisation of the Faculty of Health and Social Science of the South Bohemian University in the framework of the Internal multidisciplinary research project No. MPŽD2021-001 "Multidisciplinary care about woman and child during the period of pregnancy, labour and puerperium."

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Human Papillomavirus infections – knowledge and attitudes of women of childbearing age

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Introduction

Since the discovery of HPV, more than 200 different types have been described, with about 100 full genomic DNA sequences described. The virus spreads among many animal species, not only humans. It most often affects the skin and genitals. The effect of its spread in the body is a local infection, never systemic. In most cases, the infection is asymptomatic and resolves spontaneously [1], but sometimes serious diseases, including cancerous lesions, develop.

The human papillomavirus belongs to the family *Papillomaviridae*, which it named in Latin comes from the word *papilla*, meaning warts, and from the Greek suffix *oma-*, which is used to create names denoting tumours. Initially, all *Papillomaviridae* were included in one group *Papovaviridae* together with *Polioviridae*, but in 2000 the International Committee on Taxonomy of Viruses decided to split them into two separate families. Today's classification of *Papillomaviridae* based on the principle of DNA sequence similarity has only been in place since 2003 [2].

The modern classification distinguishes 29 types of *Papillomaviruses*, among which as many as 189 types of this virus are listed. There are only 5 types of pathogenic to humans, Papillomaviruses are characterized by complete resistance to acids, ether and high temperature [2].

The symptoms and diagnosis of human papillomavirus HPV vary depending on where the inflammation or cancer develops. In the case of highly oncogenic types of HPV, the latent phase usually does not give any clinical symptoms, and the virus itself is eliminated by the immune system within 6-18 months of infection. Sometimes, however, it can be enough to persist infection with the virus, which in turn causes the formation of precancerous conditions, which can then lead to the development of cervical cancer. When it comes to invasive cervical cancer, it can

metastasize or infiltrate nearby organs and usually the symptoms of disease within them are noticed by women in the first place - such as lower abdominal pain, vaginal discharge or bleeding from the genital tract. Less frequently observed, but still possible to develop as a result of persistent infection with high-oncogenic types of HPV, are cancers located in the vagina, vulva, anus, as well as Bowen's disease. In addition, HPV can cause the development of cancers located in the head and neck, including cancers of the palate, mouth, throat, palatine tonsils, oesophagus and larynx. When it comes to low-oncogenic HPV variants, they in turn most often lead to the formation of condylomas (soft, pedicled, papillary appendages) or condylomas of the flat genital organs and around the anus [3].

The most commonly diagnosed disease entities caused in humans by HPV viruses will be discussed in more detail in the next part of the chapter.

Diagnosis of HPV infection is carried out primarily in the direction of cytological control. According to the current recommendations of the Polish Society of Gynaecologists and Obstetricians, annual monitoring should be carried out by all women over 25 years of age. The first examination is recommended in the case of early sexual activity no later than three years after initiation [4]. Doctors note that frequent Pap smear tests are a simple and effective screening method, however, it is not able to detect all cases of cervical cancer and, above all, does not indicate precancerous conditions. It also does not give information about the HPV infection itself.

The detection of HPV is possible today thanks to the development of molecular biology methods, especially in the field of polymerase chain reaction - PCR. It is a technique used to quickly copy genetic material [6/5]. The currently used test to differentiate HPV infection, both casual and chronic, is the mRNA test. It makes it possible to detect white E6 mRNA of type 16 virus and/or E7 protein mRNA of type 18, 31, 33, 45. This test is able not only to indicate whether it is a chronic or accidental infection, but also whether the process of carcinogenesis has already begun. Two HPV mRNA tests are currently in use: Pre-Test HPV Proofer and APTIMA. The first is a qualitative test and checks the amplification of NASVA RNA, full length transcript E6/E7) before detecting amplified RNAs from Molecular Be-acson corresponding to HPV types 16, 18, 31, 33 and 45 HPV Proofer. As for the second test, it is also based on the performance of 14 types of HR [9]. The purpose of the HPV test is to detect the presence of high-gene papilloma DNA or mRNA but does not indicate changes in CIN or cancer. Their task is to verify abnormal results in cytological examination, which makes it possible to determine the risk of developing cancerous changes, including cervical cancer. If the test results in a negative DNA HR HPV test, then the presence of CIN 3 and cervical cancer is excluded, which

allows it to be concluded that the woman will not develop cervical cancer within six years. However, a negative test result does not exclude CIN 1 and CIN 2, as these changes may be caused by viruses with low oncogenic potential. A single positive test indicates the presence of viral DNA in the sample but does not allow to assess the duration of infection [5].

The aim of the study is to assess the knowledge and attitudes of women of child-bearing age about the human papillomavirus HPV.

Material and methods

The paper uses the method of diagnostic survey technique. The research tool was an original questionnaire consisting of 36 questions, of which 16 were a test of knowledge about HPV, and 11 concerned women's attitudes towards people infected with this virus and towards the prevention of this disease. The imprint includes 8 questions and asks about the age, place of residence, marital status and education of the examined people, as well as whether they had contact with a person infected or who is a carrier of HPV, whether they had a test for HPV and where they get knowledge on this subject.

In the knowledge test, the respondents could obtain a maximum of 16 points. i.e., 1 point for each correct answer). (1-8 points – low level of knowledge, 9-12 points of average level of knowledge, >12 points of high level of knowledge).

The examination was conducted in the obstetrics and gynaecology department, as well as in the gynaecological clinic at the Medical Care Centre in Jarosław, Poland. The study group consisted of 130 randomly selected patients. All respondents were informed about the purpose of the study, as well as about maintaining anonymity. Criteria for inclusion in the study: women of childbearing age 18-49, age over 18 years of age, as well as voluntary participation in the study. The criteria for exclusion from the study were age other than procreative, age under 18 years of age and lack of consent to participate in the study.

Characteristics of the study group

The study included 130 women ($n = 130$). Among the respondents were 22.3% women aged 18-25, 45.4% of the respondents were women aged 26-35, and the remaining 32.3% of respondents were > 35 years old. Among the respondents there were about 47.7% of women living in the city and 52.3% of women living in rural

areas. The largest number of women were married (56.1%), 28.5% lived in cohabitation and 15.4% were single. 44 respondents had higher education (33.8%), 42.3% women had secondary education, vocational education 21.6%, (Table 1).

Table 1. Characteristics of study group (n= 130).

Variable		n	%
Age (years)	18-25	29	22.3
	26-35	59	45.4
	> 35	42	32.3
Place of living	city	62	47.7
	village	68	52.3
Marital status	married	73	56.1
	cohabitation	37	28.5
	single	20	15.4
Education	higher	44	33.8
	secondary	55	42.3
	vocational	28	21.6
	primary	3	2.3

Results

During the survey, women assessed their own perceived knowledge about the human papillomavirus HPV on a scale of 1 to 10 points, with 1 = lowest knowledge and 10 = the highest. The average assessment of their own knowledge by the respondents was 4.95 points \pm 2.31 points, so it was in the middle of the adopted scale (Table 2).

Table 2. Subjective assessment by the respondents of their own knowledge about the HPV on a scale from 1 to 10.

Knowledge assessment	Descriptive statistics							
	n	M	Me	Min.	Max.	Q I	Q III	SD
0-10 points	130	4.95	5.00	1.00	9.00	3.00	7.00	2.31

The results of the analysis of the knowledge test, consisting of 16 statements, will be presented in the further part of the work. Any statement could be considered as true or false. The majority of respondents claimed (92.3%) that HPV is transmitted sexually.

63 respondents (48.5%) were of the opinion that you can get infected with HPV using the same towel. More than half of the respondents believed that HPV can be contracted during anal intercourse (69.2%). Less than half of the respondents

agreed that HPV is responsible for the development of head and neck cancers (38.5%). Just over half of the respondents were aware that there was an effective HPV vaccine (59.2%). Just over 50% of the respondents (52.3 %) reported that HPV is spread through other methods not only through sexual contact.

The majority of respondents said that not all women who are infected with the virus will give birth to a child with HPV (82.3%). Over half of the respondents (59.2%) knew that a condom was effective in protecting against HPV infection. The respondents most often rightly considered as wrong the statement (75.4%) that a person who takes an antibiotic will not become infected with HPV. The majority (92.3%) were aware that having sexual contact with more than one partner increases the risk of HPV infection. The respondents most often disagreed with the opinion that women infected with HPV cannot become pregnant (80.0%).

The respondents most often considered as true the statement (74.6%) that cytological examination confirms HPV infection. The majority of women knew (92.3%) that HPV infection had an impact on the development of cervical cancer.

107 (82.3%) of respondents agreed with the opinion that a weakened immune system affects the development of HPV. The respondents also most often shared the opinion (74.6%) that condylomas (warts) are a symptom of HPV infection. 75.4% of respondents agreed with the statement that there is a test for the detection of HPV.

The next part of the analysis was aimed at presenting women's opinions on HPV prevention as well as their attitude towards people infected with human papillomavirus. The respondents with the given statements could agree or disagree to varying degrees.

Respondents tended to strongly disagree (46.2%), rather disagree (20%) or disagree (23.8%) that "the majority of people infected with HPV deserved what happened to them".

Similarly, the respondents mostly disagreed, including 39.2%, strongly, 20% rather and 24.6% simply disagreed that "HPV carriers should be isolated from other patients."

Women overwhelmingly agreed (80.8%) that people infected with HPV have the right to the same medical care as other patients.

Nearly 78% of women disagreed with the opinion that HPV carriers should not become pregnant. Over 75% of respondents disagreed with the opinion that people infected with HPV should be isolated from society. 80% of respondents agreed that a woman should have a gynaecological examination at least once a year.

With the opinion that "once a year, women should be tested for HPV" 41.5% of respondents agreed, 18.5% women rather agreed and 22.3% of respondents strongly agreed.

The respondents most often (27.7%) or strongly (23.1%) disagreed that HPV carriers should not practice medical professions. Another 17.7% of respondents simply disagreed with this statement.

Women's opinions on the statement that women infected with HPV should not give vaginal delivery were slightly more diverse. 13.1% of them strongly disagreed with this opinion, 15.4% of women disagreed with it, or “rather disagree” answered 30% of respondents.

The respondents were more likely to disagree (21.5%), rather disagree (20%) or strongly disagree (26.9%), while that HPV carriers should not breastfeed. 16.9% of women agreed with this opinion.

10,8% of respondents had a contact with a person diagnosed with HPV. 20% of respondents got tested for HPV. Most of respondents pointed internet as their source of knowledge about HPV (61,5%)

Table 3. The main sources of information on HPV

Statements	True		False	
	n	%	n	%
HPV is transmitted sexually	120	92.3%	10	7.7%
You can get infected with HPV using the same towel	63	48.5%	67	51.5%
HPV can be contracted during anal intercourse	90	69.2%	40	30.8%
The HPV virus is responsible for the development of head and neck cancers	50	38.5%	80	61.5%
There is an effective vaccine against HPV	77	59.2%	53	40.8%
HPV is spread exclusively through sexual contact	62	47.7%	68	52.3%
All women who are infected with the virus will give birth to a child with HPV	23	17.7%	107	82.3%
The condom effectively protects against HPV infection	77	59.2%	53	40.8%
A person who takes an antibiotic will not become infected with HPV	32	24.6%	98	75.4%
Having sexual contact with more than one partner increases the risk of HPV infection	120	92.3%	10	7.7%
Women infected with HPV cannot become pregnant	26	20.0%	104	80.0%
Cytological examination confirms HPV infection	97	74.6%	33	25.4%
HPV infection has an impact on the development of cervical cancer	120	92.3%	10	7.7%
A weakened immune system affects the development of HPV	107	82.3%	23	17.7%
Condylomas (warts) are a symptom of HPV infection	97	74.6%	33	25.4%
There is a test to detect HPV	98	75.4%	32	24.6%

The level of knowledge of the respondents was assessed by analysing their attitude towards the 16 statements contained in the knowledge test. The respondents most often had no problem with correctly indicating that the HPV virus is

transmitted sexually, that maintaining sexual contacts with more than one partner increases the risk of HPV infection, HPV infection affects the development of cervical cancer or weakened immune system affects the development of HPV. Most respondents also had no problem pointing out that it is a misconception that all women who are infected with the virus will give birth to a child with HPV or that women infected with HPV cannot become pregnant. The most respondents were aware that HPV is responsible for the development of head and neck cancers and that it can be infected using the same towel. Less than half of the respondents had knowledge in this area (Table 3).

In the entire knowledge test, the subjects could obtain 16 points, 1 point for each correct answer. Up to 50% of points: low level of knowledge, 50-75%, points: average level of knowledge, >75% of points: high level of knowledge of respondents in this topic. Among the respondents there were 12.3% of women with a low level of knowledge, 36.2% of respondents had medium level knowledge and 51.5% had high level knowledge (Table 4).

Table 4. Overall assessment of respondents' knowledge

Overall assessment of knowledge	n	%
Low	16	12.3
Average	47	36.2
High	67	51.5
Total	130	100.0

Statistical significance between women's level of knowledge of HPV and their age (p=0.225) was not confirmed (Table 5).

Table 5. Overall assessment of knowledge and age

General knowledge level	18-25		26-35		>35		Total	
	n	%	n	%	n	%	n	%
Low	6	20.7	8	13.6	2	4.8	16	12.3
Average	10	34.5	18	30.5	19	45.2	47	36.2
High	13	44.8	33	55.9	21	50.0	67	51.5
Total	29	100.0	59	100.0	42	100.0	130	100.0
p	$\chi^2 (4) = 5,67$				p = 0,225			

χ^2 - Pearson chi-squared test; p - probability test

The respondents' state of knowledge did not vary depending on their place of residence (p = 0.262) (Table 6).

Table 6. General assessment of knowledge and place of residence

General knowledge level	City		Village		Total	
	n	%	n	%	n	%
Low	8	12.9	8	11.8	16	12.3
Average	18	29.0	29	42.7	47	36.2
High	36	58.1	31	45.6	67	51.5
Total	62	100.0	68	100.0	130	100.0
p	$\chi^2 = 2.67$ p = 0.262					

χ^2 - Pearson chi-squared test; p - probability test

The marital status of the surveyed women was close to the threshold of statistical significance (p = 0.051). Married women had a slightly higher level of knowledge compared to single women (Table 7).

Table 7. General assessment of knowledge and marital status

Overall assessment of knowledge	Married women		Informal relationship/ single		Total	
	n	%	n	%	n	%
Low	5	6.9	11	19.3	16	12.3
Average	25	34.3	22	38.6	47	36.2
High	43	58.9	24	42.1	67	51.5
Total	73	100.0	57	100.0	130	100.0
p	$\chi^2(2)=5.95$ p=0.051					

χ^2 - Pearson chi-squared test; p - probability test

There was significant difference between the level of knowledge between women with different education levels (p=0,001). Women with higher education had higher level of knowledge than women with lower level (Table 8).

Table 8. General assessment of knowledge and education

Overall assessment of knowledge	Higher		Secondary and lower		Total	
	n	%	n	%	n	%
Low	2	4.6	14	16.3	16	12.3
Average	9	20.5	38	44.2	47	36.2
High	33	75.0	34	39.5	67	51.5
Total	44	100.0	86	100.0	130	100.0
p	$\chi^2(2)=14.89$ p=0.001					

χ^2 - Pearson chi-squared test; p - probability test

There was no correlation between the women's state of knowledge about HPV and the fact of their contact with an infected person (p = 0.149) (Table 9).

Table 9. General assessment of knowledge and contact with an infected person

Overall assessment of knowledge	Contact with an infected person in past		No contact with an infected person in past		Total	
	n	%	n	%	n	%
Low	1	7.1	8	12.9	16	12.3
Average	2	14.3	23	37.1	47	36.2
High	11	78.6	31	50.0	67	51.5
Total	14	100.0	62	100.0	130	100.0
p	$\chi^2(2)=3.81$ p=0.149					

χ^2 - Pearson chi-squared test; p - probability test

The presence of a correlation between the state of knowledge of the examined women about HPV and the fact of their contact with a person who is a carrier of this virus was confirmed ($p = 0.008$). Women who came into contact with an HPV carrier tended to have much more knowledge on the subject than women who did not come into contact with such a person (Table 10).

Table 10. General assessment of knowledge and contact with a person who is carrying HPV.

Overall assessment of knowledge	Contact with person infected by HPV		No contact with a person infected by HPV		Total	
	n	%	n	%	n	%
Low	0	0,0	8	14.8	16	12.3
Average	1	7.7	22	40.7	47	36.2
High	12	92.3	24	44.4	67	51.5
Total	13	100.0	54	100.0	130	100.0
p	$\chi^2(2)=9.72$ p=0.008					

χ^2 - Pearson chi-squared test; p - probability test

The respondents were usually positive about people with HPV and towards the prevention of this disease. They usually did not share the opinion that sexual contact with more than one partner should be prohibited, that most people infected with HPV deserve what happened to them, that HPV carriers should be isolated from other patients, that HPV carriers should not become pregnant, or that people infected with HPV should be isolated from society, they should not practice medical professions and should not breastfeed. However, they usually agreed that people infected with HPV have the right to the same medical care as other patients, at least once a year women should have a gynaecological examination and once a year should be tested for HPV. Opinions of the respondents were divided when it comes to the statement that women infected with HPV should not give vaginal birth, which was probably due to their lack of knowledge in this area (Table 11).

Table 11. Women's attitudes towards people suffering from HPV and towards the prevention of this disease

Statement	Definitely not agree	Rather not agree	I do not agree	I agree	Rather agree	Definitely agree
Sexual contact with more than one partner should be prohibited	29 30.0%	20 15.4%	23 17.7%	23 17.7%	16 12.3%	9 6.9%
Most people infected with HPV deserved what happened to them	60 46.2%	25 20.0%	31 23.8%	6 4.6%	5 3.8%	2 1.5%
HPV carriers should be isolated from other patients	51 39.2%	26 20.0%	32 24.6%	9 6.9%	6 4.6%	6 4.6%
People infected with HPV have the right to the same medical care as other patients	5 3.8%	4 3.1%	3 2.3%	47 36.2%	13 10.0%	58 44.6%
HPV carriers should not become pregnant	26 20.0%	25 19.2%	50 38.5%	17 13.1%	8 6.2%	4 3.1%
People infected with HPV should be isolated from society	65 50.0%	17 13.1%	33 25.4%	8 6.2%	4 3.1%	3 2.3%
At least once a year, women should have a gynaecological examination	4 3.1%	5 3.8%	3 2.3%	43 33.1%	13 10.0%	62 47.7%
Once a year, women should be tested for HPV	5 3.8%	9 6.9%	9 6.9%	54 41.5%	24 18.5%	29 22.3%
HPV carriers should not perform medical professions	30 23.1%	36 27.7%	23 17.7%	25 19.2%	14 10.8%	2 1.5%
Women infected with HPV should not give vaginal birth	17 13.1%	39 30.0%	20 15.4%	32 24.6%	17 13.1%	5 3.8%
HPV carriers should not breastfeed	35 26.9%	26 20.0%	28 21.5%	22 16.9%	12 9.2%	7 5.4%

The respondents had to subjectively assess their own state of knowledge about the HPV on the 10 points scale, where 1 meant the lowest knowledge and 10 the highest. The average assessment of the respondents' own knowledge was 4.95 ± 2.31 points, so it was in the middle of the adopted scale (Table 12).

Table 12. Subjective assessment by the respondents of their own knowledge about the HPV on a scale from 1 to 10

Knowledge assessment	Descriptive statistics							
	N	M	Me	Min.	Max.	Q I	Q III	SD
[0-10 pts.]	130	4.95	5.00	1.00	9.00	3.00	7.00	2.31

As a source of knowledge about the HPV virus, the respondents most often indicated the Internet (61.5%), (Table 13).

Table 13. Main sources of information about HPV

Main sources of information about HPV	N	%
School	8	6.2
Internet	80	61.5
Peers	2	1.5
Specialists: doctors, nurses	31	23.8
Other	9	6.9
Total	130	100.0

Discussion

The aim of this study was to assess the knowledge and attitudes of women of childbearing age about the human papillomavirus HPV. We also reviewed the medical literature to verify whether the results obtained in our own study were reflected in available scientific publications.

In their own study, the respondents were the first to independently assess their own knowledge about the human papillomavirus HPV on a scale from 1 to 10 points. They rated it at an average level of 4.95 points, which is close to the middle of the scale. Then, the level of knowledge of the women studied was assessed objectively, based on their attitude towards the 16 claims presented to them, which could be true or false. The correct assessment of the veracity of the statements allowed to verify the knowledge of the respondents in this area. The subjects most often had no problem correctly indicating that the HPV virus is transmitted sexually, and the risk of its infection increases by maintaining sexual contacts with more than one partner. The women also knew that HPV infection has an impact on the development of cervical cancer and that the risk of infection with this virus can increase a weakened immune system. Most also had no problem pointing out that it is a misconception that all women who are infected with the virus will give birth to a child with HPV or women infected with HPV cannot get pregnant. The least conscious, however, were that the HPV virus is responsible for the development of head and neck cancers and that it can be infected using the same towel. Less than half of the respondents had knowledge in this area. To sum up, a general assessment of the respondents' knowledge in this area was made and it was found that in the case of most of them, it was at a high - 51.5% or medium level - 36.2%. In this study only 12.3% of women had low level of knowledge.

In their publication, Bajcarczyk, Florek et al. assessed the state of knowledge on cervical cancer prevention and HPV vaccines for women, including 105 daughters and 46 mothers [6]. Their research shows that both mothers and daughters had

sufficient knowledge about Pap smear and saw a link between HPV infection and cervical cancer. Mothers participating in the cited study were most often able to correctly indicate the appropriate time to perform a Pap smear test (54.3%), and they themselves most often underwent this examination on average once a year (50%). The majority of respondents (73.9%) believed that as part of HPV prophylaxis, women should have a gynaecological examination at least once a year and should also test for HPV at least once a year (82.3%). The respondents from the cited publication described themselves mostly as supporters of HPV vaccination (including 60.8% of mothers and 80.0% of daughters). Half of the young people surveyed would like to get vaccinated, and only 8.6% of mothers have vaccinated their daughters against the virus. In their own study, 59.2% of women were aware of the existence of an effective HPV vaccine. Both the cited publication and the results obtained among the respondents from their own research confirm the relatively high knowledge of women about cytological examination and the relationship between HPV infection and cervical cancer. However, women's knowledge of HPV vaccination needs to be supplemented.

Wala and Kalinowski also investigated knowledge about risk factors and prevention of cervical cancer in their work [7]. In the light of the results of the research, they found that the level of knowledge of the students examined by them was average, and the knowledge about the HPV virus itself and the risks associated with infection with this virus turned out to be low among female students. Respondents from Wala and Kalinowski's studies usually did not treat HPV as a risk factor for cervical cancer. Slightly more knowledge in this area was manifested by students of medical faculties compared to students of other faculties. Of the self-surveyed women, 92.3% of women knew that HPV infection was a significant risk factor for cervical cancer, but only 38.5% of them knew that HPV was responsible for the development of head and neck cancers. The state of knowledge of women of working age from their own research was therefore higher, compared to the state of knowledge on this subject of female students from Lublin.

Research similar to that of Wala and Kalinowski was carried out by Mędrała-Kuder [8]. In her work, she analysed knowledge about risk factors for cervical cancer among female students, at Krakow universities. She came to conclusions similar to those of Wala and Kalinowski. Also in her study group, students of medical faculties had more knowledge on this subject compared to students of other faculties, not related to medicine. On the basis of the last two cited publications, it can be concluded that women's state of knowledge may be significantly influenced by their education. Similar conclusions were drawn on the basis of author's research. In our own study, women with tertiary education had a greater knowledge of HPV

than women with secondary education or less ($p=0.001$). Wala and Kalinowski, as well as Mędrala-Kuder, in their research did not see a relationship between the respondents' knowledge and their place of residence, marital status or sexual activity. This coincides with the results of author's research, which also did not confirm the relationship between women's knowledge about HPV and their age, place of residence or marital status ($p>0.05$). In the author's study, however, it was shown that women who came into contact with a person who was carrying HPV usually had much more knowledge on this subject than women who did not have contact with such a person ($p = 0.008$).

Knowledge about HPV infections and prevention of Warsaw students was assessed in their work by Błazucka and Cieślak [9]. Respondents asked whether screening and other forms of prophylaxis should still be performed despite being vaccinated against HPV. Most of the students answered this question in the affirmative, emphasizing that both cytology and HPV testing should be included in the prevention of women, both vaccinated and unvaccinated against HPV. Only 6.0% of female students disagreed, believing that HPV vaccination exempts women from preventive examinations.

Clinical studies show that vaccination against human papillomavirus is highly effective and has long-term benefits in the form of reducing the incidence of cervical cancer in women. In his work, Trojanczyk [10] also emphasizes that the prevention of this disease in the form of vaccination of young girls is much more economical compared to oncological treatment of patients with cervical cancer and also in the context of reducing the number of premature deaths of women from this disease. Despite its numerous benefits, however, HPV vaccination is still controversial.

Other researchers discussing the issue of knowledge about HPV were also Kostrzewa-Zabłocka et al. [11]. In their work, they focused on assessing the awareness of nurses in the field of cervical cancer prevention. Of the respondents surveyed, 13% did not know about the existence of an HPV detection test, and only 19% of them had ever done so. Similarly, in the case of HPV vaccinations, only 2% of women performed them among the medical staff studied. The low interest in vaccination among the surveyed nursing staff most often did not result from the lack of knowledge in this area or from the lack of access to vaccines, but most often nurses indicated the lack of such a necessity in their case – 38% and the high cost of the vaccine – 34%. The authors of the cited publication also drew attention to the opinions of their respondents, according to which HPV vaccination is pointless and is only intended to generate profits for pharmaceutical companies, which in the light of the previously described scientific research raises concern, and similar comments should not be made by people associated with medicine.

Research on women's knowledge in the field of cervical cancer prevention was also conducted by Stefanek and Durka from the Medical University of Warsaw [12]. The respondents participating in the study of these authors mostly indicated HPV infection as a risk factor for cervical cancer – 78%. They also indicated as a risk factor a large number of sexual partners – 37% and less often, smoking cigarettes – 37%. In the author's work, maintaining sexual contacts with more than one partner as increasing the risk of HPV infection was indicated by 92.3% of respondents.

The increased risk of cervical cancer among women with multiple sexual partners was also pointed out in his publication by McIntyre-Seltman, Castle et al. from the United States [13]. In turn, Plummer, Peto et al. As an important factor influencing the risk of this disease, they indicated early initiation of sexual initiation [14]. The knowledge of female students in the field of cervical cancer prevention was evaluated by Szykuła, Czarnecka et al. from Warsaw [15], describing their knowledge in this area as sufficient. Different conclusions from their own research were drawn by Błazucka and Cieślak from the Department of Social Nursing of the Medical University of Warsaw [9]. In their research, they have shown that knowledge about the prevention of cervical cancer and HPV is only satisfactory among women, regardless of their age. The lack of relationship between the level of knowledge and age was also confirmed in author's research, although here, the level of knowledge of women was assessed as relatively high.

In our study we also assessed women's attitudes towards people infected with HPV and towards preventive examinations. Respondents were usually positive towards people suffering from HPV and towards the prevention of this disease. Most often they did not share the opinion that sexual contact with more than one partner should be prohibited, that most people infected with HPV deserve what happened to them, that HPV carriers should be isolated from other patients, that HPV carriers should not become pregnant, or that people infected with HPV should be isolated from society. They should not practice medical professions and should not breastfeed. They usually agreed that people infected with HPV have the right to the same medical care as other patients, women should have a gynaecological examination at least once a year and women should be tested for HPV once a year. Opinions of the respondents were divided when it comes to the statement that women infected with HPV should not give birth by the forces of nature.

Researchers assessing the awareness of 350 engineering students about sexually transmitted diseases were also Subbarao and Akhilesh from India [16]. They concluded that the majority of respondents – 90% – had heard of any venereal diseases. As sources of knowledge about sexually transmitted diseases, respondents from India indicated primarily teachers, the Internet and the media. In the case of respondents

from the author's work, the source of knowledge about HPV was primarily the Internet - 61.5%, and half less often, respondents obtained information on this subject from their own research from medical staff - 23.8%. Nearly 75% of those surveyed in India were knowledgeable about how venereal diseases are transmitted, and less than half of them had heard about the symptoms and complications of these diseases.

Cervical cancer is one of the most common cancers among women. A significant relationship between the development of this disease and HPV infection has been confirmed, and every sexually active woman is at risk of developing this disease. The important role of HPV in the etiopathogenesis of cervical cancer prompted the creation of an effective vaccine against it. The key factor here was also the confirmation of the lack of effectiveness of drugs used in the case of diagnosis of cervical cancer. Therefore, the role of education on the possibilities of HIV prevention among both women and men, including the promotion of vaccination against this disease [17], is very important. Preventive and informational activities in the field of HPV infection and its effects should be directed to younger and younger recipients, which is caused by the lowering of the age of sexual initiation for both boys and girls. This is important because it is in this lowest age group, teenage girls who are just starting their sexual life, that the risk of HPV infection is the highest [18].

Conclusions

Women of childbearing age have a high level of knowledge in the field of HPV. Women with higher education have a higher level of knowledge of HPV compared to women with secondary education or less. Contact of women with a person who is carrying HPV increases their awareness in this area. Respondents are most often positive about people infected with HPV and towards the prevention of this disease. The Internet is the basic source of women's knowledge about HPV, and they assess their own knowledge in this area as sufficient.

In practice, it is necessary to ensure proper prevention and health education about HPV infections and their consequences, with particular emphasis on the possibility of vaccination, among sexually inactive adolescents.

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Examination of musculoskeletal disorders among midwives

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Introduction

As health professionals, midwives are directly or indirectly involved in the provision of health services, either in health facilities or in health activities. They take part in special training in order to fulfil the responsibilities of their field of expertise. Looking at the development of the number of midwives in the country, in the early 2000s, approximately 2,600 midwives were employed in health institutions. Due to the initial four years of college training, which began in the 2005/2006 academic year, there were no young entrants in the system until 2010. After that, the number of midwives decreased every year, but not as significantly as from 2017 to 2021. Based on the data gathered from 2015 to 2017, there was a decrease in the number of individuals from 1,653 to 1,622, which accounts for a total reduction of 31 people, equivalent to a 1.9% decline over a span of 2 years. The number of working midwives decreased by 225 (13.87%) from 2017 to 2021. The number of unfilled midwife positions/statuses increased by 64 people, which represents an 87.67% growth. The number of permanently vacant and unreplaced midwife positions increased by 19 individuals, which represents a 13.19% rise during this period. Out of all midwife positions in 2021, including both vacant and permanently absent, unreplaced positions, there was a total increase of 83 individuals, equivalent to a 38.25% growth compared to 2017. When projected onto the working midwives, it can be observed that the proportion of permanently vacant positions reaches 21.47%. The number of midwives working in hospital delivery rooms also decreased by 69.5 individuals (8.62%) over the past 4 years [1]. Based on the results of national research, the prevalence of musculoskeletal disorders among midwives is over 30%, affecting even a quarter of the youngest age group. In the oldest group of workers, these symptoms occur in as much as 60% of cases. In the 40-49 age

group, there is a significant increase in the number of concurrent diseases, with the oldest age group having 3-4 different chronic diseases [2]. The novelty of the research lies in the fact that, in the context of our country, such a large-scale study within this target group has not been conducted on this topic before. In the field of studying health and workplace relationships, we aspire to examine the disparities in musculoskeletal health and its prevalence, particularly among healthcare workers. This focus is driven by their known exposure to risk factors and the resulting consequences within the professional community. Healthy, well-trained, and motivated healthcare professionals play a pivotal role in the healthcare system [3]. The World Health Organization (WHO) has reported that musculoskeletal disorders are among the most common causes of disability and limitations in daily life and work-related activities. They emphasize the importance of protecting the health of nurses and midwives and preventing non-communicable diseases [4]. Healthcare professionals, including midwives, as part of their work, mobilize pregnant women and postpartum individuals. In maternity wards, they may even be required to transfer clients from bed to bed in critical situations, sometimes without the presence of surgical assistants, which may include assuming challenging body positions during childbirth management [5]. The results of this studies emphasize that lifting heavy loads can have a significant impact on the musculoskeletal health of workers. This information can prompt the development of occupational ergonomic guidelines and the establishment of safe workplaces and conditions aimed at preventing LBP [6]. Recent studies have shown that safety-related leadership attitudes, such as the emphasis on the value of safe performance, setting goals for injury prevention, and rewarding compliance with safe work practices, have had a positive impact on reducing accidents and various occupational injuries, including severe muscle and back injuries [7]. Several physiological underpinnings support why exertion may play a dominant role in the relationship between psychosocial workplace stressors and musculoskeletal disorders. Stress acts as an intermediary in the effect of stressors on work-related musculoskeletal disorders (WRMSD) due to increased muscle tension when employees experience exertion. The presence of muscle tension and other autonomic effects in the body increases the biomechanical load to which employees are exposed during physical efforts related to job tasks. In fact, previous research has supported that exertion can have a direct impact on muscle tension. In some experiments where clients participated in stress-inducing tasks, psychological stress reactions and anxiety were strongly linked to muscle tension [5]. Moreover, exertion has several physiological effects. It diminishes blood circulation to the extremities and muscles, raises blood pressure, increases the levels of corticosteroids and cortisol, and triggers fluid retention in tissues. Additionally, it can

result in heightened levels of peripheral neurotransmitters, such as noradrenaline, which may compromise the efficiency of the immune system's defence mechanisms. Exertional responses like frustration and anger can lead to escalated exertion, thereby elevating the risk of WRMSD. In summary, it can be postulated that exertion could potentially act as an intermediary factor in the relationship between psychosocial workplace stressors and WRMSD [7]. Exertion significantly mediated the relationship between job control and lower back muscle symptoms. Higher levels of job control can protect employees from lower back pain by reducing the perceived exertion by employees. The quality of job control is associated with physical exertion and the degree of muscle tension, which poses a significant risk for the development of WRMSD. Employees with higher levels of control in their jobs can work more independently, take more breaks, thereby reducing the strain on their muscles and directly reducing the risk of musculoskeletal disorders. Workplace leaders who demonstrate a focus on safety can help protect employees from performance pressure. Lower job security-oriented leadership behaviour is often associated with poor ergonomic conditions. There are alternative mechanisms through which safety leadership behaviour is linked to WRMSD [7]. It has been recognized that pain, the main symptom of musculoskeletal disorders, has a multifactorial origin and is prevalent among healthcare workers. Biomechanical factors such as heavy lifting and maintaining forced and prolonged body positions can play a role in the development of back pain [8]. Repetitive upper limb movements or gestures performed during static contractions can cause pain in the limbs and neck [9]. Undoubtedly, psychosocial factors, which include individual characteristics such as age, gender, behaviour (e.g., smoking, sedentary lifestyle), and the presence of comorbidities [10], can trigger or exacerbate musculoskeletal pain [11]. The aetiology of musculoskeletal disorders is multifactorial, encompassing not only physical stressors but also psychosocial risk factors [12]. There is a clear relationship between workplace psychological factors and social support [13]. While we cannot modify workers' personal attributes, individual-level elements can be modified through improvements in working conditions and reductions in the impacts on workers. Among them, employment conditions, such as the organization, content, and demands of work, and the promotion of healthy habits and behaviours, stand out [14]. Nurses and midwives together constitute the largest group of healthcare workers in every country. The WHO strategy plan also emphasizes that healthy, adequately supported, well-trained, and motivated staff improve the quality of patient care, thereby positively impacting the health of the population. They can serve as role models for the community [4]. Nurses and midwives are healthcare professionals who come into direct contact with patients/clients in their everyday work.

A positive work environment and mental well-being ensure active work, quality performance at the workplace, and can reduce turnover rates. For all these reasons, it is essential to support midwives and nurses in achieving optimal health in all age groups, prevent the development of non-communicable diseases or complications, and strengthen health promotion tasks among them.

Material and methods

Data collection and sampling

A cross-sectional study will be carried out from November 2023 to 2024 June 2024. Taking into account the midwifery staffing figures for 2021, we have determined the planned sample size, which 720 midwives is working in the delivery room. The inclusion criterion for the sample was that the midwives interviewed should work in the obstetrics and gynaecology department, including inpatient care (mainly in the labour ward). Questionnaires that were not scored were excluded. The sample selection will be stratified within a random sample of midwives working in inpatient care in the 38 hospitals. The head midwives will assist in the distribution and collection of the questionnaires. Midwives working in the obstetrics and gynaecology inpatient ward (mainly in the labour ward). The questionnaires will be randomly sampled and distributed.

Measurement tools

The questionnaire will consist of the following:

- Individual Characteristics: Sociodemographic data (gender, age, marital status, and educational level), lifestyle factors (participation in leisure activities, physical activity, and smoking habits), and factors determining health status (sick leave, workplace absenteeism, or absence due to health issues).
- Job Characteristics: Job position, length of employment, time spent in the organization, work schedule, the presence of other job roles, weekly working hours in the institution, and total hours worked.
- Examination of Musculoskeletal Complaints: The participants' musculoskeletal complaints in the lower back, hand/wrist, and shoulders are assessed using the standardized Nordic Musculoskeletal Questionnaire. This simple, widely recognized and validated questionnaire identifies symptoms in the regions of the neck, back, shoulders, and limbs. The questionnaire consists of 28 multiple-choice questions and is divided into two distinct sections.

- Investigation of Workplace Psychosocial Factors: The COPSOQ II (Copenhagen Psychosocial Questionnaire II), which is the most used tool in European occupational health practice, was developed by the National Institute of Occupational Health in Denmark. The Occupational Health and Safety Act requires regular psychosocial risk assessment and reduction at work, but in Hungary there has been no provision for this so far, a wide range of targeted questionnaires integrating several theoretical models to carry out a risk assessment. To fill this gap the Copenhagen Questionnaire on Risk Assessment in the Workplace was adapted into Hungarian. Psychosocial Factors II (Copenhagen Psychosocial Questionnaire II), abbreviated COPSOQ II questionnaire, also known as the Copenhagen Occupational the Hungarian version of the COPSOQ II is available in English and French. The Hungarian version of the COPSOSOQ version was tested for validity by Katalin Nistor and colleagues. The COPSOQ II consists of 92 questions and 28 scales grouped into seven main dimensions work stress models by integrating several work stress models local psychosocial risk factors, as well as individual health and well-being factors indicators (burnout, stress, sleep disturbance, self-perceived health).

Expected Outcomes

The results obtained are expected to place significant emphasis on preventing musculoskeletal disorders arising from work, taking into account international recommendations related to patient handling, lifting, material handling, water births, and the use of comfort devices during various special positions during childbirth. The frequency of musculoskeletal disorders can be associated with professionals who report inadequate environmental conditions and perform tasks with high physical demands. The significant burden of musculoskeletal disorders among healthcare workers leads to functional limitations, reduced work efficiency, poor patient care, income loss due to workplace absences, and increased costs related to the management of musculoskeletal disorders and disability pensions. With the presence of expected results, we believe it is essential to integrate our findings on psychosocial stressors with other relevant ergonomic interventions to gain a more comprehensive understanding, ultimately reducing the prevalence of musculoskeletal disorders from multiple perspectives. It is crucial to develop a participatory ergonomic model that highlights the active presence of employees in the execution of ergonomic procedures, provides training on requesting feedback, and motivates employees to voice their concerns and frustrations. The results may suggest that

supervisory training significantly contributes to reducing the occurrence of work-related musculoskeletal disorders (WRMSDs). Training for top-level managers in healthcare institutions can help them draw the attention of healthcare professionals to ergonomic standards, proper body postures, and WRMSD prevention. A supportive environment and leadership attitudes that promote direct communication about ergonomic and safety measures can indirectly reduce the long-term disability and career abandonment caused by WRMSDs. Involving employees in the job planning process can reduce work overload and role conflicts through better information exchange. Additionally, employees may perceive increased control when they are involved in job planning and other ergonomic interventions.

Summary

We would like to encourage ergonomists, personal factors specialists, and psychologists to address musculoskeletal disorders as an important outcome of the research. Future studies should explore these additional intervention strategies. Based on our expected results, we anticipate that interventions and provisions aimed at directly reducing psychosocial workplace stressors, improving psychosocial and ergonomic aspects of work (such as personal participation-based ergonomics or process planning interventions), and providing supervisory training hold great potential in reducing and preventing WRMSDs.

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Nursing workload characteristics and organizational culture among hospital nurses

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Background

Global challenges facing health systems

The European Commission's 2008 Green Paper on the European Workforce for health [1] summarises the challenges facing the health workforce that are common to all European Union (EU) Member States. The 2008 study identifies several key challenges. Demography and the promotion of a sustainable health workforce: life expectancy at birth has increased by an average of 2.5 years per decade since 1950. Health systems are making great efforts to increase the number of healthy life years, but the number of people living with chronic diseases and the length of time they live with them is steadily increasing. This is likely to increase the demand for both formal and informal care. The ageing of society can also be traced in the ageing of the health workforce. The average age of doctors and nurses is also increasing, and already in 2008 there were EU Member States where 50% of nurses were over 45. Public health capacity: disease prevention, health promotion, planning and implementation of screening and vaccination programmes require a trained, adequately staffed and organised public health system.

Training: to ensure sufficient numbers and appropriately trained doctors, nurses and other health personnel, it may be necessary to improve the training system,

including increasing the capacity of schools, higher education institutions, and providing sufficient numbers of theoretical trainers and practice hospitals.

Addressing the migration of health workers within the EU: Free movement of persons is one of the fundamental freedoms guaranteed by the Community and ensured by a number of laws, directives and treaties. However, mobility can have a positive or negative impact on inequalities, which can also have an impact on the planning of training capacity. Global migration of health workers: working in the EU can have an attractive effect on skilled workers from third world countries. This can lead to severe labour shortages in sending countries, and EU countries should therefore adopt ethical recruitment practices.

It also draws attention to the collection and sharing of data to support decision-making, the use of new science and technology in healthcare, among other issues. In its study „Global strategic directions for nursing and midwifery”, published in 2021 [2], the WHO sets out priorities and strategic directions for nursing and midwifery in 4 focus areas that can help countries achieve their overall goals.

The four main areas are:

Education: training sufficient numbers of nurses and midwives with the necessary competences to meet the health needs of the population. Creating jobs, managing migration and recruiting and retaining midwives and nurses where they are most needed.

Leadership: strengthening leadership and research in nursing and midwifery. Ensuring that midwives and nurses are supported, respected and protected, so that they are motivated, prepared and able to do their work in safe conditions.

Jobs: Create sufficient numbers of nursing and midwifery jobs to address the health challenges facing society. Developing financial and non-financial incentives to reduce career drop-outs among health professionals. Create conditions for ethical migration.

Service delivery: Nurses and midwives should be encouraged to use their competences to carry out their work with the maximum autonomy appropriate to their qualifications. It is essential to provide the necessary supportive regulation, the right working environment and the necessary tools.

The European Commission's bi-annual publication Health at a Glance: Europe [3,4] presents key indicators on health status, determinants of health, health resources and activities, quality of care, health expenditure and financing in 35 European countries. The 2018 publication identifies 4 key areas for improvement in its foreword: preventing deaths from preventable diseases, a more efficient and

people-centred health system, increasing access to care, and developing more flexible health care systems. The 2020 publication, on the other hand, focuses on the adaptability of health systems, with cancer prevention and cure, prevention and detection of mental illness, digital transformation of health systems and the importance of collaboration as key challenges. The adaptability of health systems must cover not only predictable challenges (ageing population, chronic diseases, etc.) but also unpredictable challenges. Such as the COVID-19 epidemic or the challenges of economic difficulties. The nurse-to-patient ratio, which shows how many patients a nurse is responsible for simultaneously, is a key determinant of the quality of healthcare, recovery time and complications.

This number obviously varies according to the type of care and the level of progressivity, but several research studies have consistently shown that the more and the more highly qualified the number of nurses in the system, the lower the nurse/patient ratio, the lower the complication rate is. In some cases, a reduction in post-operative mortality has also been shown with an increase in the number of nurses. In order to ensure an adequate number and quality of nurses, it is essential that the number of nurses leaving the profession is kept to a minimum, and therefore it is essential to study the factors influencing the number of nurses leaving and remaining in the profession.

The aim of the research

To conduct a literature review on nursing workload and organizational culture in healthcare in Hungary, focusing on sources published after 2010. The review aims to provide a scientific foundation for future empirical data collection.

Methodology

A review was conducted on all nursing workload and organizational sociology Ph.D. dissertations completed after 2010 at the Hungarian Doctoral School of Health Sciences. Additionally, the literature review analysed the supporting literature for the aforementioned data collection.

Results

Organizational culture and career abandonment

The NEXT study (2005) conducted a comprehensive study and interpretation of nurses' workplace conditions, trying to identify the factors that may determine whether nurses stay or leave their careers. The study identified two basic groups of people planning to leave nursing [5]:

- “motivated” career leavers are generally young, well-educated and see other areas of the labour market as more likely to achieve their goals
- “discouraged” leavers are older, in poorer health and more likely to be burnt out.

They have worse chances of entering the labour market, with more early retirements. In 2011, Ujváriné et al. confirmed that Hungarian patterns of labour market exit are consistent with the trends shown in the NEXT study.

McCarthy and colleagues in their 2007 study [6], based on previous literature and research, describe the following factors in the decision to stay in or leave a career:

- Personal factors, such as age, education, marital status, work commitment, family responsibilities.
- Organisational factors, were the communication, participation in decision-making, reward and punishment systems at work, promotion opportunities, perceived status in the organisation, job satisfaction.

Medvés and colleagues published a study in 2015 investigating the relationship between work stress and personal well-being [7]. They conducted a questionnaire analysis with 86 health professionals, which showed that higher work stress was significantly negatively related to job satisfaction and work-life balance.

Several studies have also examined the relationship between perceived stress and lifestyle.

Németh [8] in a study involving physicians, found a link primarily between a relaxed diet and lower stress levels. In her study, she found - not significantly - that more of the doctors reporting higher stress levels performed sporting activities involving sweating and flushing at least once a week, which he suggested was due to a desire to reduce stress.

The authors Ceglédi and Tandari draw attention to the role of psychological counselling in preventing burnout among nurses [9]. In their 2019 summary, they concluded that prevention should be at the level of individual-focused prevention (career choice, self-awareness, sleep-rest, regular physical activity), peer support (stable belief and value system, meditation, relaxation, screening) and professional and workplace levels.

In his PhD thesis [10], Tamás Irinyi investigated the relationship between burnout among professionals, their aggression and workplace conflict. In his study of workplace conflict, he found that relationship conflict and task conflict were the two most common types of conflict among respondents. His results showed that aggression (verbal or physical) was more common among employees with higher levels of burnout.

The more intense the emotional exhaustion, the greater the negative impact on aggression, which is also more difficult for workers to cope with in a poor state of mind than for colleagues with a good state of mind. A similar correlation was found in the area of job insecurity. Where workers reported greater job insecurity, the response to aggression was also worse.

Anikó Németh measured the well-being of nurses in a follow-up study [11] with data collected in 2003 and 2010, and investigated how certain characteristics of organisational culture affected well-being. She found that by 2010, nurses' perceived support had declined, and this was true for both workplace and social support. Respondents reported a less welcoming workplace atmosphere, fewer encounters outside the workplace and fewer opportunities for promotion. While in 2003, the desire to help was more motivating for nurses to stay in the profession, in 2010 it was more the lack of finding another job. It is also noteworthy that when measuring control (degree of autonomy), respondents reported a decrease in autonomy compared to 2003.

They had limited control over their work methods and pace, and they felt disempowered to make autonomous decisions in their workplace. These conclusions were outlined in their PhD dissertation [12], Gyöngyvér Vámosiné Róvó examined, among other things, perceived stress among health care workers in her study of the general physical and mental health of health care workers. The higher one rated perceived stress, the worse one rated one's own vitality and mental health.

Decreases in vitality can lead to a negative spiral, with coping deficits increasing stress, which further decreases vitality.

Research published by Tamás Irinyi in 2019 [13] showed that burnout affects both nurse managers and middle managers, not only subordinate nurses. The study did not reveal a significant increase in the average burnout level compared to previous studies. However, it is worth noting that those who encountered less aggression reported higher levels of burnout. The study distinguishes three levels of burnout, low, medium and high. Factors related to job and organisational culture (e.g. job insecurity, overtime, number of years in health care) may differentiate between low and medium levels of burnout.

In their 2019 study, Ujváriné and colleagues [14,15] investigated how organizational factors affect nurses' intent to remain in their careers. They sought to explore the role of organizational control, joint problem-solving, and conflict communication in addressing this issue. The researchers conducted a questionnaire survey of approximately 400 active nurses working in various inpatient care settings. Conflictual communication, particularly among younger individuals, can increase the

likelihood of leaving the profession by up to 50% within the next five years. Their findings indicate that a positive organizational culture results in lower levels of perceived stress and higher levels of self-esteem and internal control. Conversely, increased stress leads to lower self-esteem and greater external control. Conflictual communication, particularly among younger individuals, can increase the likelihood of leaving the profession by up to 50% within the next five years. However, the selection of internal coping mechanisms, which is a characteristic of the organizational culture, can reduce this likelihood [16,17].

Nursing workload

Nursing workload is a difficult phenomenon to grasp and even more difficult to measure. There are a number of different approaches to characterising it, which can be broadly divided into two broad categories [18]. Dependence-based methods, on the other hand, measure the activities required to meet the patient's care needs.

One example is the NAS (nursing activity score), which assigns a score to each nursing activity based on the time it takes to complete it [19]. By adding up the scores, the nurse's workload can be known. 100 points is the optimal workload for a nurse in a shift. Information on nurses' workload can also be obtained by using the AS patient classification system. This system measures the nursing needs of patients according to how much help each patient requires to meet their basic needs (A) and the specialist nursing tasks they need to perform (S). The system measures the nursing needs of patients on a daily basis (or as the nursing needs change), so that information on workload can be obtained by determining how many patients per nurse per shift and what their nursing needs are. However, neither approach is suitable for taking into account activities that are not directly necessary to meet the physical needs of the patient. The AS system based workload estimation does not take into account at all example e.g. time spent on documentation or patient education. The NAS is well suited for describing the workload of intensive care unit staff, but much less so in areas where the time required to complete a work process is less predictable.

An excellent tool for a more subjective assessment of workload is the NASA TLX test. This measure was originally developed by NASA to assess the workload of pilots, but has been used in many fields (including nursing) over the decades. The test measures perceived workload along 6 parameters: physical, mental, temporal, performance, effort and frustration. The survey assesses perceptions of each parameter using a Likert scale and explores their interrelations by prompting respondents to determine which characteristic poses greater difficulty for them, such as performance or frustration.

A positive organizational culture in nursing is a culture that promotes teamwork, unity, communication, builds mutual trust and collaboration among nurses, enhances innovation and creativity, treat people as more important, supportive, and other healthcare professionals [20]. It values the contributions of each individual and encourages open and honest communication. Such a culture fosters a sense of belonging and purpose among nurses and helps them to feel motivated and engaged in their work, increasing job satisfaction and productivity, hence reducing work-related stress and turnover [21-24]. Negative organizational culture is inversely true.

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Safe process of preparation and administration of medicines by the nurse

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Supported by a program of the Ministry of Health of the Czech Republic reg. No NU20-09-00257. All rights under intellectual property regulations are reserved.

Introduction

Giving medication to patients is one of the most important and time-consuming nursing tasks in many healthcare facilities. Patient safety and the highest quality of care should be a priority for nurses when preparing and administering medicines [1]. The Global Patient Safety Challenge on Medication Safety (2017), in which the World Health Organization called on its Member States to improve the safety of medicines [2], demonstrates that this is a topic of global significance. According to Brabcová et al. (2021), the process of administering drugs by a nurse consists of the following steps (1) prescribing the drug by the doctor and adding it to the patient's medical documentation, (2) recording the prescription of the drug by the nurse in the patient's documentation, (3) preparation of a mobile pharmacy (preparation of aids, checking of medicines), (4) hand washing and hygienic and hand disinfection, (5) arrival of a nurse with a mobile pharmacy to the patient, (6) safe identification of the patient both active and passive identification, (7) preparation of the drug (checking correctness and expiration date of the drug using the triple check method), (8) administration of the drug to the patient, (9) observe the patient's use or response to the drug, (10) record of the administration/non-administration of the prescribed drug in the appropriate medical documentation, (11) cleaning of aids, waste disposal, and (12) completion of missing medicines in the mobile pharmacy [3].

The safety of the process of preparation and administration of drugs should be the subject of constant improvement; therefore, it is necessary to identify factors that can

lead to errors. The paper aims to point out the factors that may contribute to errors in the preparation and administration of drugs and an overview of effective interventions reducing possible medication errors in the preparation and administration of medicines by nurses in hospital settings.

Results

Factors contributing to errors in the preparation and administration of medicinal products in hospital settings

When administering medications, nurses are expected to use the 6 Rs, i.e., the (1) Right Patient, (2) Right Drug, (3) Right Dose, (4) Right Time, (5) Right Route, and (6) Right Documentation. We can often look to these “Rights” to find the underlying causes of medication errors. Medication errors can include errors in documentation (form of the medication, dosage, specific documentation), storage and administration (incorrect storage location or poor supply management), increased workload (reduced time for dispensing of medicines, evaluation of the effectiveness of the administered medicines), patient factors (availability, overview of medicinal products), nurses’ health (stress, fatigue), and inaccurate interruptions during preparation or administration [4-6]. Brabcová et al. (2021), using the FMEA method with multidisciplinary teams of experts, analysed the drug administration process by nurses in selected hospitals in the Czech Republic. Expert teams identified 28 possible failure pathways in the drug delivery process, with 12 specific causes [3].

In hospital settings, nurses are principally responsible for administering medication (MA) to patients. Nurses are responsible for administering the right medication to the right patient, at the right time, in the right way, and in the right form [3] and should have the appropriate knowledge for undertaking these activities [7]. In addition to the preparation and administration, responsibility concerns proper documentation of administered medical products. In the Czech Republic, these competencies are defined by Decree 391/2017 Coll., as amended, on the activities of healthcare professionals and other professionals [8].

A medication administration error (MAE) is defined by Keers et al. (2015) as a deviation from (1) the prescription of a drug, (2) the practice of recording it in the patient’s documentation, (3) usage according to the manufacturer’s instructions for preparation/administration, or (4) the relevant institutional principles [9]. MAEs usually involve a combination of personal, organizational, material, and technical failures (or some combination) that can harm a patient [10-13]. It

is essential to understand how mistakes occur [14-15]. Using direct observation of drug administration processes used by nurses, based on a review of 250 studies, the most accurate and reliable way to monitor MAEs was identified [16]. The detection of individual and systemic factors is vital for increasing the safety of nursing care [17].

Evaluation of MAEs by nurses in Czech hospitals was conducted through a standardized questionnaire called the Medication Administration Error Survey (MAE Survey) and was performed according to Wakefield et al., 2005 [18]. The standardized MAE Survey effectively identifies risks in prescribing, preparing, and administering drugs. The research study involved 1,205 nurses working in hospitals in the Czech Republic [19].

Risk factors that increase the likelihood of MAEs include in the authors' opinion, the similarity of drug names (4.0 ± 1.3) and drug packaging (3.7 ± 1.3), the substitution of original drugs by cheaper generics (3.5 ± 1.4), frequent interruptions of nurses during the preparation and administration of drugs (3.6 ± 1.4), or the illegibility of medical records (3.4 ± 1.4). In a descriptive correlation study using a non-standardized questionnaire of the same group of nurses, it was found that there was a statistically significant relationship between MAEs and (1) nurse education, (2) number of interruptions and medication preparation outside of a patient's room, (3) insufficient patient identification, (4) the large number of patients assigned per nurse, (5) the use of team nursing care, and (6) administration of generic substitutions [20]. Several different types of medication errors are described in healthcare facilities, (1) incorrect dose or missed dose, (2) wrong time of administration, (3) wrong route of administration, (4) wrong patient, and (5) insufficient documentation [21-22]. MAEs are also related to the reasons for nurses failing to document MAEs.

A standardised Medication Administration Error Survey (MAE Survey) was used in this research study of 112 nurses from four hospitals in the South Bohemian Region working in surgical, internal medicine, and follow-up departments and standard rehabilitation care. The study found, among other things, that the most common reasons for nurses not reporting MAEs were (1) the fear of being blamed for a deterioration of the patient's health (3.3 ± 1.7), (2) fear of adverse consequences of reporting an MAE (2.7 ± 1.4), and (3) fear of the doctor's reaction to the MAE (2.6 ± 1.4). Other decisive factors that reduce a nurse's motivation to report MAEs include repressive responses from hospital management to the error, where hospital management focuses on punishing the individual instead of trying to fix the system that may have led to the MAE (2.9 ± 1.5) and an overemphasis on MAEs as a measure of nursing care quality (3.1 ± 1.6) [23]. Yung et al. pointed out the difference between the

actual incidence of MAEs (19.5%) and the number of reported cases (1.3%) during one shift [22]. Another frequently mentioned factor in international research is the psychological state of nurses [24], and often cite the fears, anxiety, etc., of nurses [25-27]. They also note that older nurses report a statistically significantly lower number of reported MAEs than younger nurses. On the other hand, nurses with more clinical work experience (21 years or more) greatly underestimated the number of reported MAEs than nurses with less experience [19].

Recommendations to reduce medication errors

Automated systems for administering medicines or systems using barcodes are considered functional interventions for reducing MAEs [15, 28, 29]. Introducing educational and training programs can help nurses understand medication errors and report their occurrence appropriately [30]. Ford et al. (2010) recommend simulation-based teaching, which provides a significant advantage in patient care by reducing medication errors compared to lecture-style education [31]. Even though all nursing programs emphasize patient safety and the safe administration of medicinal products, not all students follow the safety guidelines for administering medications. New methods are needed to teach safe drug administration to properly prepare students for this critical skill [32]. Nurse training programs should include simulation instruction led by experienced practitioners with knowledge of “real world” clinical settings. The simulation environment will help students connect theory with practice and allow them to learn and adopt safe drug administration strategies [33].

It is confirmed that the verification by another nurse, doctor, or pharmacist often leads to the detection of potential MAEs [34]. Basic rules recommend double or triple confirmation of patient identification, dosage, and documentation. Additionally, knowing proper drug storage locations, unrestricted access to operational protocols, and an up-to-date list of medicinal products are essential [21, 34, 35]. Since patient overload in hospital wards is a common problem, interventions to reduce MAES must include dealing with increased patient numbers [36], adjusting competencies, and delegating some activities to other nursing staff [21, 37]. This was confirmed by Prokešová et al. (2022), who analysed the process of drug administration by nurses in selected South Bohemian hospitals using a SWOT analysis and a SWOT risk analysis. To improve the drug administration process, they recommend, in particular, a transition to a comprehensive system of electronic documentation, linking the hospital pharmacy system with the hospital information system, increasing the number of staff according to the number of patients on a ward or in the hospital, increasing the

use of clinical pharmacists in the drug administration process, and sharing experiences between hospitals [38].

Patient involvement is also essential to improve the safety and quality of healthcare relative to the drug delivery process. Patient engagement is essential as a potential defensive barrier to MAEs and to optimize their treatment. Patients are much more likely to engage in their care if medical staff encourage them to get involved and explain that it is their right [39].

The safety of drug administration processes, from the perspective of hospitalized patients and their involvement in drug administration, has not been investigated in hospitals in the South Bohemian Region in the Czech Republic. The aim of the study by Hajduchová et al. (2022) was, therefore, to evaluate the subjective perception of the safety of the drug administration process from the perspective of hospitalized patients and evaluate their involvement in drug administration in the departments of internal, surgical, and follow-up care in four selected hospitals of the South Bohemian Region of the Czech Republic. They found different perceptions and individual understanding regarding the safety of the drug administration process by individual patient groups. Interest in participating in the drug administration process varied between patient groups. Women participated in the drug administration process to a significantly greater extent than men. Patients under the age of 60, patients with more than secondary education, and patients on surgical wards expressed more interest in being involved in drug administration decisions. Patients with less formal education expressed an interest in increasing the involvement of their family members in their treatment decisions. Hospital patients must be more effectively and consistently integrated into their treatment, and their preferences must be respected. Both healthcare professionals and hospital management should encourage patients to be more involved in the drug administration processes used during hospitalization. Effective interventions must also be developed to bridge the gap between desirable and actual patient involvement [40].

Gorgich et al. consider the establishment of electronic registers of medicines to be an appropriate and effective solution for reducing MAEs [41]. Lin et al. also confirm that the introduction of barcode identification was the top-rated system for clinical practice. Nurses were optimistic about all the benefits, assuming the appropriate technical facilities, and confirmed a reduction of MAEs [42]. Doyle and McCutcheon (2021) propose automated systems for dispensing medications, where nurses enter the patient's name, drug, dosage, and method of administration, which leads the system to open a drawer with the appropriate drug [43].

Conclusion

Many medication errors occur in clinical practice, and many factors can lead to these errors. The human factor always plays a role and is often associated with poorly designed protocols, interventions, or technical understanding. The most common factors linked to MAEs include high nurse workloads, large numbers of critically ill patients, interruptions during the preparation or administration of medicines, absence of a system for reporting adverse events, non-compliance with guidelines, and fear and apprehension. MAEs are often perceived by nurses to be multifactorial and linked to systemic causes. In response to frequent medication errors, the management of healthcare facilities has tried various interventions. The use of electronic prescriptions and the use of barcodes in the preparation and administration of medicines has proven very effective. To support these new methods for reducing MAEs, nursing faculties need to create additional coursework in pharmacology; hospitals need to develop suitable technical facilities and IT systems for the electronic preparation and administration of pharmaceuticals; and the state needs to find ways to increase nursing faculty enrolment.

Supported by the program project of the Ministry of Health of the Czech Republic sreg. No NU20-09-00257. All rights under intellectual property regulations are reserved.

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The learning effectiveness of high-fidelity simulation among medical and nursing students - Polish-Slovak experiences

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Introduction

Medical simulation is a rapidly growing area of education for future health-care professionals in Poland and globally. The purpose of innovative teaching in medical professions is to comprehensively train upcoming medical professionals for their roles. Simulation techniques are utilised to enhance practical skills and experiences by accurately recreating real-life situations based on specifically prepared scenarios [1].

Depending on the students' level of education, simulation can be classified into low, intermediate, and high-fidelity tiers. In low and intermediate fidelity tiers, students obtain concise feedback, and the scenarios used are shorter with less detailed discussions. In high-fidelity scenario-based simulations, educational equipment consists of both basic simulators for mastering individual tasks and advanced patient simulators that accurately replicate human features and parameters. Scenarios are more intricate, requiring students to perform complex tasks during the simulations. Summaries of student performance are considerably more detailed and extensive. During the debriefing process, students are provided with comprehensive feedback on their technical proficiency, progress and the acquisition of transferable skills like teamwork and stress management. The objective of this feedback is to facilitate self-reflection, analysis, and the application of appropriate remedies.

In medical simulation, the concept of high fidelity can be categorized into classical and virtual forms. Classical simulation employs advanced Human Patient Simulators (HPS) that mimic various aspects of human physiology and vital signs. These simulators possess reactive pupils, sweat, cry, and urinate, and can respond suitably to administered medications and implemented treatments. Common as well as rare pathologies can be replicated repeatedly throughout the course of education. [2,3].

Virtual reality (VR) simulation offers learners genuine clinical experiences based on real medical cases. Learners are fully immersed in a virtual clinical setting, providing them with dynamic engagement opportunities with patients. Virtual simulations employ tools such as Body Interact, an e-learning tool which enables students to practice fundamental patient interactions using a touchscreen and/or mouse. Students interact directly with a virtual patient, select suitable questions for medical history gathering and conduct a variety of diagnostic as well as therapeutic interventions [4].

In Poland, medical simulation's role in the education process is governed by education standards for different medical fields, as specified in the most recent Regulation of the Minister of Science and Higher Education concerning education standards for the preparation of specific medical professions. These professions include nurses, doctors, midwives, pharmacists, dentists, laboratory diagnosticians, physiotherapists, and paramedics (Journal of Laws 2019, item 1573). This document outlines the necessary infrastructure for medical education and mandates that practical skills in real conditions are preceded by the acquisition of the same skills in simulated conditions. Complementary to education are practical classes and professional internships that employ appropriate types of simulation depending on the level of advancement in the educational process, classified as low, intermediate, or high fidelity [5].

Meanwhile, in Slovakia, the education of nurses is currently governed by Directive 2013/55/EU. Additionally, ESG 2015, which outlines standards and guidelines for ensuring quality in the European Higher Education Area, also influences the education model. The second document that shapes the education framework is the Government Regulation No. 34/2018 which is published in the Official Journal of the Government of the Slovak Republic. It deals with professional competencies in the medical profession, continuing education for healthcare workers, the arrangement of specialized fields, and the certified professional activities system. The objective of this study was to assess the efficiency of education delivered through high-fidelity simulation using conventional and virtual reality techniques among undergraduate medical students in Slovakia and Poland.

Materials and methods

The aim of the study was to analyse the effectiveness of learning through high-fidelity simulation among medical and nursing students in Poland and Slovakia.

The designed study was observational in simulated conditions, while the type of study is descriptive.

It was carried out from March to June 2023 at the University of Rzeszów, the State Academy of Applied Sciences in Przemyśl, and the Pavol Jozef Šafárik University in Košice. The research took place in the Medical Simulation Centres at these institutions.

A total of 205 students participated in the study, including 156 from Poland and 46 from Slovakia. Due to the division of the conducted simulation, 124 students underwent examination via virtual reality, whilst 79 students experienced traditional simulation. The study inclusion criteria comprised enrolment as a student with at least two years of medical and nursing programs and nursing programs, and provision of voluntary written consent to participate.

The above-mentioned students completed the subject of physical examination and took part in medical simulation classes, which enabled them to carry out all elements of the simulation and complete the examination questionnaire with understanding.

The people in the study sample were selected by the researcher himself (purposive selection).

The surveyed students were selected from universities offering medical studies using a virtual simulation including Body Interact. The obtained number of students results from meeting the conditions and expressing willingness to participate in the study. For comparison and to obtain a larger group of subjects and more interesting results, Polish nursing students were included.

The research involved dividing the participants into two groups. The first group comprised of students who utilised virtual patients (via Body Interact) to enact a selected scenario. The second group consisted of students who utilised traditional simulation to enact the same scenario. The entire study was carried out as an extension of medical simulation classes in groups of four students. In both groups, a team leader was chosen to manage the team, relay instructions, and make decisions for the entire team.

The research used a survey methodology, consisting of a self-generated questionnaire (which collected data on socio-demographic factors of the participants such as age, gender, marital status, place of residency, year, and field of study) and three standardized questionnaire forms.

One of the utilized tools was the questionnaire named “Student Satisfaction and Self-Confidence in Learning with Virtual Simulations (SSCL),” consisting of 13 statements divided into two parts. The initial part examined five inquiries related to the learners’ contentment during the educational procedure, while the second part included eight queries concerning self-confidence in the learning process. As a response, students were able to score their answers on a scale of 1 to 5, where 1 indicated strong disagreement and 5 indicated strong agreement with the statement.

Another tool used in the study was the student version of the “Simulation Design Scale (SDS),” which consisted of 20 items evaluated using a five-point scale. It assessed five statements regarding students’ personal feelings during simulations, including goals/information, support, problem-solving, feedback, and fidelity. The tool is divided into two parts: one inquiries about specific features in the simulation and the other asks about their significance for the students.

Additionally, the “Educational Practices Questionnaire (EPQ)” was utilized, which is comprised of four parts containing 16 statements. The first part focused on students’ active learning during the educational process in simulations. The second section pertained to teamwork during simulations, the third section addressed various learning methods, and the fourth and ultimate section pertained to student expectations during scenario execution [6,7].

Statistical analysis

The main statistical tests employed in the analysis were the Chi-squared test for variable independence, particularly used for questions based on nominal scales. Coefficients, namely Phi and Cramer’s V, were utilised to evaluate the strength of relationship. Furthermore, the Phi measure indicates the relationship direction (positive or negative). For each Chi-squared test analysis (denoted by “a”), additional tests were carried out, particularly with small samples, utilizing the exact or Monte Carlo methods (also referred to as “b”). The calculated probability “p” indicates whether the examined relationship is statistically significant. The statistical significance of “p” for the Phi and Cramer’s V coefficients is determined based on the Chi-squared test result. The coefficients mentioned above are assigned a strength-of-relationship measure that ranges from 0 to 1, with a higher score indicating a stronger association. Typically, the Monte Carlo method involves a sample of 10,000 tables derived from an initial random number of generator seed of 2,000,000.

Our analysis was undertaken using the IBM SPSS 26.0 package, supplemented with the Exact Tests module. Any dependencies, correlations or differences are considered statistically significant when $p \leq 0.05$.

Code of ethical conduct

The Institutional Bioethics Committee at the State Academy of Applied Sciences in Przemyśl approved the study (Resolution No. 5/03/2023), along with all relevant administrative authorities. The research was conducted in accordance with ethical standards outlined by the Helsinki Declaration (64th WMA General Assembly, Fortaleza, Brazil, October 2013) as well as Polish national regulations.

Results

The study involved 205 participants, comprising of 160 females (87.0%) and 45 males (13.0%). Within the Polish group, women were more dominant (81.1%), making up 78% of the total group. In the Slovak group, men constituted the majority (40.9%), comprising 22.0% of the entire group. The respondents were divided into five age groups, and those aged 19 to 25 years were equally represented in both groups (POL 64.0% - SLO 69.7%). In the age bracket of 26 to 35, the Slovak group had a significantly higher percentage of individuals (19.7%) compared to the Polish group (7.2%). Conversely, respondents aged over 36 were more prevalent in the PL group (10%). Only the Polish group had participants above the age of 40, comprising 13.7% of the sample. In terms of residency, the Slovak student group had a greater proportion of respondents from urban areas (77.3%), with a higher prevalence of those residing in rural areas observed in the Polish group (42.2%). Analysis of marital status revealed that the Slovak group had a higher percentage of single individuals (75.8%) and those with other statuses (18.2%), while the Polish group had a higher frequency of married individuals (28.8%).

In terms of academic specialisations, medical students constituted the majority in the Slovak group (63.6%), whilst the Polish group was chiefly comprised of nursing students (74.1%). The sample examined displayed varying numbers of students in each academic year. In contrast, in Slovakia, only 3.0%, 9.1%, and 13.6% of students were in their fifth, fourth, and third years respectively. Of note is that, in Poland, a higher percentage of senior students were present: 8.6% were in their fifth year, 20.1% in their fourth year, and 39.6% in their third year.

According to the data collected, a similar proportion of individuals took part in the Body Interact simulation (49.6%) and traditional simulation (50.4%) in the Polish group. However, in the Slovak group, the Body Interact simulation was participated in by a significant majority of the respondents (97.0%). Table 1 presents the characteristics of the study group.

Table 1. Characteristics of the study group.

DEMOGRAPHIC VARIABLE		N/%	GROUP		Total
			PL	SLO	
Age	19 to 25 years	N	89	46	135
		%	64.0%	69.7%	65.9%
	26 to 30 years	N	10	13	23
		%	7.2%	19.7%	11.2%
	31 to 35 years	N	7	6	13
		%	5.0%	9.1%	6.3%
	36 to 40 years	N	14	1	15
		%	10.1%	1.5%	7.3%
Place of residence	City	N	79	51	130
		%	56.8%	77.3%	63.4%
	Village	N	60	15	75
		%	43.2%	22.7%	36.6%
Marital status	Bachelor/Maiden	N	91	50	141
		%	65.5%	75.8%	68.7%
	Married woman / Married	N	40	4	44
		%	28.7%	6.0%	21.5%
	Another	N	8	12	20
		%	5.8%	18.2%	9.8%
Field of study	Medicine	N	36	42	78
		%	25.9%	63.6%	38.0%
	Nursing	N	103	24	127
		%	74.1%	36.4%	62.0%
Year of study	2	N	44	49	93
		%	31.7%	74.2%	45.4%
	3	N	55	9	64
		%	39.6%	13.6%	31.2%
	4	N	28	6	34
		%	20.1%	9.1%	16.6%
Type of simulation	Body interact	N	69	64	133
		%	49.6%	97.0%	64.9%
	Traditional simulation	N	70	2	72
		%	50.4%	3.0%	35.1%

The Mann-Whitney U test was utilised to analyse the data; N represents the total number of respondents, % represents the percentage of respondents, PL refers to the group of Polish students, and SLO refers to the group of Slovakian students.

Table 2 compares three tools employed by surveyed students from both countries in the virtual simulation Body Interact. The majority of respondents similarly rated the effectiveness of virtual simulation using each tool (SDS, SSCL, EPQ). Notably, only the Simulation Scenario Assessment Scale (SDS) revealed significant differences in the section related to reflection with feedback. The Slovaks displayed a higher level of consensus (4.55) compared to the Poles (4.29 - $p = 0.040$). Similar patterns were observed in the responses to the EPQ questionnaire, particularly in the section concerning diverse learning techniques. The average score in the Polish student group was higher, at 4.57, compared to the Slovak group's average of 4.52, with $p = 0.153$.

In comparing two simulation types within the Polish group, discrepancies were noted in different sections of the questionnaires employed in the investigation. It was observed that participants in the conventional simulation group demonstrated a higher level of agreement in SDS than those in the Body Interact group. Specifically, the former had higher agreement scores in problem-solving (Body Interact 4.31, Conventional Simulation 4.57), fidelity (Body Interact 4.29, Conventional Simulation 4.58), and reflection with feedback (Body Interact 4.40, Conventional Simulation 4.65). In this cohort of participants, the employment of conventional simulation yielded a commendable elevation of self-assurance in the educational course with the SSCL tool (Body Interact 4.24, Conventional Simulation 4.52), and an expanded multiplicity in learning techniques in the EPQ (Body Interact 4.31, Conventional Simulation 4.61).

Discussion

Medical simulation has emerged as one of the foremost education methods in medical fields. It creates conditions that closely simulate real-life events and scenarios, which demand students to make challenging decisions and promptly adjust to changes that arise during the implementation of specific scenarios. This instils in future healthcare professionals a sense of confidence, accountability, authority, empathetic conduct, and team spirit. Medical simulation assists students in bridging the gap between theory and practice. It also helps to systematise and reinforce their knowledge. The acquisition of soft skills, such as managing stress and developing effective team communication, improves the quality of work in later clinical settings [8,1].

Table 3. Analysis and comparison of simulation results among Polish students.

Type of simulation	SDS CONCENT LEVEL - Information														
	SDS CONCENT LEVEL - support (1-5)	SDS CONCENT LEVEL - Problem Solving (1-5)	SDS CONCENT LEVEL - Feedback/Guided Reflection (1-5)	SDS CONCENT LEVEL - Fidelity (Realism) (1-5)	SDS CONCENT LEVEL - Objectives and Information (1-5)	SDS CONCENT LEVEL - support (1-5)	SDS CONCENT LEVEL - Problem Solving (1-5)	SDS CONCENT LEVEL - Feedback/Guided Reflection (1-5)	SDS CONCENT LEVEL - Fidelity (Realism) (1-5)	SDS CONCENT LEVEL - Objectives and Information (1-5)	SDS CONCENT LEVEL - support (1-5)	SDS CONCENT LEVEL - Problem Solving (1-5)	SDS CONCENT LEVEL - Feedback/Guided Reflection (1-5)	SDS CONCENT LEVEL - Fidelity (Realism) (1-5)	SDS CONCENT LEVEL - Objectives and Information (1-5)
Body interact	Av	4.51	4.58	4.30	4.30	4.55	4.28	4.44	4.44	4.44	4.42	4.31	4.40	4.29	4.34
	Med	4.60	4.75	4.50	4.50	4.75	4.50	4.80	4.80	4.80	4.50	4.40	4.50	5.00	4.60
	Mid r	64.86	71.43	63.11	63.11	68.05	63.63	65.80	65.80	65.80	65.92	62.03	62.40	66.08	65.14
	N	69	68	69	69	69	69	69	69	69	69	69	69	69	69
	SD	0.57	0.54	0.69	0.69	0.58	0.83	0.70	0.70	0.70	0.62	0.65	0.70	0.95	0.69
Traditional simulation	Min	2.80	2.25	2.40	2.40	2.50	1.50	1.40	1.40	1.40	2.50	3.00	2.00	1.00	2.00
	Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Av	4.66	4.56	4.57	4.57	4.66	4.56	4.61	4.56	4.61	4.59	4.57	4.65	4.58	4.54
	Med	4.80	4.75	4.60	4.60	4.75	5.00	4.80	4.80	4.80	4.75	4.80	5.00	5.00	4.60
	Mid r	75.06	67.63	76.79	76.79	71.92	76.28	74.14	74.14	74.02	77.86	77.86	77.49	73.86	74.79
Total	N	70	70	70	70	70	70	70	70	70	70	70	70	70	70
	SD	0.43	0.48	0.44	0.44	0.41	0.61	0.49	0.49	0.49	0.45	0.50	0.49	0.51	0.51
	Min	3.20	3.25	3.40	3.40	3.50	2.50	3.00	3.00	3.00	3.50	2.80	2.75	3.50	2.80
	Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Av	4.59	4.57	4.43	4.43	4.61	4.42	4.53	4.44	4.53	4.51	4.44	4.52	4.44	4.44
Mann-Whitney U	Med	4.80	4.75	4.60	4.60	4.75	4.50	4.80	4.75	4.75	4.60	4.60	4.75	5.00	4.60
	N	139	138	139	139	139	139	139	139	139	139	139	139	139	139
	SD	0.51	0.51	0.59	0.59	0.50	0.74	0.61	0.59	0.59	0.54	0.59	0.62	0.77	0.61
	Min	2.80	2.25	2.40	2.40	2.50	1.50	1.40	1.40	1.40	2.50	2.80	2.00	1.00	2.00
	Max	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
p (Monte Carlo)	2060.50	2249.00	1939.50	2280.50	1975.50	2125.00	2133.50	1865.00	1890.50	2144.50	2080.00	1789.50	2055.50	2150.50	1946.50
	0.119	0.560	0.042	0.552	0.047	0.199	0.217	0.017	0.020	0.209	0.149	0.008	0.123	0.184	0.030
	0.120 ^b	0.559 ^b	0.041 ^b	0.546 ^b	0.045 ^b	0.197 ^b	0.223 ^b	0.014 ^b	0.020 ^b	0.207 ^b	0.152 ^b	0.007 ^b	0.123 ^b	0.174 ^b	0.027 ^b

The data were analysed using the Mann-Whitney U test. The study includes two groups: PL, which is comprised of Polish students, and SLO, made up of Slovakian students. The number of respondents is denoted as N, with standard deviation shown as SD, minimum value presented as Min, maximum as Max, average as Av, median as Me, and middle rank as Mid r. The significance of results is indicated by p. This information is drawn from the authors' own work.

The teacher's responsibility is to objectively introduce and discuss the simulation scenario thoroughly. This study involved using EPQ and SDS questionnaires, which students found significant, as Roha et al. discovered in their findings on the importance of scenario familiarity, clearly defined objectives, and the role of the student during execution [9].

In the present study, we investigated the students' reflections on the feedback they received after engaging in the simulation scenario, during the debriefing phase. Based on the ratings provided on the Likert scale, the students ranked this aspect among the most crucial elements of simulation, with a minimum score of 4. This finding is consistent with Perlak et al.'s [10] study, where participants evaluated the opportunity to jointly analyse the scenario, draw appropriate conclusions, and solve potential issues during the simulation.

The conducted study sought to examine the efficacy of two distinct types of high-fidelity simulations with regards to nursing and medical students. The significance of traditional high-fidelity simulation was deemed valuable by the nursing students, akin to Wenxi Zhang et al.'s [11] study respondents who highlighted the importance of the realistic nature of the simulated event or situation. Aleksandra Frances Macamara and colleagues [12] conducted a comparison between high-fidelity and virtual simulations and found that participants preferred the traditional simulation approach. According to the participants, the traditional simulation provided a more useful and realistic experience, making it easier for them to interact with the patient. These findings align with those of Dinét J. and Kitajima M. and Muckler V. C. [13,14].

In the cohort employing conventional simulation in the SSCL instrument, an increase in confidence regarding the acquisition of knowledge was noted. Kardong-Edgren et al. and Hura et al. [15,16] attained elevated marks in two sub-scales: contentment with ongoing education and belief in one's aptitude to learn; the mean outcomes were over 4 on the Likert scale, attesting to an overall positive affirmation of simulation tutelage. Other authors have observed that high-fidelity simulation enhances knowledge and skills, without significantly affecting self-confidence. Their results were consistent with similar studies, with both dimensions scoring above 4 Likert scale, indicating student satisfaction with simulation during academic education. Comparable findings have been reported by other researchers such as Haddeland K. et al. , Bergamasco E. C et al. and Omer T. [17,18,19].

Both traditional and virtual simulations were valued and deemed effective by the surveyed students as a learning method within both fields of study. Students acknowledged the chance to link the information learned from lectures with practical tasks during scenario enactment. They perceived traditional simulation to be more

effective and akin to real conditions, enabling them to fully immerse themselves in their roles and refine practical skills.

The study aimed to demonstrate and justify that high-fidelity simulation is a viable substitute for real-world clinical practice. This eliminates the additional stress associated with interacting with actual patients, who may not be willing to cooperate, and allows students to learn in a controlled setting. The analysis presented affirms that simulation is an appropriate setting for students to acquire practical skills, integrating them with newly gained theoretical knowledge in a safe environment without endangering patients. It allows for effective and repeated learning of skills.

Conclusion

Analysing the two simulation types suggests that in the Polish group, there was greater agreement among participants in traditional simulation than students using Body Interact, as shown in all questionnaires.

Both countries' students mostly rated the virtual simulation's effectiveness similarly across all tools (SDS, SSCL, EPQ).

Variables such as the field of study and sociodemographic data had no significant impact on the effectiveness of learning through high-fidelity simulation.

In the future, the authors aim to broaden their research by incorporating conventional simulation among medical students to evaluate the significance of this pedagogical approach relative to virtual simulation.

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Simulation based learning on invasive techniques among nurses and ambulance officers

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Introduction: The competency of healthcare professionals in invasive procedures is of paramount importance [1]. Among these healthcare professionals, nurses and ambulance officers stand as frontline heroes, frequently called upon to navigate high-pressure situations where rapid and precise interventions can be life-saving [2]. Effective training and ongoing skill development are essential for these professionals as they confront the challenges posed by invasive techniques [3-4]. We embark on an in-depth exploration of the transformative role of simulation-based learning, employing video-based educational techniques, in preparing nurses and ambulance officers to excel in the domains of difficult airway management utilizing videolaryngoscopy and bronchofiberscopy and thoracostomy [5].

The practice of invasive techniques spans a spectrum of procedures aimed at diagnosing, treating, and managing critical conditions [6]. The management of difficult airways, in particular, presents a formidable challenge to healthcare providers [7]. Advanced tools like videolaryngoscopy and bronchofiberscopy have revolutionized airway management, offering improved visualization and success rates in endotracheal intubation. Proficiency in employing these advanced techniques, adaptable to diverse clinical contexts, is now a necessity rather than an option [8-9].

Moreover, the ability to perform thoracostomy, a procedure used to relieve tension pneumothorax or drain pleural effusions, is a life-saving skill for healthcare providers, especially ambulance officers, who often find themselves in emergency situations where swift intervention can make all the difference [10].

The high-stress, high-stakes nature of these procedures demands a departure from traditional training methods [11-12]. Traditional pedagogical approaches often fall short in adequately preparing healthcare providers for the multifaceted challenges and stressors inherent in these procedures. In contrast, simulation-based learning has emerged as a transformative force in healthcare education [13]. It furnishes a secure, controlled, and immersive environment in which learners can acquire, rehearse, and finesse their skills while mitigating the inherent risks associated with live patient encounters. This educational paradigm meticulously replicates real-world scenarios, compelling learners to make critical decisions under pressure and fostering effective teamwork and communication all foundational components of proficient execution of invasive techniques [14]. Simulation-based learning, coupled with video-based educational techniques, provides a solution, a safe, controlled, and immersive environment where learners can acquire, practice, and refine their skills while minimizing risks to real patients. It recreates real-life scenarios, cultivates decision-making under pressure, and fosters teamwork and communication, all essential elements for mastering invasive techniques [15]. Our research question aimed to investigate the comparative effectiveness between video-assisted learning, characterized by the absence of a physically present instructor, and simulation-based learning, involving an instructor's presence for equipment demonstration, in cultivating practical skills. The primary objective was to ascertain which educational approach yielded superior outcomes in skill development.

Methods and materials:

Study design and participants

We conducted a randomized controlled trial between 2021 and 2023 at the National Ambulance Service's Tolna County ambulance stations and the University of Pecs, Faculty of Health Sciences Simulation Centre. The study involved second- and third-year paramedic and nursing students who had completed their paramedical courses, along with National Ambulance Service employees possessing professional qualifications. Individuals with prior experience in training related to videolaryngoscopy or bronchofiberscopy were excluded from participation.

Randomization process

Participants (n=119) were randomized into two primary groups based on their method of education. Further subgrouping was performed according to participants' qualifications. The randomization process was conducted using [specify the randomization method, e.g., simple randomization, block randomization], ensuring an equal distribution of participants in both primary groups.

Instructor-Present Group: This group included ambulance officers, paramedic students, and nursing students who received hands-on instruction with an instructor present. The instructor demonstrated intubation techniques using bronchofiberscopy and videolaryngoscopy on a simulation mannequin suitable for airway management.

Video-Based Group: Comprising ambulance officers, paramedic students, and nursing students who watched a standardized 2-minute video tutorial on the utilization of bronchofiberscopy and videolaryngoscopy. The video content aligned closely with the instruction provided to the Instructor-Present Group.

Intervention and assessment:

Following the respective training methods, participants underwent individual assessments, performing intubations using bronchofiberscopy and videolaryngoscopy on an Ambu Phantom, suitable for airway management. Data collection utilized a custom-designed scoring sheet, evaluating equipment handling, occurrence of dental injury, Cormack-Lehane grading of laryngoscopic view, correct endotracheal tube placement, and procedure duration.

Scoring methodology:

A composite scoring sheet was designed, incorporating weighted scores to assess intubation success and procedure duration. Penalties were applied for complications during intubation, indicated by an audible 'click' sound from the Ambu Phantom. The scoring scale ranged from 0 to 10, with higher scores indicating greater proficiency.

Additional procedure for thoracostomy:

For thoracostomy procedures, one group received video-assisted instruction on the SamThoraSite device, while the other group performed the procedure without video assistance, relying solely on their acquired knowledge and skills.

Results

Difficult airway management

"Instruction in the Presence of an Instructor Group" A total sample of 36 individuals received training in the presence of an instructor. 58.3% of the group members were male, and 41.7% were female. Half of the group consisted of trained

paramedics, while the other half comprised students without prior qualifications. Among the participants who received equipment demonstration in the presence of an instructor, their total scores had a median of 8 ± 2.6 points for videolaryngoscopy and 8 ± 2.39 points for bronchofiberoscopy.

“No Instructor - Video Group” A group of 36 individuals received video-based education, with 58.3% being male and 41.7% female. Half of the group were trained paramedics, while the other half were students. Among the participants who received video-based equipment demonstrations, the median total scores achieved were 8.25 ± 1.44 points for videolaryngoscopy and 8.5 ± 1.88 points for bronchofiberoscopy.

When examining correct positioning, all participants in the “video group” were successful in using videolaryngoscopy, while in the “instructor-present group,” 91.7% achieved success. According to the Fisher exact test, there is no significant difference between the two groups ($p=0.239$). Similarly, in the case of bronchofiberoscopy, there was no significant difference in terms of successful intubation ($p=0.614$).

Thoracostomy

In the first subsample (R1) and the second subsample (R2), both groups of students had prior theoretical knowledge, but they lacked practical experience regarding thoracostomy procedures. R1 consisted of 21 participants, and their group watched the instructional thoracostomy video before the practical assessment. On average, they scored 5.26 points (66%) on the theoretical pretest. The procedure was performed in an average time of 1 minute and 1 second, with 20 out of 21 participants starting in the correct position.

R2 comprised 22 participants who did not view the instructional thoracostomy video before the practical assessment. On the theoretical pretest, they averaged 5.56 points (70%). Based on their higher theoretical scores, better performance was expected in the practical assessment compared to the video group. This expectation was reflected in the time taken to complete the thoracostomy, with an average of 57 seconds. However, despite this, only 17 out of 22 participants in this group began the procedure in the correct position. There was no significant difference in terms of successful outcomes between the subsamples (12 vs. 11 participants, $p=0.26$).

Interestingly, the hesitancy time in the R2 subsample was significantly better than that in the R1 subsample ($p=0.002$).

Conclusions:

Our results indicate that viewing a video was sufficient for participants, including paramedics and paramedic students, to acquire the necessary manual skills for using videolaryngoscopy and bronchofiberoscopy. We did not find any criteria

where participants who watched a video performed worse than those in the other group. In fact, in certain aspects, they performed even better, although this did not reach statistical significance.

Overall, it can be concluded that after watching a high-quality video recording, the use of a manual skill-requiring instrument can be learned effectively. Using a video allows for the replay and review of specific activities or crucial details multiple times. While practical training may be less cost- and time-efficient, it offers the advantage of immediate interaction with the instructor for clarifications if something is not entirely clear.

In a multi-participant setting where there may not be enough time to individually demonstrate a particular tool or its usage from all positions, creating an instructional video can be beneficial, serving as an educational supplement or even a substitute for personal instruction [16].

As our study revealed, presenting a specific procedure or instrument, even with the use of video projection, can effectively impart the necessary knowledge, thereby creating more time for practical training. This could potentially reduce the need for extensive theoretical instruction, allowing more focus on hands-on practice.

Regarding the SAMThoraSite device, we observed that its use is straightforward and does not require prior preparation, as all essential instructions are available on the device in the form of diagrams and labels. The students quickly grasped its function and were able to use it safely during the practical assessment. Based on our examination, it appears that the device could be effectively employed in a clinical setting, particularly among healthcare providers who do not yet have experience, in a laminated format.

Simulation-based learning has proven to be a valuable educational tool for healthcare professionals, particularly nurses and ambulance officers, when it comes to mastering invasive techniques such as difficult airway management and thoracostomy. In this context, the use of video-based learning has emerged as an effective and flexible approach.

Our study highlights the significance of video-based learning in equipping healthcare practitioners with the necessary skills for challenging procedures like difficult airway management and thoracostomy. The findings reveal that participants who watched instructional videos demonstrated competence in both theoretical knowledge and practical application. One key advantage of video-based learning is its accessibility and repeatability. Learners can review and revisit video content as many times as needed, reinforcing their understanding and skills. This accessibility is especially beneficial for large groups where individualized instruction may not be feasible due to time constraints.

Moreover, our study indicates that video-based learning can bridge the gap between theory and practice effectively. Participants were able to apply their acquired knowledge confidently during practical assessments, leading to successful outcomes.

In conclusion, simulation-based learning, particularly through video-based instruction, holds great promise for improving the competency of nurses and ambulance officers in mastering invasive techniques like difficult airway management and thoracostomy. The flexibility, accessibility, and effectiveness of this approach make it a valuable addition to healthcare education and training. As technology continues to advance, leveraging video-based learning alongside traditional methods can enhance the overall preparedness and competence of healthcare professionals, ultimately benefiting patient care and safety.

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Simulation education in healthcare training

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The development of simulation education in the training of healthcare professionals started in the early 2000s. In addition to the simpler models used before, realistic patient simulators have appeared, which now offer the possibility to model practical tasks in a realistic environment, to create situational exercises involving modern computing tools or even human actors. The scenario exercises will enable students to acquire at a skill level both technical and non-technical skills in a protected environment. Simulation-based education has required the development of new teaching methods in order to achieve the desired goal and to be effective in practical training [1,2].

The need for the introduction and development of simulation education was also underpinned by the European Council's framework for action in 2000, which set out the objectives to be achieved by European countries by 2010. The five basic skills whose acquisition is a priority for the European education system and for the development of common competences were defined. The key competences have been identified in the fields of information and communication technologies (ICT), technological culture, foreign languages, entrepreneurship, and social relations. It also drew attention to the importance of the acquisition of basic skills and the need to increase the emphasis on the so-called European dimension. It has become clear that the unifying European processes of higher education and labour market - vocational training - adult education - cannot be successful if future European citizens do not have the required level of skills and competences [3].

The next significant factor is the fact that the fundamental purpose of simulation-based education is associated with the concept of patient safety and safe patient care worldwide. Abdulmohsen, in a 2010 summary article, describes how

simulation-based medical education offers useful opportunities to reduce risks to patients and learners, improve student competence and confidence, as well as to increase patient safety and reduce healthcare costs in the long term [4].

In addition to the many advantages of simulation training, there are also some limiting factors, which include personnel, time, and financial constraints. Because it is taught in small groups (3-4 students), with special equipment, scenarios to write, instructor time, skill lab set-up and equipment, costs due to equipment wear and tear.

The toolbox of simulation education

There is currently no international classification of simulation tools and demonstration solutions from a technological point of view.

It can be grouped according to the classification proposed by David Gaba:

1) verbal role-play, 2) standardized patient, 3) sub-task simulator, 4) digitized patient and 5) use of electronic patient simulators [5].

Developments in technology also offer a number of new solutions in training e.g. 3D printing, VR and AR based solutions, and robotics to exploit the potential of artificial intelligence.

Structure of a simulation lesson

Teaching skills using a four-step teaching method: 1st step the instructor first performs the task to be learned in real time. 2nd step the instructor repeats the sequence of movements more slowly, while explaining each movement in detail 3rd step a designated student directs the instructor to perform the sequence of movements previously seen. 4th step the student performs the exercise

Simulation-situational training: complex situations are solved in groups of 3-4 people. The simulation classes are composed of 3 parts, briefing, scenario solving and debriefing. The briefing consists of an introduction to establish a positive atmosphere, a pre-meeting and a summary part. The simulation itself is the situation to be resolved based on a pre-written scenario. And the debriefing is a quick summary, focusing only on the exercise in hand, with an objective evaluation. It provides an opportunity for self-reflection and feedback.

Measuring Instrument

Simulation-based education in health education initially focused mainly on the presentation of psychomotor skills, and in the last decade competency-based education has been introduced in practice in higher education. In order to measure

the achievement of competences, a measurement tool had to be developed to measure whether nursing students are ready for field practice. The most commonly used competency measurement tool was the Creighton Simulation Evaluation Instrument (C-SEI), developed by researchers at Creighton University, which assesses students' competency in four core competencies (assessment, communication, critical thinking and technical skills) across 22 professional tasks. It provides assessment options of 'competent', 'not competent' or 'not applicable' for each practical skill in a simulated clinical setting [6]. In 2014, Hayden and colleagues revised the instrument and re-named it the Creighton Competency Evaluation Instrument (C-CEI) [7]. The innovatively revised measure has already emphasized the centrality of patient safety as a guiding principle of nursing practice, and the critical thinking domain has been re-named the clinical judgment domain to reflect the nursing-specific aspect of nursing better [8]. Studies have supported the reliability and validity of the C-CEI measure in clinical and simulation settings, which has helped to develop a recommendation for the percentage of practical hours that can be completed in simulation practice hours [7,9]. The results of studies that have demonstrated the practical usability, reliability and validity of the C-CEI highlight that the instrument contains comprehensive and easy-to-understand questions that can be used to assess student performance effectively [9]. The scores and results of the instrument correlated well with the Laster Clinical Judgment Rubric (LCJR), a tool developed to measure clinical judgment of nurses [10] and with the previous C-SEI questionnaire [11]. Burbach and colleagues in 2019 also used the C-CEI to measure student performance in simulation conditions and to measure the correlation between student performance on knowledge-based examinations, with results showing a correlation between C-CEI scores in simulation education and performance in a theoretical pathophysiology course [12], also found a correlation with scores on basic knowledge tests for C-CEI scores in palliative care [13], as scores on knowledge tests increased, so did competence scores on C-CEI [14][15]. All these results show that C-CEI scores can be used to differentiate the level of knowledge and theoretical preparedness of students and can distinguish between well-prepared and poorly performing students [8].

Simulation Research Group at the University of Debrecen

At the University of Debrecen, Faculty of Health Sciences a Simulation Working Group was established in 2022, education started in the Skill-lab, we started to revise the sample curriculum, and simulation-based education was integrated into the curriculum. In 2023, we established a Simulation Research Workshop, in which

an interdisciplinary team of teachers conducts research on the effectiveness and efficiency of simulation-based education using the C-CEI tool, the Hungarian adaptation of which was completed and adopted by researchers at Creighton University.

Aim of the research

Measurement of the effectiveness of simulation-based education, student competency assessment based on the principle of competence-based education using the Hungarian and English versions of the C-CEI instrument.

Material and method

In the first phase of the research, the Hungarian adaptation of the instrument was developed and the validation process was started. A cross-sectional survey of Hungarian and English-speaking students participating in the simulation course is being carried out, and questionnaires are being collected. SPSS 24.0 software will be used for data processing and statistical calculations.

Expected results

As a result of the research, a reliable and practically applicable Hungarian version of the questionnaire will be developed, which will allow us to measure the implementation of competence-based education and to identify possible shortcomings and areas to be corrected. We will be able to raise the quality of education and raise competences to the level of proficiency.

Conclusion

The use of realistic patient simulators can be seen as an appropriate method for measuring student performance and competence when used in conjunction with a reliable and validated assessment sheet. By taking into account the current level of student knowledge, existing competences, technical skills and abilities, as well as non-technical skills and critical thinking, the measurement can be similar to a real clinical setting.

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Nursing in prehabilitation

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Prehabilitation is a relatively new concept, which is becoming increasingly popular in medicine and has formed the basis of many publications and scientific studies, and its benefits are beginning to be recognised by specialists and experts in various fields of medicine. It means preparing the body in advance for a hard effort, involving a high physical and energetic load. It is an optimal, multidirectional prophylactic measure aimed at creating a specific functional and metabolic reserve in order to better tolerate the expected effort and load. Such action is aimed at improving the patient's general condition, which determines better tolerance of the planned therapeutic process, including surgery or oncological treatment, including surgical treatment. It also aims to reduce the risk of complications, shorten the time of necessary hospitalisation, and achieve the highest possible quality of life in the shortest possible time [1,2]. Therefore, the aim of the study is to present a general concept of prehabilitation methods of its implementation and measurable benefits from its use.

Prehabilitation is a new concept that stems from the realisation that perioperative or oncological care must include, in addition to the clinical and pharmacological preparation of the patient, the optimisation of the patient's physical state, nutritional state and mental state. Its aim is not just to perform a single medical procedure, but to provide comprehensive measures to guide the patient safely through the surgery and ultimately achieve a specific physical and psychological well-being and social reintegration. In view of the fact that every year more than 300 million people undergo various types of surgery, including oncology, and that cancer, right after cardiovascular diseases, is at the top of the list of diseases of civilisation and is one of the leading causes of death [3], the issue of prehabilitation takes on a completely different meaning.

An indispensable element accompanying surgical and oncological treatment is the organism's reaction to trauma (stress), understood as a factor that interferes with the organism's functions and disrupts its balance. Starvation, dehydration, infection, surgery, the cancer process, physical inactivity, or mental stress are some of the factors that place a heavy burden on the body. In response to an injury, the body triggers the so-called a "stress reaction" mechanism responsible for the occurrence of the change syndrome. The changes in question are adaptive and are of two types. The first is the Local Adaptation Syndrome (LAS), which includes specific changes occurring at the site of the stressor (e.g. at the site of a burn). The second is the General Adaptation Syndrome (GAS), which includes non-specific, generalized physiological changes not directly related to the nature and action of a harmful stimulus. This multidirectional stress response based on the neurohormonal response, including autocrine, endocrine, paracrine, and metabolic responses, thus initiating immediate short- and long-term systemic changes, allowing the body to maintain balance and the ability to perform activities of daily living. However, a prolonged and uncontrolled stress response is the substrate for many adverse changes in the in the body. In the absence of specific functional and metabolic reserves, the developing post-traumatic syndrome and poor tolerance of traumatic stress can result in the occurrence in patients of adverse events in the form of complications (20%–30%), reduced functionality (40%), various types of disability (10%–20%), impaired system and organ function (50%) and cognitive impairment (25%) [4]. There is therefore an ongoing interest in the development and systematic implementation of perioperative care protocols. One of such protocols is the evidence-based protocol of comprehensive perioperative care for improved patient outcomes (Enhanced Recovery After Surgery (ERAS)), which has measurable benefits in terms of, among other things, reducing the stress induced by surgery, reducing catabolism and the number of complications, speeding up the patient's return to full activity, thereby reducing the duration of hospitalisation and improving the quality of care in surgical wards. This approach also has other terms, e.g. Fast Track Surgery (FTS) and Pathway of Controlled Rehabilitation with Early Ambulation and Diet (CREAD). These programs are intended to shorten the patient's stay in hospital and thus reduce treatment costs [5-8].

Despite surgical developments and advances in perioperative safety, postoperative complications still have a clear negative impact on clinical outcomes, patients' quality of life and the economic costs of treatments [9,10]. In addition, surgical treatment results in reduced physical activity and immobilisation of the patient in bed, as well as the adverse effects of general anaesthesia and pain [11]. Sedentary lifestyle and weakness are now recognised as important determinants of surgical prognosis [12]. The prevalence of both features increases markedly with age, but it

is also associated with the presence of chronic diseases, the consequence of which is a progressive deterioration of a person's cardiopulmonary reserve and functional capacity [13]. Despite advances in surgical care, there are still patients with suboptimal recovery from surgical intervention. The elderly, oncology patients, patients with limited protein reserve are those most at risk of negative post-surgical outcomes. Although measures are taken both during and after the introduced oncological or surgical therapy to improve the recovery and rehabilitation process, it has been shown that the period preceding the invasive, or in oncology, systemic therapeutic process is the most effective for interventions – following the principle that prevention is better than cure [14].

Over the past few years, increasing evidence has accumulated on the potential of prehabilitation in optimising physical and psychological resilience, and in coping with stress generated during major surgical procedures, both general and oncology surgery. Therefore, the most effective way to prevent surgery-related complications is to implement measures already in the preoperative period and systematically continue them in the postoperative period. Therefore, prehabilitation should be an additional and valuable component of ERAS pathways, improving and enhancing its effectiveness by designing a targeted perioperative intervention tailored to the patient's needs [15,16]. This will allow a better characterisation of high-risk patients, especially in the elderly, frail, and multi-disease group, will give the opportunity to modify the conditions, thus improving the physical and emotional state of the patient [17]. This type of management will allow a strategy to be established for the prevention of potential complications, with the aim of reducing their incidence and severity and therefore implementing an appropriate prehabilitation programme [18]. The range of possible measures to prepare the patient for surgery is constantly expanding. Currently, three main levels of prehabilitation can be identified, depending on the measures taken. The first is classical prehabilitation, comprising four elements, such as nutritional preparation, physiotherapy, psychological preparation, and elimination of addictions. It is the universal basis for preparing the patient for any more complex surgical treatment, but also for chemotherapy or radiotherapy. The second is extended prehabilitation, understood as the optimisation of the patient's condition, taking into account his/her general state of health, in the context of co-morbidities (e.g. anaemia or diabetes). The third level is individualised prehabilitation, referring to a group of patients requiring specific preparation, related to the type of surgery and clinical characteristics of the patients [19]. Classical prehabilitation is based on **four lines of action**: elimination of addictions, nutritional preparation, physical exercise, and psychological support.

The elimination of bad habits mainly refers to giving up smoking and eliminating alcohol consumption, which is generally expected to result in a reduced risk of

dedicated diseases, as well as the prevention of perioperative complications, including reduced mortality rates [20–22]. The harmful effects of smoking have been proven and widely reported in the literature [20], so giving up smoking at any time before or after surgery is always beneficial for the patient. Even one day without a cigarette before surgery helps to improve tissue oxygen supply and reduce carboxyhaemoglobin levels. However, a reduction in mucus production and bronchial hyperresponsiveness requires a longer period without tobacco (min. 1–2 weeks), and only after at least 3–4 weeks of absence does the risk of wound healing complications decrease. Stopping smoking 2 months before surgery is most beneficial, but the effects of smoking can be improved within 4 weeks of quitting [23]. Therefore, it would be most beneficial to quit smoking at least four weeks before the operation. The same is true for alcohol. Prior to elective surgery, it is advisable to limit alcohol consumption for at least 4 weeks to reduce postoperative complications, which are likely to be a consequence of alcohol's effects on cardiac function, blood clotting and immune function, combined with the surgical stress response. However, in this regard, the assessment of clear benefits is still a subject of research. Consequently, the optimal timing of such interventions has yet to be determined [24]. However, the effects of alcohol abuse on the liver, pancreas and nervous system are well known and proven. Its chronic consumption increases inflammation and leads to organ steatosis and further necrosis and fibrosis. In contrast, permanent impairment of organ function and carcinogenicity are the end stages of uncontrolled addiction.

Nutritional preparation is important in all patients, but it is particularly important and absolutely necessary in patients with severe malnutrition, which delays recovery and increases the risk of postoperative complications such as impaired wound healing, delays in the next cycle of oncological treatment, the need for repeated surgical intervention or prolonged stay in treatment facilities [25]. The extent of nutritional preparation depends on the individual patient's needs and the type and complexity of the procedure or therapy being performed. This preparation emphasises the assessment of the patient's nutritional status as soon as possible and appropriate management, including consultation with a dietician if malnutrition or risk of malnutrition has been identified. Severe malnutrition, especially the need for enteral or parenteral supply, requires the support of nutritional clinics, which have the capacity to establish appropriate nutritional accesses and dedicated patient monitoring. An important part of nutritional preparation is immunomodulatory nutrition, i.e. the administration of selected nutrients (arginine, omega-3 fatty acids and glutamine) in excess of the basic requirement, which have a positive effect on the immune system. Immunnutrition supports the treatment of underlying and co-morbid conditions, stabilises nutritional status, as well as reduces the risk of

perioperative complications and accelerates wound healing and recovery time. Nutritional support also includes a reduction in perioperative starvation, which also takes into account the ERAS protocol. Randomised trials have shown that preoperative carbohydrate supply improves well-being and reduces nausea and vomiting [26] and is also safe in well-controlled diabetics [27]. Taking clear liquids up to 2 hours before surgery does not increase gastric contents, decrease gastric fluid pH or increase complication rates. Therefore, in patients without conditions associated with delayed gastric emptying, it is now recommended that clear liquids be taken up to 2 h before induction of anaesthesia, and that fasting on solid food be restricted to 6 h before induction [28].

Another important aspect of prehabilitation is the implementation of appropriately selected exercises. The introduction of even very simple exercises improves the aerobic capacity of the body and supports anabolic processes. Physical activity plays a key role in all patients being prepared for surgery and is particularly important in patients with excessive body weight. It is therefore recommended that patients undertake regular physical activity, individually adapted to their capabilities, at least 30 minutes a day before surgery. If the patient's condition allows it, high-intensity endurance training is highly recommended. In stressed, elderly, cachexia patients, appropriately selected physical exercise is very important and can have a beneficial effect, especially on the long-term outcome of treatment. In patient groups that require individualised exercise selection, it is optimal for the physiotherapist to be involved in the planning of physical activity as part of the preoperative preparation [29]. Frequently, the relatively short time between diagnosis and surgery precludes more advanced exercises; however, patients can be taught appropriate breathing patterns and mundane activities such as getting out of bed after surgery or stabilising the abdominal integuments when coughing, even within a few days, as well as exercises to mobilise the peripheral circulation as part of the prevention of embolic and thrombotic complications.

Prehabilitation also includes **psychological support** to reduce the patient's anxiety and stress, which negatively affects the treatment and recovery process. Psychological support should include both patients and their families or loved ones, as very often it is those closest to the patient who have a great influence on the thinking and behaviour of the patient himself. In order to get the family to cooperate in this, they need to be prepared, including being told how important their role is in the patient's therapeutic process. Providing detailed information can prevent or minimise the occurrence of stress, anxiety, or fear of surgery. The conversation should cover preparation for surgery, the surgery itself, anaesthesia, and post-operative care. The patient should get to know the staff who will participate in his/her surgery and provide care immediately

afterwards. The way the message is communicated plays an important role in improving recall. The information to be remembered by the patient must be as simple as possible, and the number of new messages and difficult wording to be remembered must be reduced. When communicating with patients and their families, avoid medical jargon, technical language, and acronyms to reduce the risk of embarrassment or feelings of humiliation among patients. It is also important to receive feedback from the patient reassuring us that the messages that have been conveyed are fully understood by the patient. Studies have shown that between 40% and 80% of what doctors tell patients is immediately forgotten, and half of what is left in memory is mostly not properly understood. It is often difficult for patients and family members to recall the information provided by doctors. However, a patient who has received comprehensive information before surgery fully cooperates with the staff while in the recovery room. An effective teaching strategy to facilitate the patient's understanding of the information provided is written materials in the form of a leaflet or brochure. All patients undergoing prehabilitation should receive a booklet tailored to their specific needs and planned interventions. When they return home, they will be able to review this information once again at their own pace, discuss it with their loved ones and, if necessary, prepare questions about unclear issues that they can review at their next visit.

At present, there is no uniform/definitive canon regarding the duration of prehabilitation, based on the results of reliably conducted studies. Quoting from the Polish consensus of comprehensive perioperative care, the most common standard is a period of 4–6 (sometimes 8) weeks [30]. A shorter period, i.e. 2 to 4 weeks, has less effectiveness, while a longer period than 3 months risks poor patient compliance. Thus, the ideal time frame for a prehabilitation programme should be estimated based on the best correlation between the effectiveness of the programme and the preparation regime. Therefore, the optimum time for prehabilitation should be at least 4 weeks with an extension to 6 or even 8 weeks if the underlying disease allows it [31,32]. Prehabilitation should not postpone planned treatments but, on the contrary, not only facilitate them but, in some situations, accelerate them.

Prehabilitation is an example of taking a patient under holistic care based on the cooperation of many specialists (doctors, nurses, pharmacists, psychologists, physiotherapists as well as dieticians), with the ultimate goal being a comprehensive assessment of perioperative risk. Prehabilitation is based on a concept: everyone works together as a team to ensure the patient's preoperative optimisation. The patient should have the opportunity to talk to each specialist on the team, from whom they will receive specific guidance. However, with such a complex process, someone has to coordinate all the activities and ensure the smooth implementation of properly coordinated therapeutic and care interventions. The main aim of managing the prehabilitation process is to achieve continuity of care by integrating all activities, while

ensuring patient safety, and support throughout the programme. This complex process requires a specialist who will act as the 'common denominator' that determines the maximum preventive effect of the programme implemented. This is because good co-ordination between all those involved in the programme will lead to better outcomes for patients, better cooperation among healthcare professionals within the care team and fewer unplanned events overall. In this regard, nurses should play a key role [14]. Over the years, the demands of an increasingly complex healthcare system have led to the role of nurses undergoing a process of redefinition. Currently, the nurse is one of the autonomous professionals, part of an interdisciplinary team, with high and varied competencies. The implementation of professional services by the nurse is a complex process, requiring creativity, knowledge, compendiousness, communication skills and flexibility in action. The complex implementation of health services encompasses both the health problems, socio-cultural and educational conditions of the patient and his/her family. The professional competence of the nurse enables the implementation of treatment, the continuation of therapy, rehabilitation and, above all, the preparation of the patient and his or her family for coping with the disease, i.e. for self-care and self-care. The nurse's role in patient care is multifaceted; it includes patient assessment, patient and family education, support and counselling, physical care, continuity of care, research, and administrative and organisational activities. An important element of holistic nursing care is the ability to communicate both with the patient and family as well as with individual members of the interdisciplinary team. The aforementioned elements of the professional profile indicate that the nurse should be a key figure in the prehabilitation programme, responsible for coordinating and managing the process. This is because it can be assigned a number of different roles and responsibilities based on professional competence. In addition to carrying out independent professional functions (educational, caring, management), as part of the overall care of the patient, it undertakes a number of activities within the dependent function (therapeutic) and interdependent functions (health promotion, preventive, rehabilitative) with other healthcare professionals such as the doctor, psychologist, dietician, pharmacist, or physiotherapist, i.e. all the specialists included in the prehabilitation programme.

A patient undergoing surgery faces many different problems. All interventions, whether diagnostic or therapeutic, raise the patient's fear of death, pain, a shorter or longer period of dependence on others, loss of social function and complications that may lead to disability. All of this generates high levels of stress and anxiety, which is why the patient requires psychological support. However, before he/she is referred to a psychologist, he/she should go to a coordinating person – a nurse – who will make contact with him/her, listen to him/her, carry out an interview and provide various types of support, depending on the current need. The support received makes it easier

for the patient to overcome negative emotions, reduces the feeling of threat to priceless values, i.e. health and life, facilitates the acquisition of coping skills to deal with stressful situations and increases the quality of life in the illness [33]. Of all the people who take care of the patient, the nurse is the one who is closest and stays with the patient the longest. As a rule, she is the first person the patient meets and makes contact with, expecting information and support. Already at this stage, using elementary psychotherapy, the nurse can take the first steps in helping reduce stress, involve the patient and his or her relatives in the prehabilitation process and build motivation to undertake specific interventions. At a later stage, she can coordinate and plan all activities, guiding the patient through the stages of the programme. She should be the glue that connects the patient with the other members of the team, clarify contentious issues, provide guidance and monitor the process. Using communication skills, she can enable an efficient and clear flow of information between the patient and the specified professional, as well as between healthcare professionals, taking into account the current progress of the patient in the process.

Another area of the nurse's work is to interact with and support team members in the initial as well as staged assessment of the patient's condition during the process. As part of their professional competence, the nurse may assess a patient's condition on the basis of a subject and physical examination, which includes history, physical examination, instrumental assessment of vital signs, assessment of a specific condition or risk using a scale, including, for example, assessment of the risk of malnutrition. The assessment of a patient's condition is also a broadly defined diagnostic process, including the performance of dedicated laboratory tests or imaging tests, in which the nurse also participates, by, among other things, preparing the patient, as well as monitoring the patient's condition after their performance. During the patient's face-to-face visits, or on the basis of the information provided, the nurse can make an initial assessment of the patient's condition, verify the extent of the patient's needs and make a referral to an appropriate specialist from the team in order to compensate for the deficits present.

Other tasks that the nurse may carry out are related to participation in the therapeutic process, including pharmacotherapy. During follow-up visits, the nurse should ensure the safety of the patient by monitoring his or her state of health in terms of the effectiveness of the therapy and the occurrence of undesirable symptoms as well as to educate and provide guidance on self-care during ongoing treatment as well as after treatment. Provide education on the various elements involved in pre-operative preparation. According to the partnership model, the patient should have such knowledge about his or her illness and medical care that he or she can actively participate in the treatment and nursing process. The increased demand for knowledge on

the part of the patient, requires all professionals and, above all, the nurse to perform the extremely important function of educating. The nurse should educate the patient on the activities carried out in the various lines of prehabilitation, i.e. on nutrition, giving up habits, taking up physical activity or reducing stress. It should also play a key role in raising awareness of the concept of health literacy, in creating and improving patient education materials to facilitate the prehabilitation programme, and in engaging and motivating patients to follow its guidelines.

Another area of activity for the nurse is monitoring, which includes admitting and registering patients on the system, entering and updating data, checking and completing patient records and monitoring the stages of the process. These measures will achieve a state where all key elements of the programme are recorded, facilitating monitoring of the patient by the whole team throughout the programme. It will also allow early verification of patients who miss appointments or fail to take the indicated action to determine the reason for the situation. Digital solutions in the form of, for example, mobile apps, can be used to monitor selected aspects as well as to communicate with the patient, facilitating ongoing contact with the patient as well as assisting in the logistical process of scheduling appointments. They will also make it possible to send information or educational material [14,34].

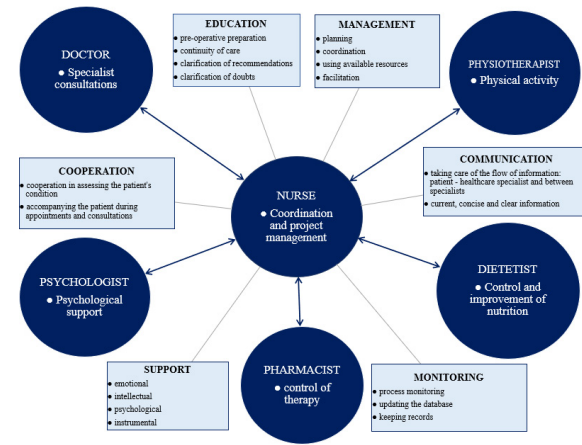


Fig. 1. Organisational chart of the prehabilitation process.

Given the range of tasks involved, the nurse should be a cornerstone in the prehabilitation team. The role of the nurse in the prehabilitation clinic should be comprehensive and play a key role in coordinating care and supporting and educating the patient, as well as making appropriate use of resources, or interacting with other team members (Fig. 1).

To sum up, it should be clearly emphasized that the benefits of prehabilitation are indisputable, and their effectiveness will be greater the higher the level of management of the process and the more motivated and educated patient. At the same time, it is worth remembering that in all the studies that looked at prehabilitation, no side effects were reported. The main beneficiary of these benefits is, in the first instance, the patient and his or her loved ones, but equally important are the savings resulting from the reduction in complications of treatment, through, among other things, a reduction in the length of hospitalisation, a reduction in the use of drugs or medical equipment. However, despite growing evidence of the effectiveness of prehabilitation, it has still not become part of standard practice in most centres. The introduction of prehabilitation still faces a number of constraints from both the system and patients. Lack of knowledge, lack of time, financial constraints, the organisational and logistical scope of the project, the multifaceted nature of the programme, and lack of social support are all significant factors hindering the introduction of prehabilitation into everyday practice [35,36]. However, the fact is that prehabilitation is the direction that needs to be developed, spread, and promoted so that patient preparation and treatment time is well managed. Knowing that YES and knowing HOW should spread the idea of prehabilitation with the health and life of the patient at its core.

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The Role of Nurses During the COVID-19 Pandemic

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Supported by a program of the Ministry of Health of the Czech Republic reg. No NU 21-09-00300. All rights under intellectual property regulations are reserved.

Introduction

In modern world history, four significant pandemics have been recorded in the 20th and 21st centuries. These were associated with the Spanish Flu, Asian Flu, Hong Kong Flu, and the H1N1 pandemic in the Czech Republic Pandemic Plan [1]. In the last 20 years, several epidemics of acute respiratory disease with pandemic potential have occurred. In the future, it is expected that further epidemics/pandemics of viral respiratory diseases can and will follow, for which it is necessary to prepare health professionals (and hence the health system) and the public. Known pandemics in the past have brought with them significant loss of life and valuable experience that has improved the care of patients with infectious diseases.

Nurses comprise the most significant number of health professionals in all healthcare systems. Thus, it is more than likely that they will encounter an infected patient. Nurses are the most important and probably the most burdened link in the health care system in dealing with a pandemic. Their importance during a pandemic is highlighted by Nolte of 2020, who points out that the role of nurses has historically been neglected in the context of pandemics, even though they have always performed their duties to the fullest during pandemics. Some have even paid with their lives. We must remember that nurses carry out activities that are based on their competencies and, at the same time, respond to the needs of patients, which are very different because their experience of the new situation influences them. Ensuring professional competencies, both in terms of personal protective

equipment (and generally adherence to isolation regimes) and in terms of awareness, psychosocial support, education, and motivation, is key to the effective delivery of healthcare to the acutely and chronically ill and the effective functioning of the healthcare system during and beyond epidemic/pandemic times.

The COVID-19 pandemic has highlighted several complex ethical issues that health professionals, and especially nurses, face in caring for patients and families. Issues have also surfaced that may create concerns for nurses, particularly in the safety of patients, colleagues, and families, but also in the changing nature of nurses' relationships with patients and families [2]. Often these are entirely new situations for which nurses may not always be adequately prepared. The availability of adequate information, a uniform procedure for dealing with a given situation, and material equipment become certain obstacles. The search for appropriate solutions is also made more difficult by time pressure, which, combined with the ambiguity, unstructured nature, and novelty of the situation, acts as an emotional burden. The current situation also shows that, as a result of this situation, nurses are beginning to experience physical exhaustion, fatigue, anger, fear, helplessness, and fear of infection, linked not only to the undersized professional support for the running of health facilities but also to the changes in the provision of care at a primary level during the pandemic.

It is pretty clear that nurses are at the highest risk in a pandemic situation. They are the closest to patients and the most exposed to the possibility of infection and the emotions of patients and their families. Performing routine nursing activities with personal protective equipment becomes much more challenging. Nurses are also tasked with coordinating patient triage activities. Those nurses who work in exposed workplaces are used to following the precautions involved in caring for a patient at high risk of infection. However, a significant proportion of nurses work in places where these rules are difficult to grasp and may expose themselves to the risk of infection and specific stressors that may be triggered by a lack of training in this area [3]. Petzold 2020 [4] says, that coping with such situations requires the normalization of strong emotions and stress, the fulfillment of basic needs, social support, clear communication and task allocation, flexible working hours, and the use of psychosocial and psychological support without stigma.

Research by Al-Hunaishi W, Hoe VC, and Chinna K [5] on the role of nurses in dealing with pandemic situations shows that their willingness to engage increases with knowledge, practice skills, and autonomy. Working with personal protective equipment (PPE) is a significant stressor [6], and the fear of transmitting the disease to loved ones [7]. Communication within healthcare settings, especially with prolonged and frequently changing referrals and lack of training in using protective

personal equipment, can be very stressful [3]. The above points to the need for streamlining and substantive support for nurses (hence sectors) dedicated to the care of hospitalized patients, as well as primary and community care. Even the WHO 2020 [8], in its recommendation, highlights the need to ensure the continuity of selected essential services, their safe delivery, the strengthening of community care as an essential component of primary care in the fight against COVID-19, and the need to protect health workers.

Objective of the project

The main objective of the project is to describe the role of the nurse during epidemics/pandemics in the health care system, i.e. from the perspective of nurses, physicians, and patients in high-risk, low-risk and primary care settings, and to clarify the factors influencing the work activities of the nurse. The views of the adult population in the Czech Republic and health professionals on the issue of the position of the nurse in the epidemic/pandemic period were obtained through a representative quantitative survey of the adult population and quantitative research in the form of a guided interview with nurses and physicians. The guided interview with nurses was based on a standardized questionnaire supplemented with nurses' issues in primary care.

The research sample was constructed as a representative sample using random sampling using quotas. It was a sample of 1,200 nurses, 1,200 physicians, and 1,800 adult population. The research was conducted through a professional interviewer network in approximately 40 healthcare facilities in all regions of the country, with a proportional representation of teaching hospitals, regional hospitals, district hospitals, other hospitals, specialist medical institutes, and the primary care sector (i.e. adult general practitioners, general practitioners for children and adolescents, and home care nurses).

Results

Evaluation of the questionnaire surveys yielded exciting findings.

The questionnaire survey of the target group "nurses" collected their socio-demographic data (including their marital status, number of dependent children), their experience of the pandemic period, problems that accompanied their work, and factors affecting the provision of nursing care. It was investigated whether they

managed the use of new protective equipment, its availability and whether the nursing care provided in this way impacted the nurse-patient relationship. At the same time, nurses working in GP surgeries were asked whether they would welcome the possibility of online communication with the patient.

Of the total $N=1197$ respondents, almost 9/10 (89.6%) respondents expressed full or partial agreement with the statement that they felt that the situation surrounding COVID-19 placed an increased burden on their bodies. Almost the same proportion of respondents (88.4%) felt that the situation around COVID-19 had meant changes in their social life. For more than $\frac{3}{4}$ (76.7%) of respondents, the situation around COVID-19 meant changes in their personal life. Respondents most frequently identified these three factors. 24.1% of nurses strongly agreed, and 40.7% of respondents instead agreed with the statement that the pandemic impacted their physical condition. More than 68% of nurses described changes in their mental state. Nurses were least likely to agree with the statement that they had left the workplace (3.3%), that they had considered it (9.3%), or that their colleagues had left the workplace (17.2%).

The most frequently cited factor affecting nurses' work during the COVID-19 pandemic was fear of transmission (63.6%). Fear of the unknown (59.0%) and increased workload (54.7%) were also frequently cited as vital influencing factors. Nurses' responses were statistically significantly influenced by the type of health facility they worked in ($p < 0.05$) and the location where they worked during the COVID-19 pandemic ($p < 0.001$).

Concerns about self-infection and transmission of COVID-19 to loved ones evolved during the pandemic. In the first wave of the pandemic in the spring of 2020, healthcare workers accounted for almost 10% of those infected in the Czech Republic (UZIS). A similar proportion of healthcare worker infections out of the total number of infections was reported globally at that time to WHO 2020 [8]. During the COVID-19 pandemic, nurses worldwide worked longer hours than usual, sometimes without sufficient protective equipment [9,10]. Some nurses became ill because of this, and some lost their lives. The ICN reports that 1,500 nurses in 44 countries and globally, more than 20,000 health workers have lost their lives, and more than four million health workers have become infected due to COVID-19 (ICN 2020). This has led to a significant shortage of health workers and work overload for those who could work.

The nurses had to strengthen their existing skills. Carpenter et al. say that in 2021, their mental health due to long shifts, lack of consistent information regarding the COVID-19 pandemic, heavy workload, and high expectations from patients [11], along with lack of protective equipment, lack of sleep and inadequate psychological counseling [12,13,14,15], led to a high psychological burden.

Nurses' perceptions of the clarity of information about the availability of GP outpatient clinics during the COVID-19 pandemic for their patients were significantly related to nurses' age, their marital status, their length of experience in healthcare, the type of healthcare facility, the type of hospital in which the nurse works and the location of their work during the COVID-19 pandemic.

Nurses with the most extended experience in healthcare (11 years or more) were significantly more likely to express their patients' dissatisfaction with the organization of care in GP practices during the COVID-19 pandemic. In comparison, nurses with 6-10 years of experience were significantly more likely to report their patients' satisfaction. Regarding the type of healthcare facility, nurses employed in primary outpatient care were significantly more likely to express satisfaction with the organization of care in general practitioners' offices. In contrast, nurses employed in inpatient facilities were significantly more likely to choose a neutral rating (don't know, can't judge).

A questionnaire survey among the adult general public aimed to identify public attitudes towards the personality of the nurse and the nursing care provided, both in secondary health care settings and in primary health care. At the same time, the opinion of the general public on the possibility of using an online counseling service for continuous health consultations in case of the impossibility of physically visiting a GP's office was sought. The lay public was surveyed to assess the physical and psychological burden of nurses in providing nursing care during a pandemic compared to expected. Of the total $N = 1,815$, 82.3% of the respondents described the work of nurses as more demanding during a pandemic.

Although at the time of the COVID-19 pandemic, more emphasis was placed on adherence to the principles of safe barrier nursing care, and many medical procedures were modified due to the use of new protective equipment, the general public expressed satisfaction with the professional, friendly, and empathetic approach of nurses to patients.

A statistically significant association was identified between citizens' education and the nurse listening patiently to them. It is true that with increasing education, citizens are significantly more likely to agree that the nurse in the GP's surgery listened patiently to them during the pandemic. The chi-square characteristic of the independence test has a value of 35.071 at 16 degrees of freedom, $p < 0.01$).

A statistically significant association was identified between citizens' education and whether the nurse was interested in what they were experiencing or how they were feeling. Citizens with a university education were indeed significantly more likely to agree that the nurse in the GP surgery during the COVID-19 pandemic was interested in what they were experiencing or how they were feeling.

The chi-square characteristic of the independence test has a value of 27.077 at 16 degrees of freedom, $p < 0.05$).

Shawahna R. [16], identified nursing care provided in Palestine in 2021 as influenced by the use of protective equipment in a multicentre study. Although nurses worked in altered conditions, they tried to maintain an empathetic approach to patients.

A statistically significant association was identified between citizens' education and whether the nurse was actively interested in whether they were in pain or discomfort. Citizens with a university education were indeed significantly more likely to agree that the nurse in the GP surgery during the COVID-19 pandemic was interested in whether they were in pain or discomfort. Citizens with primary education were significantly more likely to strongly agree with this statement. The chi-square characteristic of the independence test has a value of 26.791 at 16 degrees of freedom, $p < 0.05$).

A 2019 study by Rathnayake et al. [17] looked at the experiences and challenges of nurses who worked with patients with COVID-19. Although nurses experienced fatigue and physical and mental exhaustion when providing nursing care, directly providing care to patients gave them a sense of satisfaction from a job well done. They tried their best to approach patients kindly. The main reason for their stress, which may have manifested itself in changes in their behavior, was the lack of personal protective equipment.

Conclusion

Nurses play a vital role in the health care system. The pandemic of highly infectious disease COVID-19 posed a global problem not only in the high mortality rate of patients but, above all, in the unpreparedness of health systems to manage high numbers of patients and to organize highly professional patient care, including the protection of health care workers. A significant contribution to the management of the pandemic was made by nurses who learned to work in modified conditions, using personal protective equipment, which was not always sufficient, to cope with stressful situations related to high patient mortality and fear for their health and care of their own family. These negative factors impacted their physical and psychological deterioration, a higher probability of developing burnout syndrome, and changes in their personal and social life. Despite this, they provided highly skilled nursing care with a holistic approach and a high degree of empathy and concern for the patient's needs. The research survey carried out within the framework of a

research project supported by the Agency for Health Research of the Ministry of Health of the Czech Republic, which took place among the general public, nurses, and doctors, described the perceptions of the general public about the nursing care provided, the changed role of nurses and the perception of nurses' work by doctors. Based on applying a two-sample T-test, it can be concluded that the prestige of the nursing profession increased statistically significantly during the COVID-19 pandemic compared to before the pandemic. The increase in prestige can be assessed as significant based on the stated significance level.

At the same time, all respondent groups surveyed were optimistic about the possibility of implementing telenursing and the creation of an online nurse-led clinic in the GP's office. Such a clinic can reduce the risk of potential complications of chronic diseases. Based on their research, Danhieux et al. [18] point out that in the context of the COVID-19 pandemic, there have been significant changes in the organization of health care, as well as a reduction in the care of chronic patients. The COVID-19 pandemic also has implications for the organization of healthcare delivery and the development of strategic and conceptual materials leading to the provision of safe healthcare and ensuring safe working conditions for health workers in primary and secondary healthcare systems [19,20].

Supported by a program of the Ministry of Health of the Czech Republic reg. No NU 21-09-00300. All rights under intellectual property regulations are reserved.

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Summarising the results of a general, objective health literacy research and COVID-19 related health literacy level among university students

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Introduction

In recent years, people have faced a number of critical health situations, both at the societal and individual level [1]. To make the right choices about the health of oneself and society, it is essential to develop the right level of health literacy. Health literacy is the ability to gather, process and understand information and, as a result, to make appropriate decisions about our own and the society's health and the health care system [2]. The low level of health literacy is strongly correlated with socio-demographic, economic and educational indicators [3-4]. The low level of health literacy increases the number of hospital admissions and readmissions [5] and health expenditures [6-7], and it worsens the patients' chances regarding their illness [3,8], affect their medication taking habits [9], the communication between doctors and patients and the patient compliance [10]. Population-based studies have shown that a large proportion of the population in Europe [3], North America [11] and Asia [12] have difficulty with health-related information. The European Health Literacy Survey found that almost 50% of the population in the 8 countries surveyed have limited health literacy [3]. In Hungary, previous research suggests that these figures are distributed in similar proportions in terms of subjective health literacy [13-14], but better results are obtained when examining functional health literacy [15]. Nevertheless, it is important to stress that although these indicators are poor, the level of health literacy can be improved once the right methods are found. It is important to always start and progress step by step according to the level of health literacy of the social group concerned [16].

As the pandemic created new situations, several new concepts had to be introduced into the public consciousness. Information is pouring in from many sources, creating an “infodemic” (information epidemic), making it difficult for non-professionals to know which information to trust and which to be sceptical about. Critical thinking skills are proving to be essential in these times [17-18], as critical thinking, the appropriate use of information and digitalisation can reduce the negative effects of information overload [19]. Several researchers believe that assessing the level of health literacy is crucial for taking appropriate societal action on the pandemic [20-21]. Regarding protection, it is essential not only to deal with measures affecting great masses (quarantine, curfew), but also to raise awareness of the importance of protection at the level of individuals (use of masks, compliance with hygiene rules [22]). This should be done in a way that is appropriate to the people’s level of health literacy, so that they can understand and follow them [23]. Health literacy helps to identify disinformation, find the right source of information, and thus make the best possible decisions about their health and the COVID-19 pandemic [18,20,24].

After the outbreak of the pandemic, universities also transferred to digital education. It was a big challenge to the teachers and to the students as well. As part of the Covid HL Network [25], 49 countries conducted an internet-based survey among university students related to COVID-19 digital health literacy (DHL). As the pandemic progressed, Portuguese university students achieved worthwhile DHL levels [26]. In Slovenia, students almost achieved sufficient levels of DHL, with most difficult task being to assess the reliability of the information [27]. Satisfaction with the online information was positively associated with the participants’ DHL levels. There was no significant difference in the HL levels between healthcare and non-healthcare students [28]. Students with better HL levels had better awareness and behaviour related to COVID-19 and adopted protective behaviours more easily [29]. In a U.S. study, only 49% of students reported adequate HL levels, and 57% of them had sufficient DHL levels [30]. Based on these studies, it can be ruled out that including health literacy in the curriculum is an essential step as it can help shape good behaviour [31]. Moreover, it is also easier to find intervention points in these closed communities.

The main aim of our manuscript is to compare the subjective level of general health literacy level and COVID-19 related subjective and digital health literacy level among university students. We also wanted to compare the results of COVID-19 related subjective and digital health literacy level. Furthermore, we assessed the impact of their university’s measures, academic, socio-demographic, and economic indicators on health literacy.

We hypothesized that students' general Health literacy level is worse than COVID-19 related health literacy level. Our second hypothesis that those students who have better subjective health literacy level they reach also higher point on digital health literacy level.

Methods and materials

Our research has two parts. First, we measured the subjective and objective health literacy of students studying medicine and health sciences. Reflecting on the pandemic situation, health literacy was also examined from the perspective of the COVID-19 pandemic among students at universities, where medicine and health science courses are offered. In this research, in response to the COVID-19 pandemic, we validated the HLS-COVID-Q22 questionnaire in Hungarian and sent it to the students along with a digital health literacy questionnaire. We started our research in January 2021 and completed the last data collection in May 2022. The methods, measuring instruments and item numbers used in the research are shown in Figure 1.

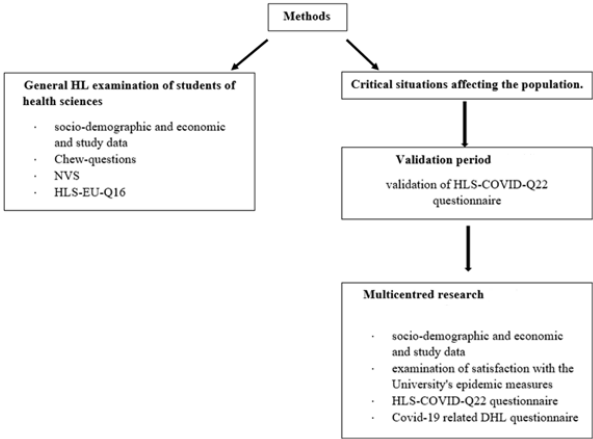


Figure 1.: Presentation of the methods used during the research

Description of measuring instruments

The HLS-EU-Q47 and HLS-EU-Q16 questionnaires were subclassified for subjective assessment of general health literacy. The questionnaires have different sub-dimensions: (1) three health-related domains: health care system (HC), disease prevention

(DP) and health promotion (HP), and (2) four information acquisition sub-indices such as access, assessment, understanding and use. Respondents can indicate on a scale of 1 to 4 how easy or difficult it is for them to perform the things listed. The answers could be: 1-very easy, 2-rather easy, 3-rather difficult, 4-very difficult. The respondents' level of health literacy can be divided into four categories based on their answers: 0-25 inadequate, 26-33 problematic, 34-42 adequate and 43-50 excellent. The inadequate and problematic categories are combined to form a limited level of health literacy. The indices and sub-indices were standardised on a scale from 0 to 50, calculated according to the formula: $\text{index} = (\text{mean} - 1) * (50/3)$, where: mean: empirical mean of the questions that make up the index; 1: theoretical minimum of the mean of the indices; 50: standardised maximum of the chosen index; 3: theoretical range of the mean [15].

The Chew questions include 3 questions in 3 areas. (1) difficulties of understanding: *"Do you have problems understanding hospital written material to get an adequate picture of your health?"* (2) filling in forms: *"How confident do you feel when filling in forms alone?"* (3) interpreting problem: *"How often does someone (such as a family member, friend, hospital worker or carer) help you interpret hospital written material?"* For these questions, students were asked to select their answers on a Likert scale from 0 to 4, where 0-never, 1-hardly ever, 2-sometimes, 3-most of the time, 4-always [32].

The NVS measuring instrument is designed to assess objective health literacy through reading, comprehension and calculation tasks. The main component of the measuring instrument is a descriptive label on the back of an ice cream carton. If the respondent answers the first 4 questions correctly, they have an adequate level of health literacy. The scoring was as follows: 0-1 points limited health literacy; 2-3 points probably limited health literacy; 4-6 points adequate health literacy. For question 5, not only were good or bad answers separated, but there was also a "partly good" answer option. This category was given if the respondent knew that they could not eat the ice cream but could not say why [33].

In the multicentre research, the HLS-COVID-Q22 questionnaire and the Covid-19 digital health literacy questionnaire were used to assess health literacy. The HLS-COVID-Q22 contained 22 questions, divided into four sub-dimensions: access (6 questions), understanding (6 questions), evaluation (5 questions) and application (5 questions). Respondents are asked to rate on a scale of 1 to 4 how easy or difficult the question is for them (1 - very easy, 2 - rather easy, 3 - rather difficult, 4 - very difficult). The scale is scored as follows: ≤ 2.5 : inadequate health literacy level; $> 2.5 - < 3$: problematic health literacy level; ≥ 3 : adequate health literacy level [34].

The questionnaire created to assess digital health literacy, linked to COVID-19, includes the following dimensions: (1) searching information online about the coronavirus, (2) adding own content, (3) assessing the reliability of information

about the coronavirus, (4) how much information found relates to the individual, (5) protecting privacy rights online. Each topic was divided into 3 questions, therefore there were 15 questions in total. The response is based on a 4-point scale, from “very easy” to “very difficult” and from “never” to “often” [35]. We have also added a separate question to Topic 5 based on the feedback received during the validation process, namely, “*Do you post content about the coronavirus on social media?*” However, this does not affect the assessment.

We asked 6 questions about satisfaction with universities, two of which required a text response. The scoring was based on a 10-point Likert scale, and the students were divided into 3 groups based on their answers: 1-4 points: not satisfied, 5-7 points: satisfied, 8-10 points: completely satisfied.

Data collection procedure

Students of the Faculty of Health Sciences of the University of Pécs with active student status from every year of studies, all specialisations, from both Hungarian and English courses were eligible to participate in research (n=267). Students of the Faculty of Health Sciences were provided with the access to the questionnaire through the university’s system (NEPTUN). The questionnaire was completed via Microsoft365® Microsoft Forms.

COVID-19 related HL research is a quantitative, cross-sectional study with data collected from students at four large universities, the University of Miskolc (ME), the University of Pécs (PTE), Semmelweis University and the University of Szeged (SZTE). All students who had active student status in the spring semester of the academic year 2021/2022 and were enrolled in a course held in Hungarian were eligible to participate in the study (n=1274). The students filled in the questionnaire using the Survio software, with a direct link to the questionnaire sent via the university’s system or its central mail system.

Students who did not complete the questions on academic studies (it was not possible to identify which university they were studying at) or health literacy were excluded.

Statistical procedures

Descriptive statistical characteristics (such as relative frequency, mean, standard deviation) were calculated to describe the variables in each study. The internal consistency of the health literacy scales was characterized by Cronbach’s α .

The relationships between the independent and dependent variables were first tested binary. Correlations between categorical variables such as socio-demographic, economic and educational data, and health literacy categories were tested using the chi-squared test and Fisher's exact test. One way ANOVA test was used to explore the correlations between continuous and multicategorical nominal variables. Examples included examining the correlation between age and health literacy categories, and the relationship between health literacy scores and socio-demographic data (e.g. economic status, type of settlement, education). Correlation analyses were performed to analyse the relationship between continuous variables such as age and health literacy scores, or DHL and HLS-COVID-Q22 questionnaire scores.

In the second step of the binary analysis, the effects of indicator variables with significant relationships with the dependent variables were tested using multivariate models. We used multiple multinomial or binary logistic models with four categorical or dichotomized versions of the aggregate index and dimensions of health literacy as dependent variables.

Data were recorded and processed using IBM SPSS 22.0. The results were considered significant at a 95% confidence interval with $p < 0.05$ value.

Results

A subjective and objective study of health literacy among Hungarian and English language students of health sciences

The questionnaire was completed online by 267 students, of which 230 were enrolled in the Hungarian and 37 in the English course. Female (86.13%) and Hungarian (86.1%) students were over-represented in our sample. The average age of the students was 21.86 ± 4.6 years. Most people said their economic situation was average (59.2%) or above average (27.7%).

Most students had no chronic illness (81.1%) and 74.5% said they had never smoked. 70.6% of students said they have a general practitioner at the place of their training. More than $\frac{3}{4}$ of the sample rated their health as good or very good. 72.7% had heard the term health literacy, most of them during their studies or through the media. Only 9.7% of respondents thought that their level of health literacy fell into the limited category (a combination of insufficient and problematic).

Chew questions results

Most respondents ask for help to understand hospital documents most of the time (50.9%) or always (31.8%). However, understanding documents relating to their health condition is only a problem hardly ever (31.4%) or sometimes (31.1%).

In addition, never or only hardly ever (65.2%) have difficulties filling in hospital documents.

HLS-EU-Q16 questionnaire results

Based on the questionnaire used to assess subjective health literacy, the number of people with limited health literacy is less than 50% for the health care system (HC) sub-index. For all sub-indices, nationality (Hungarian or foreign) was an influential factor (HC $p=0.029$; DP $p=0.002$; HP $p<0.001$). The other socio-demographic factors did not show a correlation with these sub-dimensions.

Table 1 Data on the various dimensions of health literacy (n=267)

Level of HL ¹	Dimensions of HL ¹ [n (%)]			
	Obtain information	Understand information	Process information	Apply information
Inadequate	19 (7.1%)	52 (19.5%)	52 (19.5%)	62 (23.2%)
Problematic	85 (31.8%)	91 (34.1%)	91 (34.1%)	94 (35.2%)
Sufficient	104 (39%)	78 (29.2%)	77 (28.8%)	62 (23.2%)
Excellent	59 (22.1%)	46 (17.2%)	47 (17.6%)	49 (18.4%)

¹ Health literacy

A large proportion of respondents also have limited health literacy in the areas of information acquisition (38.9%), understanding (53.6%), interpreting (53.6%) and application (58.4%) (Table 1). Nationality was found to be an influential factor in the use of information ($p<0.001$).

NVS questionnaire results

80.1% of the students were able to answer the questions adequately, and their objectively measured numeracy and literacy skills were sufficient to understand written texts. The proportion of students in the different categories is shown in Table 2.

Table 2: Results of NVS scale (n=267)

Health literacy level	Hungarian Students	International Students	Total
Inadequate	6	4	10 (3,7%)
Probably limitation	33	10	43 (16,2%)
Adequate	191	23	(0,1%)

To test whether specialisation and year of study are influential factors on subjective and objective health literacy levels—we examined the following. When comparing the results on the subjective health literacy scale with the academic data, the year of study has no effect on any of the sub-dimensions (information acquisition, understanding, interpreting and application and cHL, HC, DP, HP), but the specialisation does. Acquisition ($p<0.001$), understanding ($p=0.012$) and interpreting

($p=0.004$) information were also related to the specialisation of the students examined. Those studying nursing have higher health literacy levels than students in other specialisation in all categories.

When examining the association with objective health literacy, the chi-squared test results did not show a significant association in either case.

Health literacy survey among university students related to the COVID-19 pandemic
Analysis of the sample

Responses from 1274 university students were processed. 75% of the respondents were female students, with an average age of 25.82 ± 8.715 years. 27.5% of the sample came from PTE, 25.3% from SE, 39.7% from SZTE and 7.5% from ME. 43.2% of the sample continued their studies in medicine and health sciences. Only 21.4% of the students who rented their accommodation or stayed in halls of residence had a general practitioner at the place of training. For households with children living together, the lowest number was 1 and the highest was 7. Most often there was one person under 18 in the household (mode=1).

Evaluation of digital health literacy

In terms of digital health literacy, respondents found it easy or rather easy to navigate in the digital world in all 4 dimensions (searching for information, generating their own content, reliability and relevance). For gender, type of settlement, origin and residence, there was also a significant correlation with the level of DHL in all 4 dimensions. In all cases and dimensions, women had lower DHL levels than men, and those living in a village or town had lower DHL levels than those living in a town or county seat. Job, average income, level of education and discipline classification were also influential in the generation of own content dimension. For the reliability dimension, the presence of a child in the household and level of education had an impact on the DHL level, while for the relevance dimension, average income, university and education level had an impact. In relation to privacy, sharing other people's data was significantly associated with gender ($p=0.002$), average income ($p=0.037$), level of education ($p=0.030$) and field of education ($p=0.022$). The field of education also showed a correlation with sharing own data ($p=0.018$).

The results on the most commonly searched interface for virus-related information are quite varied. Students used various search engines most often (63.8%) to find information, but the use of social media is not negligible (23.2%). The least popular search interfaces include sites for asking questions and blogs.

When looking at search patterns, the most important issues are not prevention and protection, but restrictions, legislation and the current state of the virus.

Results of the subjective health literacy questionnaire (HLS-COVID-Q22)

In terms of subjective health literacy, both in the main dimension and in the sub-dimensions (excluding the survey sub-dimension), respondents achieved an

excellent level of health literacy in terms of average scores, and in terms of categories, more than 50% of students in each dimension fell into the satisfactory category (Table 3).

Comparing HLS-COVID-Q22 results by dimension with socio-demographic data, in the category of not understanding ($p=0.003$), by type of settlement of origin ($p=0.014$), by type of settlement for living ($p=0.002$) also for the category of understanding, university ($p=0.02$) for the category of HL overall and for the category of application ($p=0.034$), field of education, discipline ($p=0.001$) for the category of application showed significant correlations.

Table 3 Results of HLS-COVID-Q22 questionnaire selected into categories (n=1274)

LS-COVID-Q22 Dimensions		cHL	Access	Understand	Appraise	Apply
mean \pm SD		3.0765 \pm 0.52	3.1073 \pm 0.55	3.1744 \pm 0.61	2.9113 \pm 0.64	3.0874 \pm 0.62
inadequate	n	178	213	194	320	218
	%	14	16.7	15.2	25.1	17.1
problematic	n	366	224	192	291	240
	%	28.7	17.6	15.1	22.8	18.8
sufficient	n	730	837	888	663	816
	%	57.3	65.7	69.7	52.0	64.1

Satisfaction survey on universities' response to the COVID-19 outbreak

Students were first asked how satisfied they were with the flow of information from their university to them during the pandemic. 14.6% of respondents were not satisfied and 53.5% were completely satisfied. 14% were not satisfied with the measures taken by the university and 55.8% were completely satisfied. Regarding student services, 22.3% said that the quality of these services had decreased and 14.1% said that they had improved.

Overall, the majority of students found online learning challenging, making it more difficult to communicate with teachers and prepare for classes. In addition, there were some concerns with the Registrars Department's work, and the cancelling of programmes was also perceived negatively by the students. However, what some saw as a difficulty, others saw as a positive aspect. Online learning was praised by many, and the range of materials available online also increased. Online and telephone services were also positively rated by many.

33% of the students informed about the pandemic through external press, 36.3% through social networking sites and 26.8% through the university's websites and training courses. Those in the other category mainly cited family, friends and colleagues as their primary source of information.

Conclusions

More than half of the students testified to having limited health literacy in all subindexes of the HLS-EU-Q16 questionnaire. In contrast, most of the students have adequate subjective HL level regarding to COVID-19 pandemic. This development is due to everyone being more interested in healthcare during COVID-19 pandemic. Based on the Chew questions, most of them indicated problems with understanding medical information. According to the NVS, most of the students demonstrated an adequate level of functional health literacy. Those students, who have better level on COVID-19 related digital health literacy questionnaire have worth on the subjective health literacy questionnaire.

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Elderly people in Hungary

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Introduction

Who belong to the elderly age groups? Generally, the time of retirement is indicated as the age limit, although this can be different in different countries and under different social conditions. It also depends on the aspects according to which the age groups are analysed.

Based on the WHO division, which has been known since 1964:

- 50-59 years bending age
- 60-74 years aging age
- 75-89 years old age
- 90 – 100 years oldest old age
- 100 + years methuselah age (fig.1), [1].

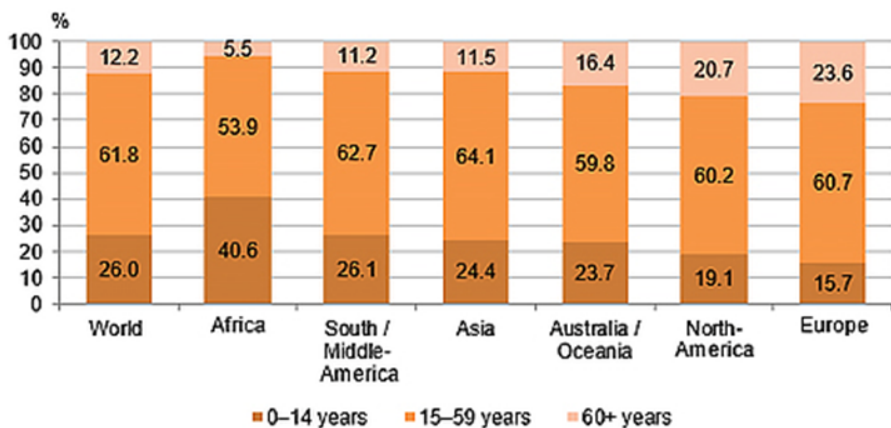


Figure 1. Age composition of the world's population and the inhabitants of each continent according to main age groups, 2015 (Source: UN Population Division. World Population Prospects: The 2012 Revision), [2].

Changing the attitude of society is important in the field of care for the elderly, because:

- aging is a natural phenomenon
- the aging of the population is a global phenomenon
- the elderly are valuable resources for society
- people do not age in the same way
- the elderly are an integral part of society
- successful aging must be helped
- have to prepare for active old age.

Aging is a psychophysical process that takes place with individual differences for each person. Characteristics associated with older people:

- chronological age (number of years lived),
- biological age (physical condition), and
- psychological age (subjective well-being) [3].

The geographical location of Hungary is Central-Eastern Europe, the form of government is a republic. In 2022, the population is 9,841,587. The number of live births is 88,400, which means 1.52 fertility rate. Unfortunately, the death rate is much more than that at 135,700. The natural increase and decrease is minus 47,300, which means that the population is constantly decreasing, there are fewer people every year. The aging index is rising very quickly, which means that the number of people under the age of 14 is significantly less than the number of people over the age of 65 (Table1), [4].

Table 1. Statistics from Hungary (Source: Yearbook of Demographic Statistics Hungarian Central Statistics Office, Budapest, 2022

		1960	1980	2000	2010	2022
Number of population		9,961, 044	10, 709, 463	10, 221 ,600	10, 014, 300	9, 841, 587
Number of birth		146, 461	148,673	97,597	90,335	88,400
Number of death		101, 525	145,355	135,601	130,456	135,700
Number of children		2.02	1.91	1.32	1.25	1.52
Natural in/de/creasing of population		44,936	3,318	-38,004	-40,121	-47,300
Aging index		35.20	61.91	91.31	115.85	141.5
Life expectancy at birth	male		65.5	68.15	71.45	72.55
	female		72.7	76.46	78.38	79.5

Demographic changes show that the continuous decline of the population takes place in parallel with the aging of the population. The proportion of the elderly, those living alone and the unmarried within the population is increasing. A few years ago, not many people lived to be 100 years old. Today, there are 1,107 citizens

who are 100 years old or older, and the number of people over 90 years old exceeds 50,000 [5].

38% of people over 65 are men and 62% are women. Life expectancy at birth in Hungary is five to six years shorter than in the western member states of the European Union [6].

The research deals with the evolution of life expectancy, but the results regarding healthy life expectancy are more important. It can be concluded that the level of education has an influence on the onset of the disease, primarily in the sense that - regardless of gender - those with a basic education are the first to get sick, and those with a graduate degree the latest. In the case of both sexes, a higher education is associated with a longer life expectancy and a shorter period of illness [7].

Elderly people live in 40% of the nearly four million households, and every fourth household consists only of elderly people. The aging of the population is also shown by the fact that the number of single-person households consisting only of elderly people is close to one million, and within that, nearly 150,000 are households where people over 80 live alone.

If we make an overview of the composition of today's Hungarian population according to age groups, the increase in the number of elderly people within the total population is clearly visible. It can also be observed that there are more women over the age of 60 compared to men, and more than 1.1 million citizens over the age of 70 live in Hungary today. Based on the trend, the estimated number of the Hungarian population in 2050 will be 8,663,514. (fig.2).

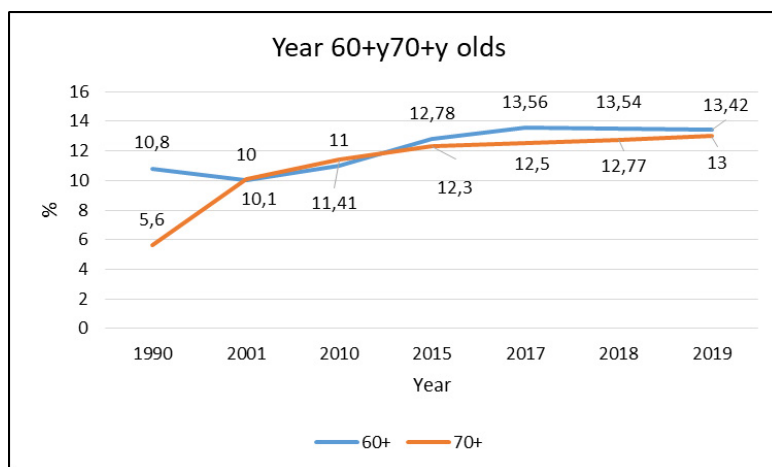


Figure 2. The proportion of each age group within the population, 1990-2019. Year 60-x-year-olds 70-x-year-olds. Source: Yearbook of Demographic Statistics Hungarian Central Statistics Office, Budapest, 2022

Another important indicator of society’s aging is the average life expectancy at birth, which is slowly but steadily increasing. In 2022, this number was 72,55 years for men and 79,5 years for women (fig.3), [5].

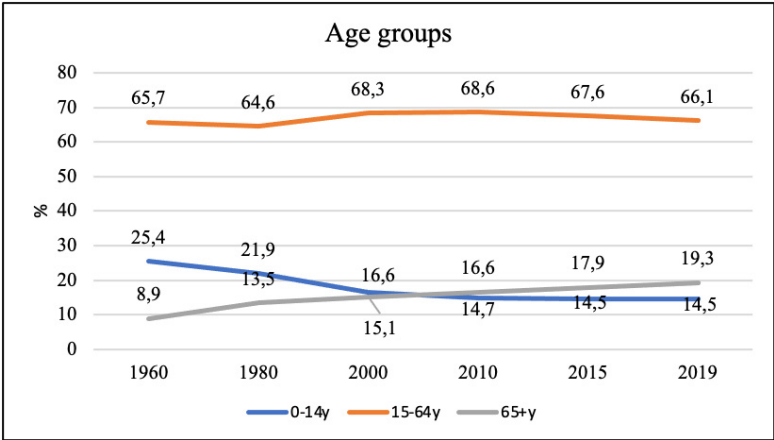


Figure 3. Population by main age-groups 1960-2019 (Source: Yearbook of Demographic Statistics Hungarian Central Statistics Office, Budapest, 2022).

The elderly and modern technology

Overcoming a certain degree of reluctance of the elderly towards technological innovations and especially IT seems to be a real challenge. At the same time, it is worth helping them in this, since modern devices and digital systems can play a significant role in improving their health [6].

Elderly people understandably stick to their own homes, even when they already harbour dangers for them. They may make mistakes in their everyday life - forget to turn off the stove, leave the door open - or they may have a minor or major accident, fall from which they cannot get up, etc. [7]

Caring clock program

The Caring Clock Program is a welfare service launched by the Government of Hungary that can be used free of charge and is accessible as a subject over the age of 65. The service provided by the CCP program and the signalling device are free of charge and are available in every settlement of Hungary, every day and every hour of the week. For those who use it, it means a greater sense of security (photo1), [8].

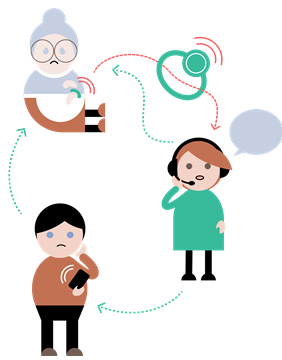


Photo1. Caring clock program

(Source:https://www.google.hu/search?q=gondos%C3%B3ra+program&sca_esv=561856720&tbm=isch&sxsrf=AB5stBiG1TIyaRKT7Ucj5NCiJ8d6U7XdiQ:1693551016342&source=lnms&sa=X&ved=2ahUKEwiysvOV6YiBAxWmgf0HHRNtBYAQ_AUoAXoECAEQAw&biw=1488&bih=750&dpr=1.25#imgrc=fYFUtpZlWzblZM).

Successful and unsuccessful aging (Table2).

Table 2. Differences between successful and unsuccessful ageing processes [9]. Source: Milliken ME, Champbell G: Mindennapos betegápolás. Országos Orvostudományi Információs Intézet és Könyvtár, 1991.

Successful ageing	Unsuccessful ageing
He can adapt to changes.	He cannot accept ageing.
He uses abilities well.	He wants to be seen younger.
He tries to overcome weaknesses and accept the ones he cannot.	He wants to get advantages from his weaknesses and illnesses by manipulating others.
He accepts the dependency status, because he knows it is due.	He is offended because he wants others to care for him more.
He keeps self-esteem.	He feels valuelessness.
He does some happy things.	He does not live healthy life.
He still has life-goals.	He does not have life-goals.
He eats proper food.	He is picking food.
He moves according to what he is able to.	He sits too much. He separates from others.

Elderly and chronic diseases

According to domestic surveys, 51 percent of people over the age of 60 suffer from one chronic disease, 10 percent from two such diseases, while three or more chronic diseases have a frequency of 3 percent [10]. It is known from professional

textbooks and from life that the body's water content decreases and its fat content increases during aging. The increase in connective tissue is associated with a decrease in tissue elasticity. The process is based on the reduction of elastic tissue and the increase of collagen. Age-related sensory changes, clouding of the lens, reduction in the ability of the eye to adapt, and hearing loss are also well known. But the elasticity of blood vessels also deteriorates, which causes an increase in systolic blood pressure. Physical performance will also be weaker, which is related to a decrease in muscle mass [11].

The efficiency of kidney function declines, and therefore some medicines are more difficult to eliminate from the body. Weaker functioning of the endocrine system often causes blood sugar levels to rise. Falling hormone levels promote the appearance of diseases such as osteoporosis and type 2 diabetes. The changes associated with aging also affect the nervous system, and the likelihood of memory impairment increases with age. Dementia, the most serious form of memory impairment, can impair cognitive functions to such an extent that it affects everyday life. Aging also affects the renewal of cells, so mutations can arise that are the starting point for malignant processes [12].

Employment of the elderly

The traditional life path is divided as follows: at the age of 20+ the learning period ends, at the age of 40+ the career path ends, and at the age of 60+ the "active years end". However, nowadays this kind of thinking seems more and more outdated. Thus, it is no longer surprising if we find that those employers who transform the career pyramid and start employing employees over 60 will be more and more successful in the labour market as well. So companies can begin to transform towards a multi-generational career model. In order for employers to open up to older workers, they invented new career paths and positions where the elderly can work comfortably and with great dedication. Age is of great importance, as age hides not only history, but also knowledge and experience, which can be an advantage for employers, compared to a young career starter. However, it is no secret that if employers open up to the employment of the elderly, they must be prepared to serve special workplace needs. In addition, over the years, employees earn higher salaries and possibly bonus benefits, which employers must factor into their expenses. Older workers have many more opportunities than many people think. Employers do not necessarily only have jobs for which the professional use of technology is essential. However, attention must be paid to the worker's health and load capacity [13].

Academy for the elderly

In Hungary in 2022, the average age for women is 79.5 years, while for men it is 72.55 years. According to KSH 2019 data, the proportion of people over the age of 65 compared to the total population is 19.34%. Residents over 65 but not yet 80 years of age belong to the elderly age group [5]. The quality of life, health, physical and mental well-being of the age group representing one fifth of the country is not indifferent either to the individual or to society. The European Union recognized the problems of an aging society and chose the year 2012 as the year of solidarity between generations - European Action for Active Aging and Solidarity between Generations 2012. Aging does not exclude the ability to learn. The purpose of the training is to ensure the time spent in health and meaningful aging for the older age groups.

The most widely known and widespread adult and senior educational programs - University of the Third Age, Senior Academy, Institutes for Learning in Retirement - provide the opportunity for people over 55 to obtain a diploma. In the older age groups, between 70 and 80, the need to maintain mental and physical freshness comes to the fore. In health-related education programs, self-care and getting to know and validating the goals of preventive medicine can be the defining goal. This is enriched by the effort to maintain the ability to adapt to rapidly changing environmental conditions. The mission of the Faculty of Health Sciences of the University of Debrecen is to spread health knowledge to the elderly. Therefore, in 2015, he launched the Senior Academy, which has been taking place in several cities since then. It is held during academic years, in autumn and spring semesters. It ends with the handing over of a diploma. The topics of the presentation are partly recommended by the organizers, and partly the elderly determine what they want to hear about. The event enjoys great social recognition. Several universities in several places organize similar educational programs for the elderly in Hungary.

Conclusion

The increase in the expected average age at birth and the increase in the number of elderly people is a global phenomenon. As the years progress, the biological and psychosocial situation of the elderly changes, and problems related to the care of the elderly increase.

The development of a society is clearly demonstrated by how it can take care of the elderly, how it compensates for their negative sense of life, that they were

important not only as long as they were active contributors to national income generation. Successful aging must be actively supported in the field of social and health policy in order to improve the quality of life.

The growing ratio of the elderly is a great challenge for public health services both in field of cure and prevention, and it is the same for the whole society in respect to social welfare.

The retirement age in Hungary for both sexes is 65 in 2023. The number of years spent in health is 62.8 years for women and 61.5 years for men. These figures suggest many tasks in order to improve the quality of life of the population.

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The role of all healthcare professionals in tobacco cessation

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Introduction

Today, it is well known and accepted that cigarette smoking is a threat to the health of individuals and a major burden on society, increasing the economic burden on society. The World Health Organisation (WHO) estimates that tobacco consumption accounts for 10% of all deaths. Tobacco consumption is a major risk factor for preventable deaths, making tobacco control one of the most important public health challenges worldwide. Cigarette consumption is one of the world's leading causes of death: it is the leading cause of death from cardiovascular disease, cancer, and lung disease. Smoking has a detrimental effect on the reproductive cells of the parents-to-be, mother and father before conception, increases the likelihood of developing a number of diseases and has potentially intergenerational effects. In writing this paper, our aim is to present and emphasise the importance of smoking cessation support. In women, smoking affects the reproductive organs and their function partly through direct toxic effects and partly through effects on the neuroendocrine system. Smoking is a major public health and economic problem in Hungary. In Hungary, a very strong legal framework has been introduced since 2012, where smoking is prohibited in all public and enclosed places (restaurants, workplaces, health and educational institutions), but also in public and otherwise open spaces such as public transport stops and playgrounds. Tobacco cessation interventions should be implemented as widely as possible throughout the health system and should support population-level tobacco control measures. The aim of this study is to demonstrate the harmful effects of smoking on health and to highlight the importance of smoking cessation promotion. All professionals working in primary and specialist care, at the appropriate level in their work, to recognise and take on the task of supporting smoking cessation, and to reduce the proportion of smokers as a result.

Methods

I have carried out a literature review of relevant publications in several electronic databases. Following a summary of the results found in this set of selected studies, I have compiled the paper to put the problem in context. On this basis, I have formulated suggestions for everyday practice and future work.

Literature review

According to data from the World Health Organization, the number of smokers worldwide in the age group of 15 years and older has reached 1.4 billion. A slight decrease can be observed compared to 2007, when 1.46 billion were registered. 80% of smokers live in low- and middle-income countries. According to forecasts, their number can be expected to increase, but a decrease is expected in countries with more developed economies. The positive trend can be seen in all countries of the world between 2007 and 2017; quantified, the global average decreased from 22.5% to 19.2%. The relative decline in smoking is significant mainly in countries with higher incomes and higher GDP values [1]. A favourable smoking trend can also be observed in Hungary: 34% in 2003, 32% in 2009, 28% in 2014, and 24.9% in 2019 of the population aged 15 and over smoked on a daily basis, and it is 2.1 percentage points fewer than in 2009. Compared to 2014, the smoking rate of occasional smokers and women has increased, according to data from the European Population Health Survey.

27.7% of men, while 22.3% of women smoked on a daily basis. In terms of gender, a smaller proportion of women in the 18-64 age group smoke daily than men of the same age. For those aged 65 and over, the difference is not significant. A kind of decrease in the number of smokers can be observed with increasing age. Nowadays, smoking has become a health-damaging risk factor on a global level [2]. It takes first place in terms of preventable deaths, cancer diseases (mainly lung cancer) can be classified as a prominent risk factor, as well as in the development of many other diseases. It takes first place in terms of preventable deaths, cancer diseases (mainly lung cancer) can be classified as a prominent risk factor, as well as in the development of many other diseases [3]. It is responsible for 85% of trachea, bronchial and lung cancer and 16% of deaths due to ischemic heart disease. During smoking, more than 7,000 toxic chemicals, including at least 70 known carcinogens, enter the human body. Tobacco smoke mainly contains carbon monoxide and nicotine, as well as various irritating substances, which exert their harmful effects not only

locally, but also when they enter the bloodstream [4]. When it gets into the lungs, it causes structural and functional damage, but in the heart and vascular system it causes early vasoconstriction [5]. When somebody starts smoking, structural changes occur immediately, but they are typically not immediately recognizable, they remain hidden, and later appear in the form of a clinical disease, including the aforementioned ischemic heart disease, hypertension, vasoconstriction or chronic obstructive pulmonary disease (COPD) [6]. Smoking also plays a role in the existence of another big complex problem, the decrease in population growth. This serious problem can be traced back to many reasons. Smoking during pregnancy is one of the most serious risk factors, which negatively affects the outcome of pregnancy and contributes to morbidity and mortality around birth [7].

Secondary smoking harm

The negative consequences of passive smoking (SHS=second-hand smoke) on the outcome of pregnancy are already well known. The two most toxic substances cotinine and cadmium (Cd) can be detected in the blood of both active and passive smoking pregnant mothers, which have been proven to inhibit the growth of the foetus by affecting the functioning of the umbilical cord [8]. Almost every day, 14% of the inhabitants of the EU member states have to endure the smoky environment created by others. During passive smoking, the non-smoker is exposed to the smoke exhaled by the active smoker and to the secondary smoke. Side stream smoke, which is produced by smouldering without smoking a cigarette, contains more of some compounds than the main smoke inhaled. The negative effects of passive smoking on health are almost the same as those of active smoking [9].

Third-hand smoke is harmful

The smoke produced when smoking a cigarette pollutes both indoor and outdoor areas, as the cigarette remains a spreading and long-lasting source of toxic substances even after it has been extinguished [10]. Remnants of chemicals found in second-hand smoke accumulate on objects and in the indoor environment after smoking. Contamination of the surface in contact with emitted compounds, which forms secondary pollutants with oxidants and other compounds in the environment, and these can even transform into volatile compounds and get back into the air. Interest in third-hand smoke (THS) has increased in recent years, and research

into this area has come to the fore. The negative impact of smoking has now become a global problem. The production of tobacco and tobacco products can cause extensive environmental damage. All of this is topped by the fact that the demand for tobacco leaves increased dramatically with the rapid growth of global tobacco consumption at the end of the 20th century and the beginning of the 21st century. As a result, the harmful effects of smoking on the environment have greatly increased. The life cycle of tobacco lasts from the cultivation of tobacco to the waste after smoking (Figure 1). Tobacco life cycle - clearly shows that the production of all tobacco products begins with the cultivation of tobacco leaves, and this is already the anteroom of health damage (fig.1).

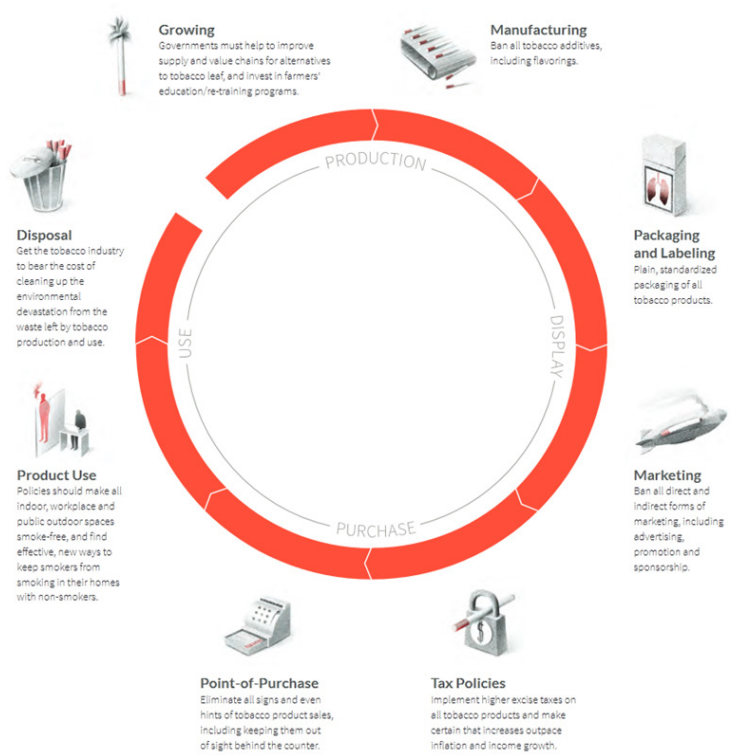


Figure 1. The life cycle of tobacco

Source: <https://tobaccoatlas.org/mission/>

Options for reducing smoking. Quitting support has two levels. The first is the so-called minimal intervention, and the second level is the level of specialist care, which refers to programmatic support for quitting smoking. The activities of the

primary care level are covered by the time-saving and short “3T” minimal intervention: “inquiry”, “consultation” and finally “information”. If the patient refuses to quit, they recommend strengthening the motivation to quit smoking, for which the so-called “5R” method can be applied. If the client is positive about quitting smoking. In this case, two additional steps are added to the method: “support” (behavioural and pharmacological support for quitting smoking) and “activity control” (relapse prevention). In the case of long-term and frequent smoking, addiction develops, so it should be treated as a chronic disease. BNO code: 2831.

Second level is intensive or programmed withdrawal: behaviour therapy (behavioural medicine) supplemented, if necessary, with pharmacotherapy. We distinguish two types of pharmacotherapy: nicotine replacement therapy and the use of nicotine-free products. Professionals and patients should work together to choose the right treatment, taking into account different situations and health conditions. Pharmacotherapeutic interventions, over-the-counter nicotine replacement products, and prescription medications such as varenicline and bupropion are an important group of smoking cessation support methods for adults.

It is important to emphasize that it is one of the tasks of all highly educated professionals working in health care to initiate and promote smoking cessation within the framework of minimal intervention. There is evidence that during the minimal intervention, asking about smoking habits and giving a firm recommendation to quit strengthens the motivation to quit and thereby the success of quitting [11, 12].

Non-pharmacological support for quitting smoking can be effectively provided by qualified doctors, psychologists, graduate workers, health promoters, and, in the case of pregnant women, nurses [13]. Efficiency increases if representatives of several professions participate in quitting support, providing complementary treatments. All professionals with advanced health and social education must have the knowledge and skills to effectively contribute to the reduction of smoking, which is also emphasized by the European guidelines for supporting smoking cessation [11].

Conclusion

The health care system is a prominent arena for smoking cessation support. That is why students in the health sciences training must learn about the health damage associated with smoking, learn about methods to help them quit smoking. A professional with a higher education degree must deal with the smoking of the patient during the meeting. Inform him about the harmful effects of smoking on health and recommend him to stop smoking. The smoking cessation support must

be adapted to the patient's individual needs within the specialist's competence and must support the process of quitting with the method known as minimal intervention. A healthcare worker with appropriate knowledge and skills should have a prominent role in supporting smoking cessation.

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The role of the therapeutic team in the assessment of nutritional status of children with cerebral palsy

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Introduction

In the case of any disease, nutrition is an important factor in the recovery process. When it comes to patients with cerebral palsy (CP), the significance of nutrition lies not only in food quality, but also in factors related to the disease that hinder proper eating. Limited food consumption often stems from impaired “hand-mouth” and “mouth-throat” coordination or even a lack of coordination. Consequently, the feeding process may necessitate the presence of an assistant, result in slower eating pace, extended feeding time, food spillage before it reaches the mouth. This, in turn, poses a significant safety threat during the swallowing process. Other factors that have a substantial impact on both the quantitative and qualitative assessment of feeding and nutrition status include dental issues, becoming satiated quickly, vomiting, and various behaviours commonly observed in children with severe cerebral palsy [1-2].

Irrespective of the disease, the consequences of malnutrition during childhood are devastating and can persist for years or even for a lifetime. Malnutrition affects motor, neurological and psychological functions, and the still ongoing development of physiology. Malnutrition results in diminished cerebral growth, disturbances in cognitive development, slower circulation time, diminished cardiac work capacity, and a predisposition to congestive heart failure when under stress, as well as increased susceptibility to infection. Malnutrition may also impact

socio-cognitive development due to lower cognitive activity, which in turn impacts participation in social life [3-4].

The aim of this work is to present the role of the therapeutic team in the assessment of nutritional status of children with cerebral palsy, a chronic neurological condition that affects movement and posture. The work will discuss the causes, symptoms, and consequences of malnutrition in children with cerebral palsy, as well as the methods and tools used to evaluate and monitor their nutritional status. The work will also highlight the importance of interdisciplinary collaboration in providing optimal nutritional care and improving the quality of life for children with cerebral palsy.

The indicator of health and well-being for all children is achieving appropriate weight gain and height growth in accordance with growth charts, which serves as a signal for the parents that their child is developing properly. In the case of children with cerebral palsy, measuring and monitoring height growth is challenging, as it is impacted by many factors, which make the analysis of nutritional needs difficult [3,5].

The following chapter discusses the role of the therapeutic team in the context of patients with cerebral palsy, which is a chronic neurological disease.

Cerebral palsy causes activity limitation, which is attributed to disturbances that occurred in the developing foetal or infant brain. It is characterised by a group of permanent disorders related to the development of movement and posture. Disturbances of perception, sensation, communication, cognition, epilepsy, behaviour or secondary musculoskeletal disorders are often observed.

The causes of cerebral palsy lie in three categories: intrauterine factors (foetal growth restriction, intrauterine infections, placental vascular insufficiency, birth defects), complications around birth (foetal membrane inflammation, perinatal asphyxia, early separation of the placenta from the wall of the uterus) or early childhood incidents (strokes, intraventricular haemorrhage, sepsis, periventricular leucomalacia (PVL) [6].

The frequency of cerebral palsy is estimated to 1.5-3.0 per 1000 live births; however, these figures may vary in the case of patients with different risk factors. The work conducted by Surveillance of Cerebral Palsy in Europe (SCPE) is of paramount importance in terms of epidemiological factors. Considering the role of the therapeutic team in the assessment of the nutritional status of children with CP, it is worth mentioning that specialists from various fields participate in the work carried out within the framework of SCPE. These specialists encompass epidemiologists, neonatologists, paediatric neurologists, gynaecologists, paediatricians,

surgeons, geneticists, orthopaedists, public health specialists, occupational therapists, physiotherapists, nutritionists, speech and language therapists, nurses, midwives, and social workers [7].

The crucial factor in the treatment of cerebral palsy appears to be the time from making the diagnosis, as this is the period of intense growth and development of children between 12 and 24 months of age, and during this phase it is easier to detect developmental anomalies, thus there is hope for earlier diagnosis and, consequently, the quicker initiation of treatment, rehabilitation, and prophylaxis [8]. Early detection also promotes family acceptance, and facilitates the establishment of a proper therapeutic relationship with the medical team. It further allows improved access to early intervention and efficient use of healthcare resources and the potential of the young patient [9-10].

According to the CP classification, the primary focus is on the affected limbs (hemiplegia, diplegia, quadriplegia), whereas when considering the motor impairments, classification is made into spasticity, dyskinesia (including dystonia and athetosis), hypotonia, and ataxia [11-12]. Comorbidities include vision impairments (50% of the patients), hearing impairments (25%), speech impairments (50%), epilepsy (30-65%), intellectual disability (35%), and emotional problems (episodes of aggression, irritability, violent reactions). Microdeficits in visual-motor coordination, and body coordination (including functional asymmetry of the right, left, or both sides of the body), as well as cognitive impairments have been observed [13-14]. Dysfunction should also be attributed to impaired lung ventilation function (which is a result of abnormal psychomotor development, different types of motor activity, or prolonged periods in forced body positions) [15], as well as disruptions in the proper functioning of the digestive system (motor dysfunction within the mouth, lack of coordination in the swallowing mechanism, or an unstable feeding position) [16].

Epilepsy, which often occurs as a comorbidity, has an impact on psychomotor development and contributes to secondary changes within the central nervous system. This can be problematic, as it leads to developmental regression and the loss of previously acquired skills [17]. Speech becomes slower, articulation movements are uncoordinated, sometimes exaggerated. Loud and rhythmic speech patterns may also be present. In the cases of visual impairments, disturbances in visual perception, problems with spatial vision, and difficulties in shape recognition are observed [14, 18].

Taking into account the cognitive development of children with cerebral palsy, it is possible to distinguish various levels of severity ranging from mild to severe;

nonetheless, the evaluation of development in these terms is complicated due to the close relationship between cognitive and motor development [18].

Every child with cerebral palsy should undergo evaluations for intellectual disability, as well as for visual, hearing, and speech impairments. Furthermore, it is essential to monitor their nutrition and growth [19].

Nutritional disorders are relatively common among children with CP, as both obesity (found in approximately 3.2% to 18.2% of children with CP) [20] and, even more frequently, malnutrition (affecting an average of 29% to 46% of children with CP) are prevalent in this population. According to American specialists, nutritional disorders may be present among 58% of children with moderate or severe form of the discussed condition [21]. Particularly, children with neurological disorders (often accompanied by gastroenterological disorders, problems with communication, feeding process disturbances or cognitive impairments) face difficulties connected with nutrition, micro- and macronutrient deficiencies, growth and developmental disorders or osteopenia. Gastric issues such as reflux disease, dysphagia or constipations also have an impact on the quality of life [22].

Swallowing disorders have a significant impact on the development of malnutrition. These abnormalities can affect various stages. The first stage involves postural disorders. During this phase, these irregularities hinder the ability to maintain a proper position and head control, leading to improper positioning of the oral cavity, pharynx, and larynx. Disorders related to upper limb function prevent grasping, and thus contribute to further difficulties, such as improper utensil handling. In the oral phase, deficits in muscle strength and coordination of the lips, cheeks, tongue, jaw, and palate muscles result in difficulties in forming and moving the food bolus. In the pharyngeal phase, due to reduced tongue strength and selectivity, there may be a lack of protection for the nasal cavity and airways, allowing food to enter these areas.

Children with cerebral palsy (CP) often experience body weight deficits due to protein loss. The reduction in BMI (Body Mass Index) is attributed to the lack of weight gain relative to height growth. It is important to note that BMI is not a perfect indicator of nutritional status due to the difficulties in obtaining accurate height measurements [23].

Anthropometric measurements should be conducted in the morning. It is preferred that they take place at a consistent time of day to minimize daily variations in body weight and height. The patient should be without shoes and undressed. Depending on the child's condition and motor predispositions, anthropometric measurements can be performed either in a standing or lying position. When measuring a patient in a standing position, a stadiometer with an accuracy of 0.1 cm should be

used. This measurement should be performed three times to obtain an average of the three readings. The body should be in an upright position, with arms to the sides. The lower edge of the eye socket and the external ear canal should be in a straight line, parallel to the ground. When measuring a child in a lying position, it should be done after the child straightens its limbs. This measurement is taken using a length board or anthropometer with an accuracy of 0.1 cm. If the patient fails to extend their lower limbs, the measurement should still be taken in the lying position. It is important to note that this measurement is an estimate, especially when there are lower limb contractures or chest deformities present. The description of the measurement should always include the patient's position during the measurement (standing or lying down). The results should be compared to normal growth charts. The reference norms are published by WHO (World Health Organization) and OLAF 2010. It's worth emphasizing that the height measurement is compared to the chronological age of the child in order to assess growth velocity. The patient's body weight should always be compared to the height-for-age reference. This parameter is defined as an age for which the 50th percentile of the height norm corresponds to the height or length of the measured patient. It is worth highlighting that during the patient's nutritional therapy, periodic checks of changes in body weight and length are essential. It is recommended to perform anthropological assessments of nutritional status and laboratory tests every 3-6 months during monitoring [19].

Anthropometric methods, bone assessment, body composition analysis and laboratory tests are intended to assist in the evaluation of the nutritional status of children with cerebral palsy; however, there are no methods which could be 100% perfect for obtaining reliable and accurate data. Using calibrated equipment and adhering to essential principles during weighing, measuring, skinfold measurement, and muscle tissue presence assessment (taking into account factors such as time of day, the child's mobility or possible contractures) is crucial. Additionally, interpreting growth charts and utilizing techniques such as BIA (bioelectrical impedance analysis) or DEXA (Dual-energy X-ray absorptiometry, a method with low radiation) can contribute to a more comprehensive evaluation [24-26].

Laboratory tests may not be perfect in terms of interpreting the nutritional status of a child with cerebral palsy; however, they are considered useful for qualifying CP patients for nutritional therapy. They can also assist in monitoring the effectiveness of therapy and diagnosing potential accompanying metabolic disorders. Due to the fact that these tests are repeatable and objective, they enable the modification of ongoing therapy. Several proteins such as albumin, transferrin, prealbumin, and total lymphocyte count (TLC) play

a significant role in assessing nutritional status. Monitoring morphology, vitamin D levels, ferritin and iron is also valuable [3,27].

An essential aspect related to assessing nutritional status is diagnosing feeding disorders. This process should encompass a family and medical history, as well as the child's feeding history and method. The classification system for eating and drinking skills in children with CP is based on, among others, physical examination, assessment of psychomotor and physical development, psychological evaluation, speech evaluation, and dietary assessment. This evaluation should also be supplemented by an observation of the feeding process, which should closely resemble home conditions. Among the tools used to assess feeding disorders, the following have been considered the best in terms of psychometric properties: the Pre-Speech Assessment Scale (PSAS), Dysphagia Disorders Survey (DDS), and Schedule for Oral Motor Assessment (SOMA). Of these, DDS, SOMA, and PSAS are recommended for use in children with neurodevelopmental disorders.

Yet another important system is the system which was created on the basis of the concept of the International Classification of Functioning, Disability and Health (ICF) [28].

The assessment of the nutritional status of patients with CP is a crucial component of therapeutic care, since it enables the early detection and treatment of nutritional problems and preventing their further consequences. Each specialist within the therapeutic team plays a unique role in evaluating various aspects of the nutrition of CP patients.

The physician is responsible for assessing the overall health of the patient, which includes the medical history, clinical symptoms, laboratory and imaging test results, as well as medications. The physician may also refer the patient for consultations with other specialists, such as gastroenterologists, neurologists, or endocrinologists, depending on the patient's specific needs.

The dietitian is responsible for evaluating the patient's dietary intake and nutritional needs, including calories, protein, fat, carbohydrates, vitamins, and minerals. The dietitian can also assess the risk of malnutrition or overweight in the patient and propose an appropriate dietary plan tailored to their preferences and possibilities. The role of the dietitian also includes educating parents about the child's nutrition. It is crucial to prevent severe nutritional deficiencies. Parents should receive education on the principles of proper child nutrition and learn the correct feeding techniques for their child. For some children with cerebral palsy, spoon feeding may be insufficient or unsafe. In such cases, there should be no delay in deciding to establish a special gastric access (percutaneous gastrostomy - PEG), which allows safe and adequate feeding for the child.

The speech therapist assesses the patient's swallowing function, including the anatomy and physiology of the oral cavity and pharynx, muscle and nerve coordination, and also protective reflexes. The speech therapist can also evaluate the risk of choking or food aspiration into the airways and recommend appropriate feeding techniques and aids for the patient [29,30].

The role of the physiotherapist involves, among others, assessing the patient's motor function, including the evaluation of muscle strength, degree of movement of joints, body posture, and balance. The vast majority of children with cerebral palsy have spasticity. Active management of spasticity is necessary to prevent painful contractures and deformities, and to promote optimal function. This management is typically provided by multidisciplinary teams that consist of physiotherapists, surgeons, and orthopaedists. Physiotherapy, widely used in cerebral palsy, has not undergone randomized trials, but is generally accepted as part of standard care. Regarding the assessment of the patient's nutrition, the physiotherapist can evaluate the impact of nutritional disorders on the patient's motor and musculoskeletal development and recommend appropriate exercises and treatments [31-33].

The nurse plays an important role in the care of children with cerebral palsy, as they can assist in assessing the nutritional status, preventing and treating malnutrition, as well as ensuring safe and effective feeding. An important aspect of the nurse's work is the ability to recognize the patient's needs and understand where they require specific assistance. Nurses should be knowledgeable about the causes, symptoms, and consequences of malnutrition in children with CP. They should also be proficient in using appropriate tools and methods of assessing the nutritional status and dietary needs.

All decisions related to the treatment of problems with feeding and swallowing should take into account the needs of the child, and at the same time they should aim to create a pleasant and non-stressful atmosphere for both the child and their caregivers. It is crucial to have interdisciplinary teamwork focused on the well-being of the young patient, taking into account the patient's individual needs. Sometimes it may be necessary to consider introducing temporary or long-term feeding through a tube [34].

The role of endocrinological factors in the growth and weight gain of children with cerebral palsy is also crucial, since these factors can influence changes in the quantity of growth hormone and the hypothalamic-pituitary axis. The latter is involved in regulating the feeling of satiety and controlling appetite [35].

The goal to maximize overall developmental functions in children emphasizes the importance of good nutrition. Nutritional needs and hydration should be prioritized while respecting the needs of the patient and their family, whereas the

specific scope of feeding and swallowing issues should be thoroughly assessed and monitored continuously. Oral feeding should be considered, taking into account the state of lung function, oral and pharyngeal capabilities, and the child's individual predispositions [34].

In the case of children with cerebral palsy, there are no specific recommendations for assessing energy needs. Such needs should be evaluated individually, as they vary depending on the patient's mobility, activity level, muscle tone, growth, and metabolism. ESPGHAN (European Society for Paediatric Gastroenterology, Hepatology and Nutrition) suggests using reference standards for typically developing children to estimate caloric intake needs in the case of chronic neurological disorders. As studies have shown [36,37], subjecting children to calorie-protein malnutrition and diminished linear growth can also lead to micronutrient deficiencies, causing difficult-to-distinguish general neurological disorders, which in turn affect the quality of life (cognitive functions, social interactions, developmental progress) [25].

It seems justified to follow standard recommendations regarding the consumption of vitamins, minerals, and micronutrients and trace elements by incorporating foods rich in the deficient micronutrient in the diet, or by means of supplementation. Proper nutrition can help restore linear growth, normalize weight, reduce spasticity and irritability, contribute to wound healing, improve peripheral circulation, reduce hospitalization rates, and enhance social participation. A multidisciplinary approach is crucial in the management of proper nutrition [25,38,39,40].

Conclusions

Children with CP often have medical conditions such as gastroenterological diseases and malnutrition that affect their development and quality of life. Assessment of the nutritional status of children with CP is difficult because it requires taking into account many factors, such as height, weight, body composition, swallowing disorders, gastroenterological problems and medications. Thanks to cooperation with specialists in the therapeutic team, such as a doctor, dietician, physiotherapist, speech therapist and psychologist, the chance of providing optimal nutritional care for children with CP increases. Moreover, the therapeutic team should collaborate with each other and with the patient's family in order to provide optimal nutritional care and improve the quality of life for children with cerebral palsy. The specialists in the team should also regularly monitor the patient's nutritional status and adjust the nutrition plan to meet their changing needs.

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Patients' knowledge on depression as a cognitive determinant for the nursing profession

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Introduction

The profession of a nurse requires not only up-to-date medical knowledge, but also understanding of patients' attitudes to disease with which a medical professional such as a nurse has very frequent contact. Understanding patients' knowledge about morbidity, diagnosis, course, complications is a key element in patient education as well as in conducting effective therapeutic methods from the prism of nursing competence.

Depression is classified as a common mental disorder (CMD), it covers a degree of depressed mood, decreased activity, loss of interest or depression, regardless of the cause. This condition is complex, multifaceted and is caused by the interaction of etiological factors (social, biological and psychological) [1,2]. The WHO estimates that depression affects 5% of adults worldwide and is twice as common in women than men. According to analyses conducted by the WHO, by 2030 this disease will become the second most common cause of disability in highly developed countries and the third most common cause of disability in less developed countries [3-5]. The Pedagogical Encyclopaedia of the 21st Century defines depression "generally and popularly as a mental state of an individual associated with a sense of inadequacy, depression, pessimism, sadness and reduced activity and reactivity" [6].

Currently, it is assumed that there are three types of factors leading to the development of this disease: psychogenic, somatogenic and endogenous. Depression is a

recurrent disorder conditioned by many factors, which, despite numerous studies, has still not been sufficiently explained. Current study intends to define a precise theory that would explain the biological and psychosocial connections [7-9]. One of the biological factors causing depression is a decrease in the level of neurotransmitters: serotonin, noradrenaline or dopamine in the central nervous system, which in turn leads to serious changes in the body. Deficiencies of these monoamines in the CNS result in impaired regulation of cognitive processes and brain functions such as attention, mood, processing of information related to reward, sleep or appetite. In addition, in people suffering from depression, a reduced amount of GABA acid was observed, which relieves the symptoms of stress and strengthens concentration [10]. The influence of genetic factors on the onset of a depressive disorder is about 30 - 40%. Inflammatory factors are another likely biological factor causing depression [7,11]. Psychological theories of depression explain its mechanisms and its onset is related to the structure of personality, life events (e.g. loss of a loved one, loss of health, social value or sense of security), disturbances in self-knowledge, learned helplessness, or negative events from work area (e.g. disagreement with the employer, too high professional requirements, mobbing) [12-17].

The basic symptoms of depressive disorders include depressed mood, loss of interest and the ability to enjoy, and reduced energy leading to increased fatigue and decreased activity. Additional symptoms that are often encountered in the course of a depressive episode include: impaired concentration and attention, lack of self-confidence, guilt and low self-esteem, pessimistic, negative prospects of the future, suicidal thoughts and acts, sleep disorders, decreased appetite [15]. The main symptoms of depressive disorders in children include: abdominal pain and headaches, lack of appetite, incontinence (uncontrolled urination), tearfulness, fear, anxiety, and behavioural disorders. In the diagnosis of depression in adolescents, the following symptoms can be distinguished: aggression, self-harm (e.g. self-mutilation), anger, rage, irritability, sadness, loss of interest, alienation, sleep and eating disorders, guilt, lack of energy, difficulty concentrating, lack of motivation or suicidal thoughts [7, 18, 19].

Currently, the treatment of depression is mainly based on pharmacotherapy and psychotherapy, as well as their combination. Depressive disorders are treated mainly symptomatically. The inability to treat depression due to its causes often leads to relapses [20]. Treatment is usually conducted in mental health clinics and psychiatric offices, as well as in psychiatric wards [21]. Pharmacotherapy distinguishes three groups of substances that are used to treat depression: tricyclic antidepressants (TCAs), monoamine oxidase inhibitors (MAOIs) and selective serotonin reuptake inhibitors (SSRIs). The most commonly used antidepressants include:

amitriptyline, citalopram, venlafaxine, agomelatine, tianeptine and mirtazapine [15, 22]. An extremely important element in the treatment of depression is psychotherapy, which is a method of treating disorders and behaviours related to the human psyche, using techniques derived from the principles of psychology, during a dialogue or a discussion between the patient and the therapist. Such activities are aimed at modifying human characteristics, such as feelings, values, behaviours and attitudes. Taking into account the methods used in psychotherapy, three main types can be distinguished: cognitive-behavioural therapy, interpersonal therapy and psychodynamic therapies [23].

Of all diseases, depression is one of the most significant causes of disability worldwide. In 2015, according to the World Health Organization, 322 million people suffered from this disorder. Taking into account the gender or the region of the world, the prevalence of depression ranges between 2.6% and 5.9%. In the years from 2005 to 2015, the approximate number of patients with depression increased by 18.4% [24]. Throughout life, the risk of developing depressive disorders amounts to 15-18%, which means that one in five people will be affected by this disease [25]. In primary health care, symptoms related to depression are diagnosed in approx. every tenth patient. Depressive disorders can be observed more often in single people, in informal relationships and those living in the city. According to data from the National Health Fund from 2023, the percentage of women suffering from depression in the years 2000-2019 was about 3% (about 600,000 people), and in men it was slightly above 2% (about 400,000 people) [26]. Women suffer from depression on average twice as often as men. In addition, in the group of women there are specific types of depression, such as depression during pregnancy, postpartum and menopause, as well as disorders associated with premenstrual syndrome [7, 27]. Depression in the elderly is a growing problem in developed countries. About 20% of seniors over 65 demonstrate symptoms related to depression. In addition, in people with Alzheimer's disease it amounts to approx. 18% [28]. Depression can also be associated with a reaction to a new condition, often one that manifests itself with pain and a person has to adapt to it. The conditions in the course of which depression can be most often observed include advanced cancer, Parkinson's disease or ischemic heart disease [29].

Aim

The aim of the study was to analyse the level of knowledge of patients living in the Boguchwała commune about depression.

Material and method

The method used in the study was a diagnostic survey, and the research tool was an anonymous, original questionnaire. The study, which was conducted in the first quarter of 2023, covered 300 adult patients living in the Boguchwała commune in the Podkarpackie province. The study used simple random sampling. The inclusion criteria for the study were residence in the Boguchwała commune, voluntary consent to participate in the study and age over 18 years. The exclusion criteria for the study included residence in a commune other than the Boguchwała commune, lack of consent to participate in the study and age below 18 years. The questionnaire consisted of 20 closed questions. The survey was anonymous and participation in it was voluntary. Oral consents were obtained from patients to participate in the study. Statistical analyses were performed using Statistica 13 by StatSoft. The relationships between the variables were assessed with the chi-square test of independence. The level of statistical significance was $p < 0.001$.

Results

Nearly half of the respondents (48%) were aged 18-30, while 34% of the respondents were patients aged 31-49 and 15% of people aged 50-69. The least numerous group were people aged over 70 (3%). In terms of gender distribution in the study group - the majority of the respondents were women (55% women vs 45% men). Almost three quarters of the respondents (72%) lived in rural areas. Patients living in the city accounted for 28% of the study group. Among the respondents, people with secondary education prevailed (47%). A slightly smaller group were respondents with higher education (38%), while 11% of people declared having vocational education, and the smallest group were people with lower secondary education (2%) and primary education (2%). The surveyed population was dominated by working people (58%), one quarter of the respondents were students (25%). Patients who declared that they were retired or on pension accounted for 10%, and the least numerous groups of respondents was represented by the unemployed (7%).

The patients included in the study were asked to indicate their level of knowledge about depression. Half of the respondents (50%) stated that their knowledge about this disease was at a good level, and only 5% of the respondents answered that they assessed their knowledge as very good (Fig.1).

In the next part of the study, respondents were asked if they had the ability to recognize symptoms of depression in themselves or in their relatives. Among

the surveyed group, 49% of respondents claimed that they did not know if they would be able to recognize the first symptoms of the disease. Patients who declared that they were unable to identify this disorder constituted 36% of the respondents, while 15% of the respondents reported that they would not be able to recognize depression either in themselves or in a loved one. The answers were compared with the gender of the respondents and statistically significant results were obtained ($p<0.001$). Women more often than men declared the ability to recognize depression in themselves or others, while men more often than women were unable to clearly define their position (Table 1).

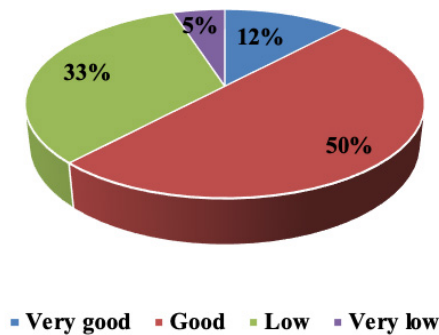


Fig. 1. Self-evaluation of the respondent’s knowledge about depression

Table 1. Distribution of patients’ answers regarding the ability to diagnose depression by sex.

Do you think you would be able to identify depression in yourself or your loved one?		Sex	
		Female	Male
Yes	Number	73	36
	% (of a given sex)	44%	27%
No	Number	33	11
	% (of a given sex)	20%	8%
No opinion	Number	59	88
	% (of a given sex)	36%	65%
Chi square independence test		$\chi^2 = 26.54618$; $p < 0.001$	

Another analysed issue was the ability to help a person suffering from depression. A large percentage of patients (43%) answered that they did not know how to help a person suffering from depression, and only 14% of respondents declared that they knew how to help a sick person. The responses obtained were compared with the sex of the patients and statistically significant results were obtained ($p<0.001$). Men more often than women declared the lack of ability to help a person suffering from depression (Table 2).

Table 2. Distribution of patients' answers regarding the ability to help a person suffering from depression, broken down by sex.

Do you think you could help a person with depression?		Sex	
		Female	Male
Yes	Number	23	18
	% (of a given sex)	14%	13%
No	Number	47	83
	% (of a given sex)	28%	61%
No opinion	Number	95	34
	% (of a given sex)	58%	25%
Chi square independence test		$\chi^2 = 36.79187$; $p < 0.001$	

Almost half of the respondents (47%) answered that depression is a treatable disease, while according to 32% of the respondents, this condition cannot be cured. Over a fifth (21%) of respondents declared that they did not know whether depression could be cured. Patients' responses were matched by gender and statistically significant results were obtained ($p < 0.001$). Women were more likely than men to believe that depression is a treatable disease. The lack of knowledge on this subject was more often indicated by men than women (Table 3).

Table 3. Distribution of respondents' answers on the treatment of depression by sex.

Do you think depression is a curable disease?		Sex	
		Female	Male
Yes	Number	96	45
	% (of a given sex)	58%	33%
No	Number	45	50
	% (of a given sex)	27%	37%
No opinion	Number	24	40
	% (of a given sex)	15%	30%
Chi square independence test		$\chi^2 = 19.90906$; $p = 0.00005$	

The patients included in the study, when asked about the most common causes of depression, indicated mainly psychological causes and lower self-esteem, loss of a loved one and loneliness. The least frequently indicated reasons were: excessive consumption of alcohol and certain drugs. Among the most common symptoms of depression, the most frequently indicated by the respondents were: sadness, depression, inability to feel joy and reduced activity, apathy, slowness, reluctance to act. Pain and reduced interests were the least frequently indicated symptoms of this disease by the respondents.

In order to determine the level of knowledge of the respondents in the epidemiology of depression, they were asked how many people in the country suffer from this disease. Almost half of the respondents (49%) answered that it is in the range of 500,000. – 1 million. According to 28% of patients, the number of people suffering from this condition is from 1 to 2 million. According to 23% of people, there are 2 to 3 million patients suffering from depression. The responses obtained were compared with the sex of the patients and statistically significant differences between the groups were obtained ($p<0.001$). Men more often than women indicated the correct answer regarding the prevalence of depression in Poland (Table 4).

Table 4. Distribution of respondents' answers regarding the epidemiology of depression by sex.

How many people suffer from depression in Poland?		sex	
		Female	Male
500 000 – 1mln	Number	36	32
	% (of a given sex)	22%	24%
1-2 mln	Number	68	81
	% (of a given sex)	41%	60%
2-3 mln	Number	61	22
	% (of a given sex)	37%	16%
Chi square independence test		$\chi^2 = 16.86346$; $p = 0.00022$	

The respondents were also asked about the sources from which the respondents mainly get their knowledge about depression. The largest number of patients declared that they obtain knowledge mainly from the Internet (47%), while it is worrying that only 5% of the respondents reported that they obtain knowledge about depression from medical professionals - doctors and nurses (Fig.2).

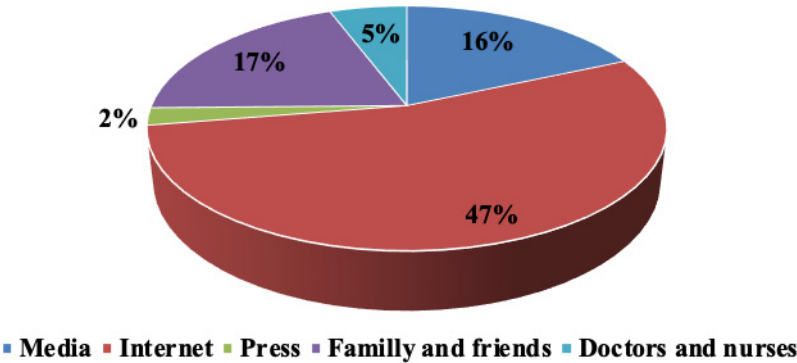


Fig. 2. Source of knowledge on depression

The answers obtained were compared with the sex of the respondents and a statistically significant difference between the groups was obtained ($p<0.001$). The majority of women (44%) and men (50%) respondents obtain their knowledge from the Internet. Women more often than men obtained information about depression from the media, while men more often than women reported family and friends as a source of knowledge about depression (Table 5).

Table 5. Distribution of respondents' answers regarding the sources of knowledge about depression, broken down by sex.

Where do you mainly get your information about depression from?		sex	
		Female	Female
Media	Number	34	15
	% (of a given sex)	21%	11%
Internet	Number	73	67
	% (of a given sex)	44%	50%
Prass	Number	3	4
	% (of a given sex)	2%	3%
Family and friends	Number	16	34
	% (of a given sex)	10%	25%
Doctors and nurses	Number	8	6
	% (of a given sex)	5%	4%
Own experiences	Number	31	9
	% (of a given sex)	19%	7%
Chi square independence test		$\chi^2 = 23.87178$; $p = 0.00023$	

Discussion

The analysis of the results of the study shows that half of the surveyed residents of the Boguchwała commune assessed their level of knowledge about depression as good, while only 12% of the respondents rated it as very good. People who declared that their knowledge on this subject was poor constituted 33%, and very poor 5%. Slightly better knowledge was declared by the respondents in the study by Anna Kužel et al. examining the perception of depression by nurses and teachers. Among the respondents, 73%, including 81% of nurses and 65% of teachers, assessed the level of their knowledge as average. Low level of knowledge was declared by 6% of nurses and 29% of teachers, which amounts to 17.5% of the total surveyed group. Only 9.5% stated that they had a high level of knowledge about depressive disorders (13% of nurses and 6% of teachers) [29]. On the other hand, in the study by Seon-Cheol Park et al. on the knowledge and attitudes of nursing staff towards

depression in general hospitals in Korea, the surveyed nurses mostly assessed that their knowledge about depression was above average. Among registered nurses and assistant nurses, it reached approx. 80% [30]. Taking into account the differences in the education of the respondents, it is impossible to directly compare the results of the research, but it is advisable to better illustrate what differences and similarities exist between the groups. As a consequence, it is possible to better assess the state of knowledge of the residents of the Boguchwała commune about depression, compared to i.e. people associated with medical faculties.

Patients living in the commune of Boguchwała, declaring their knowledge of a person suffering from depression, constituted 50%. Similar results were obtained by Krużel et al. study published in 2015. The respondents who knew a person suffering from depression included 50.5%, while 27% assumed that they currently know such a person. Among the respondents, 5.5% could not define their opinion, and 17% did not know a person with depression [29].

Among the respondents participating in the study, as many as 86% believed that depression is a health problem of the Polish society, while the group of commune residents who did not know or disagreed with this statement constituted 7% each. Barbara Kubik et al. in a study on the knowledge and awareness of inhabitants of a small town in the field of depression prevention, obtained very similar results, because 78% also note that depression is a health problem in Poland, only 4% believe that there is no such problem in Polish society, and 18% have no opinion on this topic [31].

Another aspect that was addressed in the study concerned the treatability of depression. Almost half of the inhabitants of the commune believed that this disease can be cured (47%), while 32% were of the opposite opinion. 21% of the respondents from the total group had no opinion on this subject. Krajewska-Kułak et al., investigating nurses and teachers, obtained slightly different results, because as many as 78% of the respondents declare that depression is curable (88% of nurses and 68% of teachers), and only 6.5% claimed that this disease cannot be cured (6% of nurses and 7% of teachers). 15.5% of people (6% of nurses and 25% of teachers) could not express an opinion on this subject [29].

Research shows that women are more likely to suffer from depression. Patients from the Boguchwała commune mostly thought the same - 84%, only 16% of the respondents claimed that men more often suffer from this disease. In the study "Poles' attitudes towards depression", 45.1% indicated that women were more susceptible to the disease, one fifth of them believed that it was the case for men, and 35.4% of respondents had no opinion on this subject [32].

About 50% of patients in primary care clinics report only somatic symptoms, and a small percentage of about 20% present their depressive disorder with dominant psychological symptoms, i.e. affective and cognitive. Two of the three most common symptoms reported during the current depressive episode are somatic symptoms such as lack of energy, apathy - 73%, interrupted or reduced sleep - 63%. In the conducted study, patients, among the most common symptoms of depression, mainly indicated sadness, depression, inability to feel joy and decreased activity, apathy, slowness, reluctance to act, which is directly related to the symptoms reported by patients in Kapfhammer study [33, 34].

According to the data from the CBOS announcement from 2018, about 1.5 million people suffer from depression in Poland. Taking into account the CBOS study from 2021, approximately 3,254,600 adults have experienced depression in their lives, while over 963,000 still suffer from it [35]. Almost half of the inhabitants of the Boguchwała commune (49%) believed that between 500,000 and 1 million people in Poland suffer from depressive disorders each year. The correct answer was given by only 28% of the respondents, i.e. the range of 1-2 million patients. On the other hand, according to 23% of the respondents, this number ranges from 2 to 3 million. Depression is one of the main reasons for suicide, not only in Poland. Supreme Chamber of Control shows data in which out of 22 European Union countries, Poland is in 7th place in terms of suicides per 100,000 inhabitants (13.5 people) [35,36]. Only 18% of the surveyed residents of the Boguchwała commune believe that 5-6 thousand patients commit suicide annually due to this disease. As many as 44% of the total surveyed group declare that it is 3-4 thousand, 30% believe that it is from 1 to 2 thousand, and 8% consider the range of 7 thousand and more to be correct.

Research is underway in the world in which depression and its initial symptoms are to be treated through the media, e.g. the Internet. The improvement of traditional treatment methods will be possible by "providing online and mobile interventions". Such actions result primarily from the fact that people, seeing disturbing symptoms in themselves or their loved ones, first seek help in the media, and not from specialists [36]. Taking into account the dissemination of the subject of depression, the report "Attitudes of Poles towards depression" shows that 65.2% of the respondents encountered the issue of depressive disorders in the media, 20.7% of people from the surveyed group did not encounter the topic of depression, and 14.1% did not remember whether they came across such a topic. Most often, the respondents indicated the Internet, while television, press and radio were declared somewhat less often [32]. Respondents from the study by Krużel et al. most often gained knowledge from the media (66.5%) and the Internet (60.5%). Less than half

of the surveyed nurses and teachers got their knowledge about depression from the press (46.5%), classes at school/university (35%), friends (29.5%) and family (18.5%), doctors (13.5%) and nurses (4%) [29]. Patients from the Boguchwała commune obtained their knowledge mainly from the Internet (47%), similarly to other surveyed groups. Only 17% of respondents gained knowledge from family and friends, 16% indicated the media, and 13% got knowledge from their own experiences. Only 5% of the surveyed group used the knowledge provided by doctors and nurses, and 2% from the press.

Conclusions

The knowledge of patients living in the Boguchwała commune about depression is at a moderate level. The patients knew the basic and most common causes, symptoms and effects of depression, but they had problems determining whether they would be able to help a depressed person or declared that they would not be able to do so. The vast majority of patients correctly believed that depression is a serious disease that hinders normal functioning and is a significant health problem in Polish society, and their knowledge about depression was obtained mainly from the Internet.

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