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Advanced nurses' practices related to pharmaceutical care in the Czech Republic

Zaawansowana praktyka pielęgniarska związana z opieką farmaceutyczną w Czechach

Jana Heczková[1], Tinne Dilles[2]

[1]Institute of Nursing Theory and Practice, First Faculty of Medicine, Charles University, Czech Republic
[2]Faculty of Medicine and Health Sciences, Nursing and Midwifery, University of Antwerp, Belgium

CORRESPONDING AUTHOR:
Jana Heczková
Charles University, First Faculty of Medicine
Albertov 2049/7, 120 00 Prague 2
Czech Republic
e-mail: jana.heczkova@lf1.cuni.cz

STRESZCZENIE

ZAAWANSOWANA PRAKTYKA PIELĘGNIARSKA ZWIĄZANA Z OPIEKĄ FARMACEUTYCZNĄ W CZECHACH

Wstęp. Używanie produktów farmaceutycznych jest bardzo złożoną częścią opieki zdrowotnej, w zakresie której współpracują różni pracownicy służby zdrowia. Niestety, nie wszystkie grupy zawodowe wydają się mieć całkowicie jasną rolę pomimo wielu regulacji. Istnieją dowody na to, że rola pielęgniarek jest dużo szersza niż zakładano i niż wyszczególniono w przepisach.

Cel. Celem było zbadanie punktu widzenia pielęgniarek, lekarzy i farmaceutów odnośnie praktyki pielęgniarskiej związanej z opieką farmaceutyczną (OF) w Czechach.

Metody. Przekrojowe badanie ankietowe zostało przeprowadzone metodą elektroniczną. Wykwalifikowane pielęgniarki (629), lekarze (69) i farmaceuci (39) zostali zapytani o to jak postrzegają zaangażowanie pielęgniarek w różnego rodzaju zaawansowane czynności związane z OF.

Wyniki. Udział w zaawansowanych czynnościach związanych z OF w czasie ostatniego miesiąca był wysoki (udzielanie informacji i edukowanie pacjentów 80%; monitorowanie przestrzegania dyscypliny przyjmowania leków 72%; monitorowanie działania leków 56% i uczestnictwo w przepisywaniu leków 19%). Pielęgniarki w największym stopniu były w stanie dostrzec badane aspekty OF będące częścią ich obowiązków w porównaniu z punktem widzenia lekarzy i farmaceutów. Jednak znaczna część uczestników badania uznawała za pozytywny wpływ zaangażowania pielegniarek w czynności związane z OF. Z drugiej strony, współpraca międzybranżowa pozostaje niezadawalająca a komunikacja w obrębie zespołu różnych pracowników służby zdrowia została oceniona jako bardzo słaba.

Wnioski. Istnieje potrzeba zwiększania zaangażowania pielęgniarek w OF. Optymalizacja formalnych kompetencji pielęgniarek, przypominanie wachlarza umiejętności pracy w różnych miejscach oraz przegląd programów nauczania pielęgniarek, jak również poprawa współpracy międzybranżowej, mogą pozytywnie wpłynąć na wyniki pacjentów.

Słowa kluczowe: **zarządzanie leczeniem farmakologicznym, systemy leków, jakość opieki zdrowotnej**

ABSTRACT

ADVANCED NURSES' PRACTICES RELATED TO PHARMACEUTICAL CARE IN THE CZECH REPUBLIC

Introduction. The use of pharmaceutical products is a very complex part of healthcare, where a variety of healthcare professionals collaborate. Unfortunately, the role of all professional groups does not seem to be entirely clear despite of the high regulation. Evidence suggests that the role of nurses can be much wider than expected and specified by the related policies.

Aim. The aim of the study was to explore nurses', physicians' and pharmacists' perspectives of nurses' practices related to pharmaceutical care (PC) in the Czech Republic.

Methods. A cross-sectional online survey was conducted. Qualified nurses (629), physicians (69) and pharmacists (39) were questioned about their views on the nurses' involvement in various advanced activities related to PC.

Results. Participation on the advanced activities related to PC during the last month was high (providing information and patient education 80%; monitoring medication adherence 72%; monitoring medication effects 56% and participation on prescribing medication 19%). Nurses were most likely to see the investigated PC aspects as part of their nursing tasks when compared to the physicians' or pharmacists' point of view. However, a substantial part of participants believed in the positive impact of nurses' involvement in activities related to PC. On the other side, interprofessional collaboration remains unsatisfactory and communication within an interprofessional team was rated as being very poor.

Conclusions. The need to increase the nurses' involvement in PC exists. Optimising formal nurses' competencies, revising the skills mix in different types of workplaces and revising the nursing curricula, as well as improving the interprofessional collaboration, could result in a positive effect on patient outcomes.

Key words: **Medication Therapy Management, Medication Systems, Quality of Health Care**

INTRODUCTION

The use of pharmaceutical products has become an essential, but a very complex, multistep and multifaceted part of the current healthcare [1-3]. The area is not only highly regulated and covered by various norms with a different level of authority, but the process also involves a variety of healthcare professionals. Their main roles vary, although certain tasks and responsibilities may overlap. Besides, some activities seem to be too complex and not entirely clear [4,5]. In particular, the role of nurses seems to be wider than described so far [6,7].

Background

Definition

Even though care related to the use of medication either for the treatment, diagnosis or prevention of diseases is not exclusively delivered only by one profession, but in fact ensured by different healthcare professionals with various roles. Heterogeneous terminology and classification systems are used to describe this process [8]. Unfortunately, the used terminology often reflects a particular professional group's point of view. One of the widest definitions describes this process as pharmaceutical care (PC), where pharmacists, together with the patient, physician and other healthcare professionals, work to achieve an improved therapeutic outcome and quality of life [9].

Healthcare professionals' involvement

In general, it is assumed that a physician prescribes, a pharmacist dispenses, and a nurse administers the medication, but those are not the only tasks and not the only professionals involved in the process related to the use of pharmaceutical products. Besides, in order to deliver PC effectively, the evidence suggests that an interprofessional collaboration is necessary [10], as well as the patient and his/her formal or informal caregiver involvement [11]. On top of it, the process of task shifting from one professional group to the other, in order to improve access to healthcare services, has already been described [12].

Pharmaceutical care in the Czech Republic

In the Czech Republic, the use and preconditions for working with any pharmaceutical product are defined by the law [13,14]. Physician's competencies in this area are not limited [15]. The competencies of other healthcare professionals, including nurses, are specified by a decree [16]. Healthcare facilities also manage procedures related to the PC by a variety of internal policies. Although the area is quite closely regulated, the evidence suggests that not all the procedures are clearly described and not all the policies are successfully implemented. Besides, practices may vary significantly at different workplaces [17-19].

METHODS

The aim of the study was to explore nurses', physicians' and pharmacists' perspectives on nurses' practices in medication management and PC in the Czech Republic. A cross-sectional online survey was conducted as a part of a large international study in several European countries approved by The Ethics Committee for Social Sciences and Humanities at the University of Antwerp (SHW_17_47_02). Fully qualified nurses, physicians and pharmacists were questioned about their view on the nurses' involvement in various tasks related to pharmaceutical care. The link to online questionnaire was e-mailed to representatives of professional associations and graduates of nursing education, who were asked to forward it to those eligible for participation. Before the questionnaire could be started, participants indicated they had read written information about the study and provided their consent. Consequently, data were collected anonymously. Detailed methodology has been published somewhere else [20].

Data were analysed using Statistica version 13 and described using frequency distribution, measures of central tendency and variability. The statistical significance was set at the 0.05 level. The Shapiro-Wilk and the Kolmogorov-Smirnov tests were used to test the normality of the data distribution, the Kruskal-Wallis test was used to explore differences among the professional groups.

RESULTS

Research sample

In total 868 questionnaires were submitted, but only those describing at least one (out of four) aspects of the PC were used for the data analysis. This included 629 questionnaires completed by nurses (85.3% of the participants), 69 by physicians (9.4% of the participants) and 39 by pharmacists (5.3% of the participants). The majority of the nurses (96%) and pharmacists (74%) were female while 51% of the physicians were male. The pharmacists were the youngest population (mean of 37.2 years), while the nurses had the longest experience in healthcare (mean of 23.1 years), and the physicians spend the longest time in clinical practice during a week (mean of 39.4 hours). More than 75% of the participants from all the groups worked in hospitals and about 15% from each group was involved in primary care. Most nurses (46%) and physicians (46%) took care of patients from more than one age group.

The majority of the participants worked within small teams involving one to four nurses and one to four physicians, but most of the nurses (69%) and physicians (64%) did not collaborate with any pharmacist on a daily basis, while the pharmacists (64%) usually collaborated within a team of one to four pharmacists. If medication management needed to be discussed, a good availability of the physicians was expressed by 90% of the nurses, but the good availability of the pharmacist was expressed by only 56%. Nurses working in primary care were most likely to agree with the good availability of the physician (95%), as well as the pharmacists (82%), while their availability in residential care was lower. Physicians agreed most (78%) that their employers' policy stimulates interprofessional collaboration in medication management.

The majority of the participants in all the professional groups spend more than two days per year on non-mandatory extra education. Nearly one third of nurses (30%) had at least a Bachelor's degree, with the lowest propor-

tion attending while working in residential care (18%) and the highest proportion attending while working in hospital (33%). More than half of the nurses (53%) attended specific extra education activities in medication management since obtaining their nursing qualification, with the highest proportion within those working in primary care and the lowest working in hospitals (Tab. 1.).

■ Tab. 1. Sample characteristics

Characteristics	Nurses				Physicians (n=69)	Pharmacists (n=39)
	Total (n=629)	Hospital (n=479)	Primary Care (n=92)	Residential care (n=38)		
Gender (female)	**96%**	95%	96%	100%	**49%**	**74%**
Age (years) mean (min-max)	**44.3** (22-70)	43.5	47.2	45.9	**48.5 (27-75)**	**37.2 (26-59)**
Work experience in healthcare (years) (min-max)	**23.1** (<1-52)	22.6	24.5	24.5	**22 (<1-52)**	**12.7 (2-38)**
Working hours (hours/week) mean	**34.8**	35.8	31.6	33.4	**39.3**	**30.4**
Area of clinical practice						
Hospital	**76%**	76%	-	-	**77%**	**87%**
Primary Care	**15%**	-	15%	-	**17%**	**5%**
Residential Care	**6%**	-	-	6%	**1%**	**0%**
Other	**3%**	-	-	-	**4%**	**8%**
Main patient population						
Children	**11%**	12%	10%	3%	**6%**	**N/A****
Adults	**27%**	29%	20%	21%	**25%**	**N/A****
Older adults	**17%**	13%	17%	63%	**23%**	**N/A****
More than one age group	**46%**	46%	53%	13%	**46%**	**N/A****
Number of nurse co-workers in daily clinical practice						
None	**6%**	2%	28%	5%	**1%**	**10%**
<5	**47%**	47%	40%	58%	**43%**	**51%**
5-10	**27%**	29%	15%	32%	**28%**	**23%**
>10	**19%**	21%	12%	5%	**26%**	**15%**
Number of physician co-workers in daily clinical practice						
None	**2%**	0%	4%	18%	**10%**	**8%**
<5	**69%**	66%	80%	76%	**46%**	**49%**
5-10	**18%**	21%	10%	5%	**26%**	**33%**
>10	**9%**	11%	5%	0%	**17%**	**10%**
Number of pharmacist co-workers in daily clinical practice						
None	**69%**	70%	65%	71%	**64%**	**8%**
<5	**25%**	24%	30%	29%	**32%**	**64%**
5-10	**1%**	1%	1%	0%	**0%**	**21%**
>10	**<1%**	<1%	0%	0%	**1%**	**8%**
Easy availability of physician						
Strongly agree / Agree	**91%**	91%	95%	82%	**N/A****	**N/A****
Disagree / Strongly disagree	**9%**	9%	5%	19%	**N/A****	**N/A****
Do not know	**<1%**	<1%	0%	0%	**N/A****	**N/A****
Easy availability of pharmacist						
Strongly agree /Agree	**56%**	53%	80%	50%	**N/A****	**N/A****
Disagree / Strongly disagree	**26%**	28%	12%	40%	**N/A****	**N/A****
Do not know	**16%**	18%	9%	5%	**N/A****	**N/A****
Policies stimulating collaboration						
Strongly agree	**69%**	68%	76%	**47%**	**79%**	**69%**
Disagree	**17%**	16%	14%	**45%**	**13%**	**18%**
Do not know	**15%**	16%	0%	**0%**	**9%**	**13%**

Valid % are presented * more than 1 answer possible ** not questioned

Monitoring adverse/therapeutic effects of medication (MATE)

More than half of the nurses (56%) expressed their participation in activities related to MATE (Tab. 2.) during the last month. Only 3% of the nurses (and none in residential care) did not observe an adverse effect. Following the observation of an adverse effect, the discussion with a physician was the most likely (95%) with a higher proportion within the nurses caring for older adults only (99%). Only 6% of the nurses discussed adverse effects with a pharmacist and 24% with another nurse. The proportion of nurses discussing an adverse effect with another nurse was higher in residential care (29%) or if caring for older adults only (30%). More than one third of the nurses (38%) discussed an adverse effect with a patient, and even more in primary care (50%) or if caring for older adults only (44%). More than two out of five nurses (44%) reported own intervention and 69% provided a report into the patient files.

However, there is a difference among professional groups in recognising this PC aspect as being a part of the nursing job (Tab. 3.). More than four-fifths of the nurses consider MATE as a part of nursing care. In comparison, a significantly lower proportion of physicians 59% (p<0.001), as well as pharmacists 51% (p<0.001), agreed. On the other hand, only 1% of the nurses and 1% of the physicians disagreed with the statement that the nurses' involvement in MATE would have a positive impact, while 18% of the pharmacists disagreed. The difference is statistically significant when compared with nurses (p=0.009). On top of it, there was also a significant difference (p=0.012) between the physicians and pharmacists in the opinion on the nurses' role in PC. Nearly two thirds of the physicians (62%) would agree if the nurses' role was extended, while only 31% of the pharmacists would suggest so. The majority of the nurses (52%) suggested that their role should remain unchanged. There was also a difference in the rating of the current nurses' competency in this PC area. On a scale from 0 (the lowest) to 10 (the highest), nurses ranked their competence significantly higher when compared to physicians (5.1; p=0.002), as well as pharmacists (4.0; p<0.001) rating.

Tab. 2. Nurses' self-reported involvement in PC and reported actions

	Total	Hospital	Primary Care	Residential care
Monitoring adverse/ therapeutic effects	(n=629)	(n=479)	(n=92)	(n=38)
Part of activities last month	56%	55%	61%	61%
Actions for an adverse effect*				
Discussed with a physician / pharmacist / nurse	95/6/24%	95/6/27%	96/8/11%	95/8/29%
Discussed with the patient / Report in patient file	38/69%	35/68%	50/66%	37/82%
Own intervention / Nothing	44/0%	46/0%	36/0%	42/0%
Never observed	3%	3%	2%	0%
Monitoring medication adherence	(n=567)	(n=429)	(n=79)	(n=34)
Part of activities last month	72%	69%	82%	79%
Actions for non-adherence*				
Discussed with a physician / pharmacist / nurse	87/3/25%	84/3/25%	94/1/19%	100/0/35%
Discussed with the patient /	53/62%	53/62%	71/72%	71/85%
Own intervention /	29/0%	28/0%	34/0%	26/0%
Never observed	7%	10%	1%	0%
Prescribing medication	(n=522)	(n=396)	(n=76)	(n=33)
Part of activities last month	19%	15%	28%	47%
Actions for potentially inappropriate prescribing*				
Discussed with a physician / pharmacist / nurse	88/4/23%	88/3/23%	84/7/16%	88/6/36%
Discussed with the patient / Report in patient file	17/29%	14/24%	39/47%	18/42%
Own intervention / Nothing	25/<1%	25/<1%	25/0%	33/0%
Never observed	9%	7%	16%	6%
Patient education	(n=519)	(n=394)	(n=76)	(n=32)
Part of activities last month	80%	78%	84%	91%
Nurses' opinions				
Team members aware about each other's actions	26%	26%	25%	16%
Nurses well qualified	37%	36%	46%	41%
Enough information from physician	30%	28%	45%	31%
Other professions better prepared	24%	23%	33%	38%

Valid % are presented * more than 1 answer possible

Monitoring medication adherence/non-adherence (MAD)

The nurses' participation in MAD was higher than in the previous area, 72% of the nurses expressed participation in these activities during the last month (Tab. 2.). The proportion was higher for nurses working in primary care (82%), residential care (79%) or working with older adults only (77%). Only 7% of the nurses has never observed any non-adherence. Following the observation of the non-adherence, mainly resulted in a discussion with a physician or reporting in a patient's file but more than half of the nurses reported discussions with the patient. Nurses were also more likely to perceive MAD as a part of the nurses' tasks (93%) when compared with physicians (73%; p=0.002) or pharmacists (76%; p<0.001). The pharmacists were less likely to believe in a positive impact of the nurses' involvement in MAD (76% of pharmacists) when compared to nurses (97%; p=0.034) or physicians (95%; p=0.185). Besides, the majority of physicians (61%) suggested that nurses' role should be extended, while most nurses (57%; p=0.05) and pharmacists (68%; p=0.006) would prefer their role to remain unchanged (Tab. 3.). Although there was a difference (p=0.02) in the nurses' opinions, the majority of those caring for older adults only would agree if nurses' role was extended while 75% of those caring for children only would prefer no change. When rating the current nurses' competence, there was not a significant difference (p=0.071) in the score given by the nurses (6.6) and physicians (5.7), but the rating of pharmacists (5.4) was significantly lower when compared to the nurses (p=0.043).

Tab. 3. Opinions on nurses' involvement in the different aspects of PC

	Nurses				Physicians	Pharmacists
	Total	Hospital	Primary Care	Residential care		
Monitoring adverse or therapeutic effects	(n=629)	(n=479)	(n=92)	(n=38)	(n=69)	(n=39)
Part of nurses' role	**88%**	89%	83%	87%	**59%** □□	**51%** ■■
Positive impact	**97%**	96%	96%	100%	**96%**	**82%** ■
Nurses' involvement Extended	**46%**	44%	51%	55%	**62%**	**31%** ○
Nurses' involvement Remain the same	**52%**	55%	49%	45%	**36%**	**64%**
Nurses' involvement Restricted	**<1%**	1%	0%	0%	**1%**	**5%**
Current nurses' competence*	**6.4** (2.7)	6.4	6.6	6.1	**5.1** (3.0) □	**4** (2.6) ■■
Monitoring medication adherence	(n=567)	(n=429)	(n=79)	(n=34)	(n=66)	(n=38)
Part of nurses' role	**93%**	94%	90%	91%	**73%** □□	**76%** ■
Positive impact	**97%**	97%	96%	97%	**95%**	**76%** ○
Nurses' involvement Extended	**42%**	38%	47%	56%	**61%**	**26%** ○
Nurses' involvement Remain the same	**57%**	61%	53%	44%	**38%**	**68%**
Nurses' involvement Restricted	**<1%**	1%	0%	0%	**2%**	**5%**
Current nurses' competence*	**6.6** (2.6)	6.6	6.4	6.7	**5.7** (3.0)	**5.4** (2.8) ■
Prescribing medication	(n=522)	(n=396)	(n=76)	(n=33)	(n=66)	(n=37)
Part of nurses' role	**34%**	30%	54%	39%	**15%** □	**14%** ■
Positive impact	**53%**	51%	57%	70%	**30%** □	**19%** ■■
Nurses' involvement Extended	**50%**	50%	45%	58%	**30%** □	**11%** ■■
Nurses' involvement Remain the same	**45%**	44%	51%	39%	**56%**	**59%**
Nurses' involvement Restricted	**3%**	3%	4%	3%	**12%**	**30%**
Current nurses' competence*	**3.3** (3.3)	3.2	3.9	4.5	**2.9** (2.7)	**2.3** (2.4)
Patient education	(n=519)	(n=394)	(n=76)	(n=32)	(n=65)	(n=37)
Part of nurses' role	**84%**	82%	88%	91%	**65%** □□	**59%** ■
Positive impact	**94%**	94%	95%	97%	**83%** □	**57%** ■■
Nurses' involvement Extended	**51%**	50%	61%	53%	**54%**	**30%** ■
Nurses' involvement Remain the same	**47%**	48%	39%	47%	**42%**	**51%**
Nurses' involvement Restricted	**1%**	1%	0%	0%	**5%**	**19%**
Current nurses' competence*	**5.8** (2.7)	5.7	6.0	5.6	**4.6** (2.9) □	**3.8** (2.3) ■■, ○

Valid % are presented * Mean on scale 0-10 (standard deviation) Difference in nurses and physicians: □ p<0.05; □□ p<0.001
Difference in nurses and pharmacists: ■ p<0.05; ■■ p<0.001 Difference in physicians and pharmacists: ○ p<0.05

Medication prescribing (MP)

Although formally not part of the nurses' competencies, 19% of the nurses stated they participated in MP during the last month. A higher proportion was seen in the nurses working in primary (28%) or residential care (45%), and also when caring for older adults only (26%). Potentially inappropriate prescribing (PIP) was not seen by 9% of nurses, and the proportion was higher when working in primary care (16%) and lower when working in residential care (6%) or in a hospital (7%). After observing PIP, the discussion with a physician was the most likely activity, followed by reporting in the patient file. About one-quarter of the nurses reported an unspecified own intervention (25%) and discussion with another nurse (23%). The proportion of both were higher in nurses working in residential care (Tab. 2.). Nurses were also more likely to perceive MP as a part of the nursing work (34% of nurses) when compared with physicians (15%; p=0.012) or pharmacists (14%; p=0.023). Nurses (53%) were also more likely to see a positive impact of the potential nurses' involvement (Tab. 3.) when compared to the physicians (30%, p=0.002) or pharmacists (19%; p<0.001). There was no significant difference while rating the nurses' competences although the score was higher in case of the nurses (3.3) than in the physicians (2.9) or pharmacists (2.3). However, the point of view differed significantly on the possible change in the nurses' involvement. Half of the nurses would agree if the role of nurses was extended, but the majority of the physicians (56%; p=0.004) and pharmacists (59%; p<0.001) suggested it should remain the same. A part of the participants suggested the role should be restricted with a higher proportion in pharmacists (30%) if compared to physicians (12%) or nurses (3%).

Providing patient education and information related to pharmaceutical care (PEI)

Even though 80% of the nurses stated they were involved in the activities related to PEI during the last month, only 37% of the nurses believed they are, as a professional group, well qualified for this role. In addition, only 26%

Tab. 4. Opinions on the quality of the multidisciplinary collaboration

	Nurses				Physicians (n=69)	Pharmacists (n=39)
	Total (n=629)	Hospital	Primary Care	Residential care		
Monitoring adverse or therapeutic effects	(n=629)	(n=479)	(n=92)	(n=38)	(n=69)	(n=39)
Collaboration Nurses & Physicians*	**7.5** (2.3)	7.5	7.7	6.9	**6.3** (2.6) □	**5.6** (2.2) ■■
Collaboration Nurses & Pharmacists*	**3.8** (3.5)	3.7	4.9	3.4	**2.7** (3.1) □	**4.2** (3.0) °
Interprofessional communication*	**4.9** (3.0)	5.0	4.9	4.2	**4.7** (3.0)	**5.1** (3.1)
Monitoring medication adherence	(n=567)	(n=429)	(n=79)	(n=34)	(n=66)	(n=38)
Collaboration Nurses & Physicians*	**7.5** (2.4)	7.4	7.8	7.2	**7.0** (2.5)	**6.2** (2.6) ■
Collaboration Nurses & Pharmacists*	**3.4** (3.4)	3.3	4.2	2.9	**2.3** (2.9)	**4.2** (3.2) °
Interprofessional communication*	**4.8** (3.1)	4.8	4.8	4.5	**4.6** (2.9)	**4.8** (2.8)
Prescribing medication	(n=522)	(n=396)	(n=76)	(n=33)	(n=66)	(n=37)
Collaboration Nurses & Physicians*	**6.9** (2.9)	7.0	7.1	6.8	**5.7** (3.0) □	**4.6** (2,5) ■■
Collaboration Nurses & Pharmacists*	**3.1** (3.6)	3.1	4.0	2.7	**2.0** (2.8)	**3.6** (3.0)
Interprofessional communication*	**4.0** (3.2)	4.1	3.9	3.7	**4.6** (3.1)	**4.5** (3.2)
Patient education	(n=519)	(n=394)	(n=76)	(n=32)	(n=65)	(n=37)
Collaboration Nurses & Physicians*	**6.7** (2.7)	6.6	7.0	6.7	**6.2** (2.6)	**4.7** (2.7) ■■
Collaboration Nurses & Pharmacists*	**3.4** (3.5)	3.3	4.1	3.2	**2.0** (2.7) □	**3.9** (3.2) °
Interprofessional communication*	**4.2** (3.0)	4.2	4.3	4.3	**4.5** (3.0)	**4.4** (2.8)

Valid % are presented * Mean on scale 0-10 (standard deviation) Difference in nurses and physicians: □ p<0.05;
Difference in nurses and pharmacists: ■ p<0.05; ■■ p<0.001 Difference in physicians and pharmacists: ° p<0.05

of the nurses stated they are well aware about PEI provided by other team members and only 30% of the nurses felt they received enough information related to this area from the physicians (Tab. 2.). In contrast, only 26% of the nurses stated the other professionals would provide better education. Nurses (84%) were more likely to see PEI as their professional task when compared to physicians (65%; p<0.001) or pharmacists (59%; p=0.002). The positive impact of the nurses' involvement was also seen more by the nurses (94%) in contrast to the physicians' (83%; p=0.004) or pharmacists' (57%; p<0.001) point of view (Tab. 3.). The current nurses' competence was perceived significantly better when rated by nurses (5.8) than the score given by physicians (4.6; p=0.01) or pharmacists (3.8; p<0.001). When asked about the potential changes in the nurses' involvement, most nurses (51%) and physicians (54%), would agree with the extension. The pharmacists presented a significantly different opinion if compared to nurses (p=0.005) or physicians (p=0.03), suggesting the nurses' role should remain unchanged or restricted.

Interprofessional collaboration (IC)

The data analysis also showed a difference in the perception of IC and communication within the various PC aspects (Tab. 4.). When using the scale from 0 to 10 and rating the quality of IC between nurses and physicians, the nurses' score was higher than the physicians' score for all four PC aspects, although the difference was significant only for MATE (p=0.001) and MP (p=0.003). Pharmacist's score was the lowest and the difference was significant when compared to nurses' rating in all four PC aspects. In contrast, IC between the nurses and pharmacists was scored the highest when rated by pharmacists but the difference was not significant. Physicians rated IC between nurses and pharmacists the lowest and the difference was significant when compared to physicians' rating for MATE (p=0.03), MAD (p=0.007) and PEI (p=0.017). Finally, there was no significant difference among professional groups in rating the quality of interprofessional communication. The highest score (5.1) was given by pharmacist for communication related to MATE. Average nurses' score was lower (4.9) but there was a significant difference (p=0.018) between the score given by nurses caring for children (5.7) and older adults only (4.3). The lowest average rating was given by nurses for communication related to MP. The significant difference was found again between the nurses caring for children (4.7) and older adults only (3.5).

DISCUSSION

Nurses' involvement in pharmaceutical care

A high proportion of nurses were involved in the investigated PC aspects, although this was less recognised by other healthcare professionals. Four out of five nurses, and nine out of ten when working in residential care, were involved in PEI during the last month. The majority of nurses also reported participation in MAD and MATE. About one-fifth of the nurses even stated they were involved in the area, formally not expected from nurses, MP, although it is not known to what extent. These results support previous findings suggesting that formal nurses' competencies in the Czech Republic do not reflect the real requirements of the practice and that the nurses are exceeding them [17,18]. A notable part of the nurses also considered these activities as parts of the nursing practice despite the fact the law is not always unambiguous [5,15]. As nurses are working very close to patients, they

are in a good position to observe certain PC aspects. Only a minority of nurses has never observed adverse effect (3%), non-adherence (7%) or PIP (9%); and the proportion is even lower when working in residential care. These results correspond with the high prevalence of adverse drug reactions or drug related admissions, especially in older adults [21], as well as unsatisfactory medication adherence [22]. At least four out of five nurses, as well as physicians, believed in the positive impact of the nurses' involvement in the activities related to MATE, MAD and PEI. The majority of the physicians also suggested the extension of the nurses' role in those PC aspects even though they score the current nurses' competence low. This is in contrast to the often-presented opinion regarding the uselessness of nursing education and its sufficiency at secondary school level [23,24]. On the contrary, the necessity of sufficient and adequate nursing education and revision of nursing curricula could be advocated by the fact that only about one third of the nurses believed that they are well qualified for their role in PEI although 80% of the participating nurses were involved in this activity during the last month; and nurses themselves rated their competence rather low.

Current practice

Nurses reported different strategies to deal with the observed adverse effects, medication non-adherence or PIP. However, a substantial part of these events was not reported by the nurses in the patient's files, especially when related to the PIP. It is unclear if lack of reporting may contribute to the fact that other professionals saw the investigated PC aspects less likely as nursing tasks. Discussion with a physician was the most frequent follow up action, therefore, the lack of reporting might result from handing the issue over to a more qualified professional who could be perceived as the one who is able to make more relevant report.

Although about a half of the nurses agreed on the easy availability, only a minority of nurses discussed the unexpected issue with pharmacists, and the majority did not collaborate with them on a daily basis. This might reflect the lack of pharmacists, allowing participation only on a major issue, but not to be sufficiently familiar with all patients at the particular workplace. Therefore, the discussion with the physician might be perceived as a more feasible action. Similar arguments could be applied to seldom seen discussion with another nurse, which increases when working in residential care, where the physician is not available as easily as in a hospital, therefore the issue is discussed at least with another nurse.

Optimal nurses' role

The optimal extent of the nurses' role is not obvious and requires further research and discussion. Physicians and pharmacists, above all, were less likely to consider the investigated PC aspects as part of the current nurses' role, which may imply they were perhaps less aware about all the nurses' activities. Nearly one third of the pharmacists (30%) and 12% of the physicians also suggested the restriction of the nurses' involvement in prescribing in spite of the fact this is not permitted in the Czech Republic. This may also indicate unclear and misleading legal rules and policies [15] or non-corresponding requirements, confusing practices and advanced tasks performed in an unofficial way as already described [17,18]. Although the difference is not statistically significant, a higher proportion of physicians than nurses suggested the extension of nursing role in MATE and MAD. One of the possible explanations of this difference could be not only due to the current nurses' shortage, but also to the fact that nurses are often engaged in activities that can be performed by less qualified staff [18]. Both could be possibly leading to the unwillingness to take over new tasks. However, medication related harm resulting from, e.g., non-adherence or an adverse drug reaction is a huge area that needs to be addressed and that also creates a remarkable economic burden [25,26]. On top of it, PEI is considered to be one of the enablers of patient involvement in their own care that could lead not only to the improvement of patient satisfaction, but also to the healthcare outcome and costs [27]. Therefore, defining the desirable level of nursing competencies supported by the corresponding education, as well as shifting unnecessary tasks on less educated healthcare professionals, could potentially have a considerable positive impact on providing effective and safe PC. Besides, despite feeling sufficiently unprepared, only one out of four nurses working in a hospital and one out of three working in residential care stated that other healthcare professionals would provide better patient education. A significant portion of nurses also believed that their further involvement in the investigated PC aspects would have a positive impact. This would imply nurses are able to see the gap and to identify the need to provide additional care.

Interprofessional collaboration

IC is expected to increase the effectiveness of the care and improve the health-related outcomes [28]. However, the results describing the quality of IC seem to be contradictory. The professional group not involved in the particular aspect of IC rated the quality lower. IC between nurses and pharmacists was rated the lowest by the physicians, IC between nurses and physicians was rated the lowest by the pharmacists. Interestingly, nurses rated IC with the physicians rather high, but the interprofessional communication, a predictor of the effective IC, was scored much lower. Although, there can be other healthcare professionals involved in the communication, this difference can be hardly explained by the ineffective communication with the pharmacists as a high proportion of nurses (70%) stated they did not collaborate with this professional group on a daily basis. This area would certainly deserve more attention in the future as the quality of IC in the Czech Republic was even rated the lowest in all the investigated areas of PC when compared to other countries in Europe [20], with the lowest rating given by nurses to the interprofessional communication related to MP followed by PEI.

Key elements of IC were described as the collective action addressing patient's needs and integration of the perspectives of each professional with respect and trust

[29]. However, the point of view on the common or related activities can vary in the different healthcare professionals, e.g., certain formal requirements and quality control activities, such as the necessity of a written prescription, were already described as perceived by physicians as unnecessary, annoying, time-consuming and not allowing productive performance [30]. This opinion may collide with the pressure on nurses to follow hospital policy [17] and potentially could lead to unnecessary interprofessional conflicts. Contradictory expectations and the lack of mutual respect resulting in low quality interprofessional communication, together with experience in performing advanced tasks in an unofficial way without any formal justification of this activity, could be the possible explanation why half of the participating nurses suggested the extension of the nurses' role in MP, despite the high demands on other nurses' tasks and activities resulting in unfinished nursing care [31].

CONCLUSIONS

Nurses are involved in advanced PC aspects, and their involvement can vary according to the healthcare setting. The need to provide additional care and to increase nurses' involvement in PC exists. Optimising the formal nurses' competencies could result in a positive effect on the patient outcomes. However, this cannot be limited only to adding additional tasks and activities to the nurses' responsibilities, but it is also necessary to revise the need of other healthcare professionals, auxiliary workers and the skills mix in different types of healthcare settings, as well as in the nursing curricula. More attention focused on the improvement of IC could also bring a positive outcome.

Limitation

It could be argued that the study has certain limitations. First of all, the sample size of the physicians and pharmacists was rather small. As the Czech Medical Chamber refused to participate, professional associations were contacted, but the number of their members is much smaller. The Chamber of Pharmacists recommended contacting the Association of clinical pharmacologists, whose number of members is increasing but is still very limited. The low response could be also associated with the fact that the survey focused exclusively on the nurses' role, not on the role of other professionals, as the sample of nurses reached by collaboration with the associations of nurses was much higher. Secondly, the use of an on-line survey could favour more computer-literate participants although the use of information technologies has become common in healthcare. Finally, the terminology, which was not fully consistent with the current law and policies, might also have resulted in certain difficulties and variation in the understanding.

Even though the limitation exists, the survey still brings good insight on the thus far insufficiently described nurses' practices in PC within the Czech Republic.

ORCID

Jana Heczkova https://orcid.org/0000-0001-6010-7369

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