



Original research article

Changes in nursing educational stress and coping strategies: a longitudinal study in the Czech Republic

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Abstract

Introduction: Long-term stress is generally considered to be one of the psycho-social factors that negatively affect the academic performance of nursing students.

Objectives: To discover the sources of stress, degree of stress, and coping strategies used as a reaction to stress in nursing students of the bachelor program.

Methods: Over the course of three academic years, students in each year of the bachelor in nursing program were monitored after completing the clinical practice for the given academic year. Questionnaires regarding the Perceived Stress Scale; Physio-Psycho-Social Response Scale, and Coping Behaviour Inventory were used to gather data. In the first year, 44 students were included, in the second year there were 39 students, and in the final year 40 students took part in the research.

Results: The most significant source of stress appears to be a lack of knowledge and relevant skills. The highest degree of stress was recorded at the beginning of a student's studies, after which it decreased. In the third year, when students were required to work due to the covid pandemic, the stress again reached the levels of the first year. The stress manifested mainly in emotions and problem solving was the most frequently used coping strategy.

Conclusions: The results of the longitudinal study confirmed how the COVID-19 pandemic affected the perception and manifestation of stress in students during their studies. The perception of the degree of clinical and academic stressors showed that no clear descending tendency was identified. The use of coping strategies was stable, with no significant differences throughout the study.

Keywords: Clinical learning environment; Coping behaviour; Covid-19; Nursing students; Stress

Introduction

Stress and stressful situations of nursing students in connection with the study and academic environment are long-term monitored problems (Akhu-Zaheya, 2015; Burnard et al., 2008; Jimenez et al., 2010). Besides the traditional stressors, nursing students are exposed to a specific workload resulting from clinical practice. The stress and anxiety of the students affect their performance during the clinical training. This can be a reason for avoiding important activities and can ultimately result in unfavourable study results (Akhu-Zaheya, 2015; Burnard et al., 2008), burnout, and dropping out of studying or the field (Hamadi et al., 2021; Labrague et al., 2018). Mild apprehension and anxiety that students experience during their clinical practice are natural and students have an adaptive function for them. Moreover, a certain level of anxiety is necessary and useful for coping with situations and problems during clinical practice. Students become dysfunctional if the anxiety exceeds a certain level, appears too often, or the intensity is disproportionate to the given situation. In these cases,

they become maladaptive and it negatively affects the results of students in terms of not completing or avoiding their duties, etc. (Jimenez et al., 2010).

The COVID-19 pandemic marked a significant increase in the degree of stress, anxiety, and depression in students of nursing (Espina-López et al., 2021; Savitsky et al., 2020; Tanji and Kodama, 2021; Wynter et al., 2021). In connection with the declining number of students and the global shortage of nurses, this may be a significant phenomenon requiring a more rigorous analysis (Melo et al., 2010).

Sources of stress and anxiety in students during their clinical training are defined by Jimenez et al. (2010) in the following categories: clinical stressors (related to the clinical environment, training); stressors resulting from the study itself (studying, academic stressors), and external stressors (financial and personal issues). The categories mentioned above were operationalized in the *Perceived Stress Scale* (Sheu et al., 2002), which specifically targets the perception of sources of stress in students of nursing. During the COVID-19 pandemic, these stressors were enriched with more causes, such as fear of contagion, increased workload, lack of support from the side of

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healthcare workers (Drach-Zahavy et al., 2022), as well as fear and stress from the consequences of the interrupted education process (Link et al., 2021).

The focus of recent research and their systematic review (Chaabane et al., 2021; Labrague et al., 2018) has been aimed at three basic issues: What reasons and sources of stress prevail among students? How do they change during the study? Which factors affect stress?

It is generally assumed that the highest degree of stress and anxiety naturally occurs during the first year of study, or at the beginning of the clinical training, and decreases with the gained experience during the course of study. A significant part of the qualitative studies was therefore devoted to a deeper analysis and understanding of the students' first clinical experiences (Chesser-Smyth, 2005; Sharif and Masoumi, 2005; Sheu et al., 2002). However, in quantitative and qualitative studies, we find ambiguous results in the fluctuation of stress level during the study. The highest degree of stress in the first academic year or at the beginning of the clinical practice was determined in qualitative (Chesser-Smyth, 2005; Sharif and Masoumi, 2005) and quantitative research studies (e.g. Sheu et al., 2002). Other authors (Espina-Lopez et al., 2021; Jimenez et al., 2010) point out that the level of stress increased with the demands of clinical practice. Second-year students showed the highest degree of stress in the mental and somatic areas (Gurková and Zeleníková, 2018; Jimenez et al., 2010; Sheu et al., 2002). Compared to students in lower years, final year students reported a higher degree of stress load in the area of study factors (such as, stress from teacher's assessment, stress from exams, etc.) (Bhurtun et al., 2021; Jimenez et al., 2010).

Previous research in the Czech Republic (Gurková and Zeleníková, 2018) has also confirmed that sources of stress tend to change during studies. Since these studies had a cross-sectional study design, they did not capture the dynamics of experiencing stress across the bachelor's study continuum. Only two longitudinal studies have been published, monitoring the degree of stress in students during two (Bhurtun et al., 2021) or three years of study (Zupiria et al., 2007), thus confirming the decrease in stress levels during studies.

The aim of the study was to pursue the following targets:

1. To determine how students of nursing perceive academic stressors and stressors resulting from clinical training in hospitals in the continuum of bachelor studies.
2. To discover the most frequent signs of stress and find out about strategies of stress management – in relation to hospital clinical practice during bachelor studies.
3. Examine factors affecting stress load during the bachelor's study program.

Materials and methods

Design

A longitudinal cohort study was performed, which followed the STROBE recommendations aimed at analysing the stress load of nursing students during the practical training in hospital (type, signs of stress, and coping strategies) in the continuum of individual years of the bachelor study.

Setting and sample

The study was carried out as part of the bachelor's degree program in Nursing, the field of study of General Nurse, at one of the Czech universities.

Over the course of three years, students who were enrolled in the first year of the aforementioned bachelor's study program in the academic year 2018/2019 were monitored. All students entering the first year of the General Nurse study programme in the academic year 2018/2019 (full-time form) were considered suitable participants. The students involved in the study were those who (a) provided informed consent to be part of the research; (b) attended practical training in the first year of the academic year of 2018/2019, according to the study plan of the given study programme; (c) students of the full-time study form. The research excluded distance learners and second and third-year students who did not participate in the study in their first year, or those who repeated the second or the third year (completed the practical training in the first year before the 2018/2019 academic year).

Clinical training took place in blocks of between 4 to 7 weeks at the workplace, providing basic and specialized nursing care in the internal and surgical departments for children and adults. It was preceded by theoretical and theoretical-practical lectures in all years. In October 2020, due to a resolution of the government of the Czech Republic, work duties were ordered for students in the final year of the General Nurse bachelor's study programme (as full-time work) to ensure health care was delivered by health service providers and to ensure activities of public health protection authorities in connection with the COVID 19 pandemic (Resolution of the Government of the Czech Republic dated October 12th, 2020 No. 1023). In addition, as part of the nursing practice, students from other years could also participate in hospital care as volunteers.

The team of lecturers participating in the practice was made up of tutors, mentors, and supervisors. The tutor was the academic worker teaching theoretical-practical lessons and clinical practice. His or her competencies were focused on organizing the clinical training at a particular workplace with specific mentors for each student. He or she was in charge of performance and meeting the study requirements of students and, together with the mentor, he or she participated in the initial and final assessment of students. Students at each ward were guided by mentors whom they worked with in mutual shifts during the given block of practical training. The mentors concentrated on developing the competencies of students aimed at providing nursing care with respect to the level of the student, according to the year of their study, in accordance with the latest knowledge of nursing. Emphasis was placed on practicing the standardized care procedures using methods that stimulate a student's critical thinking and clinical judgment.

After completing the practical block, students went through group supervision, the main aim of which was to support self-reflection and manage the emotions experienced during the clinical training – helping them to adjust to a professional role and the environment. Students could receive individual supervision during clinical training. The position of a supervisor was held by an academic worker who had completed the supervision training. They were not a teacher of clinical practice but had experience in providing nursing care (Šaňáková and Mazalová, 2015).

Anonymous data collection took place between January 2019 and March 2021. At the beginning of data collection, each student was assigned a code that he or she used during the subsequent data collection in the second and third years. During the collection and evaluation of data, the researchers worked only with codes, which made identification of the student impossible. Students always filled in a questionnaire after completing a block of clinical training. In the first year,

49 first-year students met the inclusion criteria, 100% were women, and the questionnaires were completed by 44 students (89.8%). In the second year, 45 students were involved, and 39 filled out the questionnaire (86.7%). In the final year, 44 students met the inclusion criteria, and the questionnaire was filled in by 40 of them (90.9%).

Instruments

The Perceived Stress Scale (hereafter PSS, Sheu et al., 2002) was used to evaluate the academic and clinical sources of stress. This tool specifically focuses on the perception of stress sources in students of nursing. It is composed of 29 potential sources of stress that students might experience. The individual stressors are divided into six areas: stress from a lack of professional knowledge and skills; stress from assignments and workload; stress from providing nursing care; stress from the clinical environment; stress from teachers and nursing staff; stress from classmates, peers, and everyday life. Stress from the lack of professional knowledge and skills, stress from assignments and workload, stress from providing nursing care, and stress from the clinical environment are included in clinical stressors. Stress from teachers and stress from classmates, peers and everyday life, are academic stressors. Individual items are rated on a frequency scale from 0 (never) to 4 (very often). The reliability of the internal consistency type of particular PSS subscales was tested in a previous study (Mazalová et al., 2019) using Cronbach's alpha coefficient. It ranged from 0.80 to 0.917 within individual subscales. In our study, Cronbach's alpha coefficient of the entire tool was 0.953. Cronbach's coefficient alpha of the original version was 0.89 (Sheu et al., 2002, p. 168).

To evaluate the manifestation of stress, the Physio-Psycho-Social Response Scale (hereafter PPSRS, Sheu et al., 2002) was used, which evaluated the physical, social-behavioural, and emotional symptomatology of stress in students during their clinical training. It contains 21 potential signs of stress that are rated on a frequency scale from 0 (never) to 4 (very often). The reliability of the internal consistency type of particular PPSRS subscales had already been tested in a previous study (Mazalová et al., 2019) using Cronbach's alpha coefficient. It ranged from 0.889 to 0.924 within its individual subscales. In our study, Cronbach's alpha coefficient of the entire tool was 0.958.

Coping Strategies were evaluated via the Coping Behaviour Inventory (hereafter CBI, Sheu et al., 2002). This is composed of 19 statements that represent the coping strategies. The strategies were divided into four areas – distracting/transferring attention; optimistic view; solving problems and avoiding problems. For each item, students stated how often they use a particular coping strategy and, at the same time, how the strategy helped them to cope with stressful situations. Therefore, individual items are attached to two scales. The first evaluates how often the student uses the given strategy, the second evaluates the influences (effectiveness) of the given strategy on stress management. The reliability of the internal consistency type of particular CBI subscales was tested in the previous study (Mazalová et al., 2019) using Cronbach's alpha coefficient. It ranged from 0.738 to 0.916 within individual subscales. In our study, Cronbach's alpha coefficient of the entire tool was 0.960.

Ethical aspects

The research protocol was approved by the Ethics Committee of the Faculty of Health Sciences of Palacký University in Olomouc (No. 620/1040). Informed consent for inclusion in the research was part of the questionnaires in paper form. It contained an explanation that the respondents' participation in the research is anonymous and voluntary, and the possibility to withdraw consent is to be included at any time.

Data analysis

Quantitative data was evaluated via descriptive statistics. The normality of quantitative data was verified using Shapiro-Wilk normality test values and skewness calculation. Due to the normal distribution of information for most of the tested parameters, demonstrated by normality tests, the student's paired *t*-test was used for comparison – comparing the differences in the mean values of the examined items for the first, second, and third-year students. Tests were performed at the level of statistical significance of $p = 0.05$. Statistical software for social sciences – SPSS version 20 – was used for statistical data reporting.

Results

In the continuum of three study years, the most significant source of stress was a lack of knowledge and skills (Table 1). The highest degree was naturally reached in the first year of study. Almost all types of stressors, as well as stress manifestations, had a declining tendency during the first two years. A change occurs in the third year when students surprisingly experience a higher degree of stress compared to the second year due to a lack of knowledge, workload, care of patients, and clinical environment. Stress caused by caring for a patient, the clinical environment, teachers/staff on the ward, or just from everyday life reached the stress level of the first year. Significant differences in three areas of stress sources were identified between the second and the third years of study – stress from a lack of knowledge and skills, care of a patient, and clinical environment (Table 1).

The most frequent signs of stress during the three years of study were emotional (Table 2). Students felt the least physical manifestations of stress. Signs of stress did not have a decreasing tendency over the course of the entire study; in the third year, these were comparable to the frequency in the first year. In the third year, students even reported physical and emotional symptoms more often than in the second year (Table 2). In the second year, the signs of stress levels from emotional and social-behavioural declined in comparison to the first year.

The most frequently used coping strategy was problem-solving (Table 3). The use of effective coping strategies was steady, without significant differences during the entire period of study. The avoidance strategy was used most in the first year, and later its frequency decreased. The most significant differences were between students of the first year and students of the third year (Table 3).

Table 1. Changes in domains of the Perceived Stress Scale during three academic years (time of follow-up) – types and degrees of stressful events

Domain	1 st year	2 nd year			2 nd year	3 rd year			1 st year	3 rd year		
	(T1)	(T2)			(T2)	(T3)			(T1)	(T3)		
	Mean	Mean	t	p	Mean	Mean	t	p	Mean	Mean	t	p
	(SD)	(SD)			(SD)	(SD)			(SD)	(SD)		
Stress from lack of professional knowledge and skills	2.31 (0.88)	1.66 (0.70)	5.184	0.000*	1.66 (0.70)	1.96 (0.82)	-2.143	0.039*	2.31 (0.88)	1.96 (0.82)	3.085	0.004*
Stress from assignments and workload	1.61 (0.72)	1.22 (0.89)	2.868	0.007*	1.22 (0.89)	1.28 (0.63)	-0.116	0.908	1.61 (0.72)	1.28 (0.63)	1.999	0.05*
Stress from taking care of patients	1.46 (0.63)	1.08 (0.62)	3.739	0.001*	1.08 (0.62)	1.29 (0.62)	-2.040	0.049*	1.46 (0.63)	1.29 (0.62)	1.653	0.107
Stress from the environment	1.49 (0.67)	1.14 (0.73)	2.261	0.030*	1.14 (0.73)	1.44 (0.71)	-3.030	0.005*	1.49 (0.67)	1.44 (0.71)	0.60	0.513
Stress from teachers and nursing staff	1.41 (0.73)	1.05 (0.72)	2.736	0.009*	1.05 (0.72)	1.20 (0.63)	-1.102	0.278	1.41 (0.73)	1.20 (0.63)	1.616	0.115
Stress from peers and daily life	0.74 (0.70)	0.58 (0.55)	1.810	0.077	0.58 (0.55)	0.71 (0.67)	-1.235	0.225	0.74 (0.70)	0.71 (0.67)	0.651	0.519

Note: * <0.05.

Table 2. Changes in domains of the Physio-Psycho-Social Response Scale during the three academic years (time of follow-up) – physio-psychosocial status

Domain	1 st year	2 nd year			2 nd year	3 rd year			1 st year	3 rd year		
	(T1)	(T2)			(T2)	(T3)			(T1)	(T3)		
	Mean	Mean	t	p	Mean	Mean	t	p	Mean	Mean	t	p
	(SD)	(SD)			(SD)	(SD)			(SD)	(SD)		
Emotional symptoms	1.18 (0.69)	0.82 (0.68)	3.146	0.003*	0.82 (0.68)	1.20 (0.68)	-2.143	0.039*	1.18 (0.69)	1.20 (0.68)	0.120	0.906
Social behavioral symptoms	0.84 (0.64)	0.63 (0.62)	2.464	0.018*	0.63 (0.62)	0.74 (0.55)	-0.116	0.908	0.84 (0.64)	0.74 (0.55)	0.905	0.372
Physical symptoms	0.44 (0.52)	0.32 (0.59)	1.272	0.211	0.32 (0.59)	0.56 (0.68)	-2.040	0.049*	0.44 (0.52)	0.56 (0.68)	-1.350	0.186

Note: * <0.05.

Table 3 Changes in domains of the Coping Behaviour Inventory during the three academic years (time of follow-up) – coping behaviours

Domain	1 st year	2 nd year			2 nd year	3 rd year			1 st year	3 rd year		
	(T1)	(T2)			(T2)	(T3)			(T1)	(T3)		
	Mean	Mean	t	p	Mean	Mean	t	p	Mean	Mean	t	p
	(SD)	(SD)			(SD)	(SD)			(SD)	(SD)		
Transference behavior	2.36 (0.78)	2.25 (0.60)	0.849	0.401	2.25 (0.60)	2.45 (0.69)	-1.395	0.172	2.36 (0.78)	2.45 (0.69)	-0.445	0.659
Optimistic coping behavior	2.37 (0.51)	2.40 (0.56)	-0.280	0.781	2.40 (0.56)	2.25 (0.57)	1.500	0.143	2.37 (0.51)	2.25 (0.57)	1.244	0.222
Problem-solving behavior	2.51 (0.69)	2.56 (0.74)	-0.456	0.651	2.56 (0.74)	2.56 (0.69)	-0.147	0.885	2.51 (0.69)	2.56 (0.69)	-0.648	0.521
Avoidance behavior	1.32 (0.52)	1.17 (0.57)	1.620	0.113	1.17 (0.57)	1.12 (0.54)	0.570	0.572	1.32 (0.52)	1.12 (0.54)	2.259	0.030*

Note: * <0.05.

Discussion

Stress is the key problem affecting the course of clinical training. External and internal factors affecting students during the practical training in the hospital can contribute both positively and negatively to experiencing stress.

Our findings confirmed that clinical stressors were the dominant source of stress for students in all years. The highest degree of stress was experienced by students due to the lack of knowledge and skills. Its level culminated at the beginning of a student's studies and dropped in the second year. This trend corresponded with the results of other study authors (Bhurtun et al., 2021; Gurková et al., 2017; Hirsch et al., 2015; Labrague, 2021). In comparison, the perception of stress in final year students was very intense, not only for the clinical stressors but also for the category of academic stressors. The government's regulation on students' work obligation for health service providers providing care to patients with COVID-19 could be a determining factor. It should be noted that an element of the students provided the same type of care in the first and second years. The crucial difference was that it was voluntary. At the time the obligation of work was imposed, all universities switched to a distance learning style, which could also be a factor affecting the perception of stress in students. The same conclusions were reached by Tanji and Kodama (2021). These authors confirmed almost a twofold increase in the prevalence of mental distress in nursing students during the COVID pandemic. Prolonged changes in the educational environment and restrictions related to the behaviour in connection with the COVID pandemic are attributed to reinforcing this trend. The same outcomes were published by Hamadi et al. (2021). These authors confirmed the increase of stress from the lack of knowledge and skills and from the clinical environment in final-year students during the pandemic.

However, only slight growth of clinical and academic stressors in final-year students was mentioned by Zupiria et al. (2007) in their study carried out before COVID-19. Increased stress related to the COVID-19 pandemic may have a direct impact on the life satisfaction, psychological well-being, and health of nursing students. (Labrague, 2021). Espina-López et al. (2021) found that the psychological discomfort of nursing students in the final year might not only be related to clinical practical training during the COVID-19 pandemic. It closely correlates with the level of readiness in the workplace and socio-demographic variables. The more students felt well-prepared for the clinical practice, the less stressed they felt (Espina-López et al., 2021). This study also confirmed the factor of gender, since women reported a much higher degree of psychological distress than men. Clinical practice during the pandemic was a significant factor in determining the relationship between the degree of stress and resilience of final-year students (Drach-Zahavy et al., 2022). Experience gained by students during the clinical practical training contributed to better adaptability to real-life conditions (Drach-Zahavy et al., 2022). Anxiety, anger, and grief were the typical reactions to stress during the pandemic (Huang et al., 2020).

The dominant signs of stress in our research were seen in the emotions, while physical characteristics were mentioned the least. Both physical and emotional signs of stress were more intensive in the final year (Table 3). Some studies do not describe signs of stress in detail, they instead use general terms, such as psychological discomfort (Espina-López et al., 2021), or psychological distress (Tanji and Kodama, 2021). Gender may also be a relevant factor affecting the symptomatology of stress.

In women, the dominant factor was the manifestation of emotional stress (Drach-Zahavy et al., 2022).

The results of this study showed that over the course of their studies students used effective strategies to manage stress. The most frequent strategies were aimed at solving problems, followed by strategies of distraction, attention shift, and an optimistic approach. The tendency to avoid stress was typical in students at the beginning of the study. It can be assumed that this was a reaction to the first contact with the clinical environment. Evidence strengthening the positive adaptation of students to this environment in the following years of study could be the decreasing tendency of the occurrence of this strategy. Final-year students chose it the least, even though the clinical training was performed under difficult conditions due to the imposed work obligation during the pandemic. In the study of Hamadi et al. (2021), pre-pandemic students reacted to stress with distraction, whereas during the pandemic, the strategy of problem-solving prevailed. The frequency of using this coping strategy increased from junior to senior year, depending on the students' increasing experience and knowledge gained in practice (Drach-Zahavy et al., 2022). Bhurtun et al. (2021) also confirmed that at the beginning of their studies, students tended to cope with stress by diverting their attention. A strategy for problem-solving was the second choice for this group.

Limitations

The most significant limitation of the research is that respondents came from just one Czech university. This limits the generalizability of the results and their transferability into various contexts. Another limiting factor could be the small sample size and its homogeneity. The research group was made up of only women, each of almost the same age, and from the same study field. The validity of our findings would therefore be supported by a greater representation of males, and students of other non-medical healthcare professions such as paramedics or midwives.

Conclusions

The results of our research demonstrated important findings about stress reactions and stress management of Czech nursing students in the clinical teaching environment before and during the pandemic. A factor determining these conclusions could be the unique situation given by the government regulation of work obligations for final year students throughout the Czech Republic in order to ensure patient care during the COVID-19 pandemic. Such a situation has not been described in any studies dealing with the same topic. Repeated attacks of the COVID-19 pandemic bring prolonged stress for the vulnerable group of nursing students during their clinical practical training. To strengthen their resilience and use flexible coping strategies for managing stress in relation to the pandemic, it is necessary to use knowledge about the multifactorial determinants of stress and its management in the curricula of theoretical and practical education. The teaching team, academics, and mentors, should emphasize teaching strategies that minimize psychological discomfort and maladaptation of future general nurses. Similarly, the government needs to sensitively consider their decisions, which can have far-reaching consequences for the psychological health and well-being of future health professionals, not only during the covid pandemic.

Ethical aspects and conflict of interests

The authors have no conflict of interests to declare.

Změny v ošetrovatelské edukaci stresových a copingových strategií: longitudinální studie v České republice

Souhrn

Úvod: Dlouhodobý stres je všeobecně považován za jeden z psychosociálních faktorů, který negativně ovlivňuje studijní výsledky studentů ošetrovatelství.

Cíl: Zjistit, jaké jsou zdroje, úroveň stresu a strategie zvládání stresu u studentů ošetrovatelství v kontinuu bakalářského studia.

Metody: V průběhu tří akademických roků byli sledováni studenti jednotlivých ročníků bakalářského studijního programu Ošetrovatelství po absolvování klinické praxe v daném akademickém roce. Na sběr dat byly použity dotazníky Perceived Stress Scale; Physio-Psycho-Social Response Scale, and Coping Behavior Inventory. V 1. ročníku bylo do studie zařazeno 44 studentek, ve 2. ročníku 39 a v posledním ročníku 40 studentek.

Výsledky: Nejvýznamnějším zdrojem stresu během tří ročníků studia byl stres z nedostatku vědomostí a zručností. Nejvyšší stres byl na začátku studia, pak klesal. Ve 3. ročníku, kdy v rámci covidové pandemie měli studenti nařízenou pracovní povinnost, opět dosáhl úrovně 1. ročníku. Stres se projevoval zejména v oblasti emocí. Nejčastěji užívanou copingovou strategií bylo řešení problémů.

Závěr: Výsledky longitudinální studie potvrzují, jak pandemie covidu-19 ovlivnila percepce a projevy stresu u studentů během jejich studia. V percepce úrovně klinických i akademických stresorů a projevů stresu nebyla zjištěna jednoznačně klesající tendence. Využívání copingových strategií bylo stabilní, bez významnějších rozdílů během celého studia.

Klíčová slova: copingová strategie; covid-19; klinické vzdělávací prostředí; studenti ošetrovatelství; stres

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