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editorial

Dear Readers,

The journal "Zdravotníctvo a sociálna práca" (Health and Social Work) was renamed in 2021 to International Journal of Health, New Technologies and Social Work. Our long-term effort is to gradually acquire for the journal European significance and be included in international databases. Starting with issue No. 4 in 2016, the journal accepted the Harvard style of referencing, and changed guidelines for the authors. The aim of the changes was to move closer to the standard in international journals published in English in the area of health and helping professions. The editors are aspiring for registration in other relevant international databases. Since last 2020 the journal has published all articles in English only.

The journal "Zdravotníctvo a sociálna práca" (*Health and Social Work*) was established in 2006 at Faculty of Health and Social Work blessed to P. P. Gojdič in Prešov and St. Elizabeth University College of Health and Social Work in Bratislava. In 2023, the journal celebrated its 18th year of publication.

Previously professional journal, within 5 years developed into an international, peer-reviewed scholarly journal, published quarterly (4 issues per year). The journal were published by the St. Elizabeth University of Health and Social Work in Bratislava. The journal became international in 2009. The journal was published and distributed in the Slovak Republic and also in the Czech Republic.

Since 2011, the journal is published both in print and as electronic issues, available from: www.zdravotnictvoasocialnapraca.sk. Starting by issue No. 3 in 2014, the scope of the journal has broaden and the journal is covering health sciences, such as Public Health, Nursing, Laboratory Medicine, but also helping professions such as Social Work or Pedagogy.

The journal is indexed in the following databases: Central and Eastern European Online Library — CEEOL (since 2018), Bibliographia Medica Slovaca (BMS), and Slovak reference database CiBaMed.

The part of journal is Supplementum, to publish abstracts from international conferences organized by the St. Elizabeth University of Health and Social Work in Bratislava. In 2024, the conference will take place in October, in the Poland.

> prof. Miron Šrámka, MD, DSc. redactor-in-chief

Planned Change in gambling legislation in the Czech Republic in the area of responsible gambling measures Plánovaná změna legislativy týkající se hazardních her v České republice v oblasti opatření pro zodpovědné hraní

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ABSTRACT

Introduction: Problem gambling is a pressing social problem in society. Gambling is a constantly evolving area and therefore it is necessary for the state to respond to news on the market and monitor the current situation. The Ministry of Finance has decided to prepare new legislation, which contribute to reducing the consequences od pathological gambling. As part of the consolidation of public finances, the Ministry of Finance is planning an amendment to Act No. 186/2016 Coll., on Gambling, as amended (hereinafter referred to as the "Gambling Act"), which will bring a number of changes. The amendment to the Gambling Act should come into force and effect on 1 January 2024.

Core of Work: The aim of the article is to present the result of long-term cooperation of several organizations in the Czech Republic that deal with the issue of pathological gambling. It is a multidisciplinary connection from the field of addictology, social work, healthcare, the Ministry of Finance and other organizations that deal with the presented issues. The effort of cooperation is to look for ways to reduce the consequences of pathological gambling at all levels and whether it is possible to get under control the highest possible number of players who endanger not only themselves, but also their families and loved ones. The Ministry of Finance, in the legislation that is under its responsibility, has introduced the so-called Responsible Gaming Measure, which aims to protect gambling players and their surroundings from the negative effects.

Conclusion: The Gambling Act allowed gambling operators to operate gambling on the Internet, which represents a riskier type of gambling in brick-andmortar branches, i.e. in a land-based environment. Primarily, the amendment to the Gambling Act aims at higher protection of gamblers, stricter regulation and making it more effective. There are a number of tools available to combat the negative consequences that come with gambling addiction. Its very important that teamwork at all preventive levels is able to respond flexibly and také zhe most effective measures to reduce the consequences and increase the possibility of controlling pathological gamblers. Updating these measures to be as effective as possible could have a positive effect on the whole society.

Key words: Gambling, Addiction, Self-Limiting Measures, RVO, Panic Button

Úvod: Patologické hráčství je palčivým sociálním problémem společnosti. Provozování hazardních her je neustále rozvíjející se oblast a proto je nezbytné, aby stát reagoval na novinky na daném trhu a sledoval aktuální situaci. Ministerstvo financí ČR rozhodlo připravit legislativu, která by mohla přispět ke snížení následků patologického hráčství. V rámci konsolidace veřejných financí Ministerstvo financí plánuje novelu zákona č. 186/2016 Sb., o hazardních hrách, ve znění pozdějších předpisů (dále jen "zákona o hazardních hrách"), která přinese řadu změn. Novela zákona o hazardních hrách by měla vstoupit v platnost a účinnost dne 1. 1. 2024.

Jádro práce: Cílem článku je představit výsledek dlouhodobé spolupráce organizací v ČR, které se zabývají problematikou patologického hráčství. Jde o spojení na multidisciplinární úrovni od oblasti adiktologie, sociální práce, zdravotnictví, Ministerstva financí a dalších organizací, které se zabývají představenou problematikou. Snahou spolupráce je hledat možnosti, jak snížit následky patologického hráčství a zda se dá dostat pod kontrolu co nejvyšší počet hráčů, kteří ohrožují ne jen sebe, ale i svoje rodiny a blízké. Ministerstvo financí v zákonné úpravě, která je v jeho gesci, zavedlo tzv. opatření pro zodpovědné hraní, které cílí na ochranu hráče hazardních her a jejich okolí před negativními vlivy.

Závěr: Zákon o hazardních hrách umožnil provozovatelům hazardních her provozovat hazardní hry na internetu, které představují rizikovější druh hazardního hraní než hazardní hry v kamenných pobočkách, čili v land-based prostředí. Primárně novela zákona o hazardních hrách cílí na vyšší ochranu hráčů hazardních her, přísnější regulaci a její zefektivnění. V boji proti negativním důsledkům, které s sebou nese závislost na hazardních hrách, existuje řada nástrojů. Je velmi důležité, aby týmová spolupráce na všech preventivních úrovních dokázala pružně reagovat a přijímat co nejefektivnější opatření na snižování následků a zvyšování možnosti kontroly nad patologickými hráči. Aktualizace těchto opatření tak, aby byla co nejefektivnější, by mohla mít pozitivní vliv na celou společnost.

Klíčová slova: Hazardní hry, závislost, sebeomezující opatření, RVO, Panic button

Currently valid legislation

The gambling environment in the Czech Republic was regulated by Act No. 202/1990 Coll., on Lotteries and Other Similar Games, which was replaced by the Gambling Act, valid and effective from 1 January 2017.

The Gambling Act regulates gambling, the conditions for its operation and the competence of administrative bodies in the field of gambling. Its effectiveness has introduced a number of changes in the area of gambling, such as the opening of the Czech market to operators from the European Union and the countries forming the European Economic Area, as well as the possibility of gambling via the Internet and the introduction of measures to mitigate the risk of pathological gambling.

The Gambling Act aims, among other things, to protect gamblers against the negative consequences caused by pathological gambling. It enshrines measures for responsible gambling. Such measures include self-limiting measures and a register of individuals excluded from participating in gambling.

The Gambling Act imposes an obligation on gambling operators to offer the gambling participant the possibility of setting self-limiting measures consisting in setting game limits at their discretion. There are three types of game limits: financial limits, play time limits, and login limits. Self-limiting measures give gamblers the opportunity to be more in control of their gambling. If a gambling participant wants to tighten the set limits, then the newly set change must take effect within 24 hours. However, if you want to relax your limits, then the change will take effect in 7 days. The types of self-limiting measures in the current legislation are set as follows: In the case of a fixed-odds bet, the operator is obliged to allow the gambling participant to set the maximum amount of bets per 1 day, bets per 1 calendar month, net losses per 1 day, net losses per 1 calendar month. In the case of technical games and internet games, the operator is obliged to allow the gambling participant to set the maximum amount of bets per 1 day, the amount of bets per 1 calendar month, the amount of net loss per 1 day, the amount of net loss per 1 calendar month, the number of logins to the user account per 1 calendar month, the period of daily login on the user account until its automatic logout, the period during which the participant in the gambling game will not be allowed to participate in the gambling game with this operator after logging out of the user account. In the case of bingo and live games, the operator is obliged to allow the gambling participant to set the maximum amount of net loss per 1 day, the amount of net loss per 1 calendar month, the number of visits to the gaming area per 1 calendar month.

Another measure for responsible gambling of the Ministry of Finance is the Register of Natural Persons Excluded from Participation in Gambling (hereinafter referred to as the "RVO"). It is a non-public information system of public administration, the aim of which is to protect vulnerable groups of people from the negative impacts of gambling. RVO serves to prevent excluded individuals from accessing gambling. The RVO is managed by the Ministry of Finance and was launched in September 2020. Persons who receive benefits in material need are registered in the RVO by law, they are bankrupt, with a court-imposed ban on gambling, who do not fulfil their maintenance obligation for a dependent child, as well as those persons who have applied for registration in the RVO themselves. Anyone can enroll in the RVO, whether they have problems with gambling or want to protect themselves from possible negative impacts, all they have to do is submit an application to the Ministry of Finance. The application can be submitted in electronic form via a data box, by e-mail or in printed form by sending it to the address of the Ministry of Finance or by handing it over in person. An application for deletion from the RVO may be submitted after one year from the date of registration in the RVO. Registration in the register of natural persons excluded from participation in gambling means that persons who are registered in it cannot enter the gaming area, i.e. gambling halls and casinos, and cannot log in to their user account with a gambling operator. In practice, this means that registered persons are prevented from participating in fixed-odds betting and all types of gambling conducted via the Internet. However, the issue in this area is illegal operators and gambling games, the operation of which does not imply the operator's obligation to verify the entry of a person in the Register, i.e. raffles, small-scale tournaments, totalisator games and lotteries operated in the so-called land-based form (in brickand-mortar branches) (Act No 186/2016 Coll.).

The Gambling Act was first updated in early 2021. The amendment concerned the registration and reporting of the operation of gambling, the register of natural persons excluded from participation in gambling, the issuance of authorizations for professional assessment and certification, and changes in the issuance of professional documentation by these entities and in the performance of control and supervision activities. In addition, the conditions of self-limiting measures and the definition of net loss have been clarified. The next update of the law should come into effect on 1 January 2024 (Chomynová *et al.* 2023).

Updating the law

In 2021, the Ministry of Finance prepared an analysis of the Impact Assessment of the Regulation of the Gambling Act and Related Legislation (hereinafter referred to as the "ex post RIA"), which was subsequently approved by the Office of the Government of the Czech Republic, and several conclusions were drawn from it. First of all, the Ministry of Finance must respond to the increased risk of gambling operated via the Internet. The speed of the game, the possibility of uninterrupted participation in the game of chance and its accessibility make all types of gambling riskier than in brick-and-mortar branches. Another point is the shift from targeting to availability. This means that any gambling game that is available in the Czech Republic should be regulated, not just those that target citizens of the Czech Republic. Other points, according to the ex post RIA, are the streamlining of the regulation of gambling and the blocking of illegal operators, the reduction of the administrative burden, especially in the area of deposits or in the system of granting gambling licences itself, the unified requirements imposed on selected similar aspects of gambling, the unification and tightening of the legislation on self-limiting measures, the specification of the legal regulation of the information obligation and the revision of offences. (ex post RIA, 2021)

From the point of view of addictology, the most important changes planned by the amendment to the Gambling Act are modifications to legal instruments that should minimize the risk of pathological gambling addiction. Therefore, in order for the Ministry of Finance to be able to regulate the way gambling is operated and to be able to monitor individual players and obtain data for statistical purposes, it is very important that there is no transfer of gambling players from operators who operate gambling on the basis of the Ministry of Finance's authorization to illegal operators. In addition to the fact that it is a criminal activity and the state would lose part of its income in such a case, illegal operators usually do not have measures to protect players. Therefore, the Ministry of Finance must proceed very carefully when adjusting the setting of parameters and conditions for the operation of gambling, so that illegal operators do not push out operators who operate legally. To combat pathological gambling, the Ministry of Finance has set up measures for responsible gambling in the Gambling Act, which includes self-limiting measures and a register of natural persons excluded from participation in gambling.

The new legislation envisages that gambling operators will not be allowed to encourage gamblers to refuse or relax their self-limiting measures. Furthermore, following the update of the Gambling Act, players should be able to adjust their restrictions as part of self-limiting measures no more than once a day. If the player tightens his self-limiting measures, they will take effect immediately, not in 24 hours, as has been the case so far.

A new obligation for gambling operators regarding the register of natural persons excluded from participation in gambling will be to allow players to register with the RVO. The option to enrol in the RVO will now have to be available at any time while participating in a game of chance. In addition, persons who are registered in the RVO will also have the possibility to extend the period of their protection by 1 year, at their own request. In addition to existing persons, persons who have debts in enforcement proceedings will be entered in the register of natural persons excluded from participation in gambling. The fact that RVO has an irreplaceable place in responsible gambling measures is evidenced by statistical

data. As of 2 August 2021, the Ministry of Finance registered 198,050 persons registered in the Register of Excluded Persons with at least one currently valid reason for exclusion. Especially in the period after the launch of the Register of Excluded Persons, the Ministry of Finance registered an increased number of applications for registration in the Register of Excluded Persons. As of 2 August 2021, the Ministry of Finance registered 1,486 persons in this Register at its own request.

The updated wording of the Gambling Act envisages the introduction of a completely new measure for responsible gambling, which is the Means of Preventing Participation in Gambling (hereinafter referred to as the "Panic Button"). This responsible gaming measure should contribute to the protection of gamblers. A panic button is a tool that allows gamblers to stop their gambling immediately. The Ministry of Finance plans that the Panic button will be easily available throughout the player's participation in the gambling game, both in brick-and-mortar branches and in the online environment. The Panic button should be placed in a visible place immediately after logging in to the player's user account. Therefore, it will not only apply to a specific type of gambling and will not apply to a specific operator, which in practice means that if a gambler is denied access to the game for 48 hours after pressing the Panic button, the gambler can go to play in the establishment of another operator. Once the Panic button is activated, the player will be banned from participating in the game of chance for 48 hours. The ban will apply both to the branch where the Panic button was activated and to other branches. In addition, in such a case, the gambling operator should be obliged to offer the gambler the opportunity to enrol in the RVO. The introduction of this new measure for responsible gambling entails a relatively demanding technical intervention of gambling operators in technical equipment, which is why the Ministry of Finance expects that the obligation to introduce the Panic button will have a deferred effect and operators will thus have room to adapt to the technical legislative change.

In addition to tightening the regulation of gambling, there is also a plan to increase the tax on gambling, especially for games that, according to the ex post RIA, have proven to be riskier in terms of negative impacts on gambling participants. On the other hand, there should be a reduction in tax on less risky gambling, such as lotteries.

Conclusions

The definition of gambling addiction is very difficult. However, if we accept the well-known definition that speaks of an irresistibly compulsive need in cases of any addiction, it is necessary to highlight the fact that the co-author's experience in the field of working with addicts in a resocialization center speaks that success leading to recovery from pathological gambling is often more difficult to achieve than in the case of substance addictions. This may be due to the fact that it is a psychological addiction, which is more difficult to treat than other types of addictions. Since it is also a socio-economic problem of our society, several institutions in the Czech Republic deal with it, both in terms of prevention and subsequent treatment. The Ministry of Finance is also dealing with the issue of prevention and possibilities of protection of gamblers and their surroundings. In its legislation, it focuses on the protection of gamblers and their surroundings against the negative effects of participation in gambling. The Gambling Act enshrines a number of addictological brakes, such as self-limiting measures, information obligations, limited opening hours of gambling establishments, mandatory breaks in the event of participation in technical games, a ban on serving drinks and cigarettes free of charge when participating in gambling, limited advertising, mandatory registration and a register of excluded persons. The Ministry of Finance has also prepared an expost RIA analysis of the risk of individual types of gambling. The analysis showed that the most risky types include technical games and games of chance operated via the Internet. Technical play is already the focus of the currently valid legislation, thanks to which the number of gaming areas and technical equipment has decreased, by more than 50 %. The regulation of gambling operated via the Internet is also directed in the Gambling Act to take care of the protection of players as much as possible.

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The role of physiotherapist and nurse in a complex balneotherapy Úloha fyzioterapeuta a sestry v komplexnej balneoterapii

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ABSTRACT

Objective: Vertebral diseases represent important medical and economical problem. According to introduced statistics 70-80 % of population in all developed countries suffer from these diseases. Taking into consideration all diseases, vertebral diseases take the second position in reasons for a visit at the doctors, the fifth position as a reason for hospitalisation and the third causing the operation. Incapability to work takes about 10-15 % of population. A year prevalence is about 25-45 %, from which 3-7 % is a chronic back pain. All expenses paid create up to 80 % of all costs of treatment of vertebral diseases. The top point of back pain prevalence is between the age of 35 to 55 years. In the period of previous years a marked increase of vertebral diseases has been noticed mainly in younger age groups. The notion of "vertebral diseases" can be defined as functional and degenerative affections localized in spine and manifested in pains. The pain is an early signal of functional risk of locomotor apparatus which appears before the morphological changes can be noticed.

The aim of the present work: The main goal of the work is to set up the position of physician, physiotherapist and nurse in balneotherapy, with these partial findings: (1) if the complex spa treatment has a positive influence on the course of the chronic vertebral illness, (2) if the length of spa stay has an influence on the course of illness.

Material and methods: In clinical practice the main part is based on research where the effect of spa treatment is statistically evaluated by using a method of McGill-Melzack questionnaire (Slovak version used), by using visual analogue scale (VAS) and objective tests based on measuring the mobility of spine before and after taking spa treatment.

Results and Conclusion: Spa treatment has the positive influence on the course of the disease in our set of 147 patients. Our results demonstrate the improvement of mobility of spine (Schober, Stibor, Thomayer) on the significant level according to parameteric Student's pair t-test (p<0,0001). The length of spa treatment is very importan: three weeks stay is more suitable than two weeks stay. The results have proved that the importance of spa treatment in direct curative balneo-rehabilitation process can be claimed as well as in prevention. The interaction of a physician — a physiotherapist and nurse and a physiotherapist and nurse — a patient is also necessary. On the base of this interaction the decisions and demands of a physician are realised in practice by a physiotherapist and nurse.

Keywords: back pain, complex balneotherapy, length of spa treatment, interaction: physician — physiotherapist — nurse — patient

Cieľ: Vertebrogénne ochorenia predstavujú významný medicínsky a ekonomický problém. Ako uvádzajú štatistiky 70 – 80 % populácie vo vyspelých krajinách trpí týmto druhom ochorení. Vertebrogénne ochoreia predstavujú druhé miesto v návštevnosti u lekára, piate mieste ako dôvod hospitalizácie a tretie ako dôvod operácie. Práceneschopnosť v populácii spôsobujú asi v 10 – 15 %. Incapability to work takes about 10 – 15 % of population. Ročná prevalencia ochorení je 24 – 45 %, z ktorých 3 – 7 % predstavuje chronická bolesť chrbta. Všetky vynaložené peniaze vytvárajú viac ako 80 % zo všetkých nákladov na liečbu vertebrogénnych ochorení. Najvyšší výskyt bolestí chrbta je medzi 35 až 55 rokom života. V predošlých rokoch bol zaznamenavý zvýšený výskyt vertebrogénnych ochorení najmä u mladších vekových skupín. Predstava "vertebrogénnych ochorení" môže byť definovaná ako funkčné a degeneratívne postihnutie lokalizované v chrbtici a prejavujúce sa bolesťami. Bolesť predstavuje skorý príznak funkčného rizika pohybového aparátu, ktorý sa objaví pred vznikom morfologických zmien.

Cieľ práce: Hlavným cieľom práce je poukázať na úlohu lekára, fyzioterapeuta a sestry v balneoterapii, s čiastkovým zistením (1) celková kúpeľná, liečba má kladný vplyv na priebeh chronického veretbrogénneho ochorenia (2) dĺžka pobytu v kúpeloch má vplyv na priebeh ochorenia

Materiál a metódy: V klinickej praxis je hlavná časť zameraná na výskum, kde sa hodnmotí prínos kúpelnej liečby štatisticky pomocou metódy of McGill-Melzack dotazníka (Slovenská verzia), použitím VAS stupnice a objektívnych testov založených na meraní mobility chrbtice pred a po absolvovaní kúpelnej liečby.

Výsledky a záver: Kúpelná liečba mala kladný vplyv na priebeh ochorenia v našom súbore 147 pacientov. Naše výsledky demonštrujú zlepšenie mobility chrbtice (Schober, Stibor, Thomayer) v signifikantnej miere v súlade s testom Our results demonstr Student's pair t-test (p<0,0001). Dĺžka kúpelnej liečby je veľmi dôležitá — tri týždne pobytu sú vyhovujúce viac ako dva. Výsledky ukázali význam kúpelnej liečby a kúpeľno-rehabilitačného procesu tak v liečbe ako aj prevencii. Spolupráca medzi lekárom — fyzioterapeutom a sestrou je rovako potrebná ako spolupráca medzi fyzioterapeutom, sestrou a pacientom. Rozhodnutie a požiadavku lekára v praxi na základe ich vzájomnej spolupráce, realizuje fyzioterapeut a sestra.

Kľúčové slová: bolesti chrbta, komplexná balneoterapia, dĺžka pobytu v kúpeľoch, spolupráca: lekár — fyzioterapeut — sestra tace.

Introduction

Vertebral diseases represent important medical and economical problem. According to introduced statistics 70-80 % of population in all developed countries suffer from these diseases. Taking into consideration all diseases, vertebral diseases take the second position in reasons for a visit at the doctors, the fifth position as a reason for hospitalization (Mašán 2019). Incapability to work takes about 10-15 % of population. A year prevalence is about 25-45 %, from which 3-7 % is a chronic back pain. All expenses paid create up to 80 % of all costs of treatment of vertebral diseases (Bartko and Drobný 1990; Bartko et al. 1984; Drdková 1988; Mašán 2019). The top point of back pain prevalence is between the age of 35 to 55 years. In the period of previous years a marked increase of vertebral diseases has been noticed mainly in younger age groups. The cause may be searched in so called biopsychosocial factors (sex, weight, age, job) and in a complex of civilization factors most of all in physical exertion of motor apparatus (unsuitable habit stereotypes) and in the states of psychical stress, in the deficiency of adaptability of vegetative part of nervous system to demands of modern civilization (Allen and Weimann 1982; Bartko and Drobný 1990; Mašán 2019; Blahunka et al. 2012; Bánovský et al. 2022). The notion of "vertebral diseases" can

be defined as functional and degenerative affections localized in spine and manifested in pains localized or radiant in some segment. The pain is an early signal of functional risk of locomotor apparatus which appears before the morphological changes can be noticed. By treatment with analgesics this natural defence mechanism is suppresed and consequently affected structures are constantly overloaded with the result of morphological changes. Vegetative changes appear as hyperalgesic changes (HAZ) and trigger points (Bartko and Drobný 1990; Hyman and Cassen 1996; Loscalzo 2022; Beňačka, Mašán 2013; Mašán 2019). This can be a starting point for treatment of painful vertebral syndrome wheather acute or chronic. According to Jandová among the others (2009) acute pain syndrome is only an immediate decompensation of status being prepared for years. It is the correct diagnose (Lukáš et al. 2022; Pavelka 2010; Pavelka, Rovenský 2003; Pavelka, Vencovský 2012) and selection of the most effective curative procedure, that helps to manage and overcome this acute state so that it doesn't become chronic (Gúth 1994; Heřmánek 1981; Huskinsson 1974; Huggard 2022; Mašán, Haring 2017). While treating functional disorders any local procedures that have local complex influence and thus improve function as a whole can be used. It means that it depends on the experience of therapist and his choice of procedure as well as on correct local and thorough diagnose

(Allen, Weimann 1982; Blahunka et al. 2012; Čelko 1986; Čelko, Zálešková 2000; Češka et al. 2020). After taking case history and objective findings a doctor determines priorities in curative procedures in the process of rehabilitation (Bradley et al. 1978; Bender 2005; Huggard 2022; Loscalzo et al. 2022; Mašán et al. 2017). Proper connection of rehabilitation procedures in the plan of rehabilitation is up to the physiotherapist and a nurse. A complex nursing process comprises of recommended procedures, instructions for patient, his family and relatives about his disease, and the ability to influence the treatment of the patient with rehabilitation procedures. This creates inavitable motivation to active attitude of the patient to his own treatment with rehabilitation (Jandová 2009; Kolář 2012; Loscalzo et al. 2022; Mašán et al. 2017; Pavelka, Rovenský 2003; Rýchliková 1987; Zvonár 2005). The basic point in balneotherapy is the complex influence of mechanical, physical, chemical and biological factors in natural curative sources (Češka et al. 2020; Trojan et al. 2005; Loscalzo et al. 2022; Huggard 2022; Mašán 2019; Korenčíková, Mašán 2021; Golská et al. 2021). It is an effective and economical method. In the balneological department a physiotherapist and a nurse qualified in rehabilitation plays an important role. She creates her own "nursing diagnose" by evaluating the functional capacity of motor apparatus and checking some data about stated problems. She keeps in contact with a doctor and informs him about the results of the treatment. The following check up helps to set up short and long termed aims in nursing care. After complex balneotherapy the treatment is again evaluated according to its main goals. Here becomes apparent the role of a nurse in this process because it is her who can analyse the results of the whole therapy. We've tried to support the main goal of our work which is to set up the position of a nurse in balneotherapy, with these partial findings: if the complex spa treatment has a positive influence on the course of the chronic vertebral illness, if the length of spa stay has an influence on the course of illness and if the spa treatment has a different influence on patients according to sex (Loscalzo et al. 2022; Čelko, Zálešáková 2000; Šimkovič 1995; Thurzová 1985; Trojan et al. 2005).

Material and methods

In clinical practice it is a big problem to evaluate pain problems especially the origin of vertebral pain. Very often it depends on a verbal information from sick people's description of their bad feelings. The evaluation of the problem is being solved by many studies of visual analogy and verbal scales through various arrangements by the classical McGill-Melzack questionnaire, up to specifically selected questionnaire for the spine construction as Oswestry Low Back Pain Questionnaire — ODQ, Million Visual Analogue Scale — MV AS, Roland-Morris Disability Questionnaire — RMDQS, Low Back Pain Rating Scale — LBPRS, Quebeck Back Pain Disability Scale — QBPDS and many others (Allen, Weimann 1982; Bartko *et al.* 1984; Tauchmannová 1979; Thurzová 1981; Šťastný 1999; Sullivan 2018). To verify research aims we used several techniques. The axis of research was to evaluate the functional state of the patient, to evaluate spine mobility with the help of tests (Bartko *et al.* 1984; Bradley *et al.* 1978; Sobota 1995; Sullivan 2018; Takala *et al.* 1982; Trnavský *et al.* 1988; Varsík *et al.* 1997). In our studies for simplicity and an easy repetition of measurements we used the following tests: Schober, Stibor, Thomayer. Patients take a half hour swim every day. The patient's diagnose was chronic low back pain with clinical appearance with and without radiculitis and pseudoradiculitis (Pavelka 2010; Loscalzo *et al.* 2022).

The results were registered into tables from which we gattered basis for statistical evaluation before and after treatment. In the same way we evaluated and compared the length of the spa stay, a two week stay and a three week stay. Into the collection we took 147 accidentaly choosen patients, cured by balneotherapy in a period of the years 2019 till 2022. There were 84 (57,14 %) women and 63 (42,86 %) men (Table 1). They were from 34 to 95 years of age. The choosen patients were divided into two groups. One group was formed of 99 respondents, from that 44 men - 44,42 % and 55 women forming 55,56 % (Table 2). Objective function tests of spine mobility were tests of Schober, Stibor, Thomayer. The another group of 48 respondents for evaluation of McGill-Melzack questionnaire were 19 men, that is 39,58 % and 29 women, that is 60,42 % (Table 4). In the collection of a two week spa stay there were 28 respondents from this 13 women that is 13,13 % and 15 men that is 15,53 %. For a three week stay -71 respondents, from these 42 women that is 42,42 % and 29 men which creates 29,29 % (Table 3). The whole collection of respondents we divided according to their age, <61 years old and > 61 years old and gender into groups of women and men. We did the same gender distinction by putting groups into the collection of two week and three week spa treatment (Table 3).

Table 1. Structure of the respondents cured by balneotherapy.

Total Number	Men	Women			
N	%	n	%	n	%
147	100 %	63	42,86	84	57,14

Table 2. Structure of respondents for objective function tests.

Gender	Number (n)	%
Men	44	44,44
Women	55	55,56
Total	99	100

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Gender	M	en	Wor	nen	Total Number		
Length of spa stay	n	%	N	%	N	%	
2 weeks	15	15,15	13	13,13	28	28,28	
3 weeks	29	29,30	42	42,42	71	71,72	
Total	44	44,45	55	55,55	99	100	

Table 3. Structure of respondents according to the length of spa stay.

Table 4. Structure of respondents for evaluation of McGill-Melzack questionnaire of pain (The Slovak version).

Gender	Number (n)	%	Age in years	Average age
Men	19	39,58	from 34 to 95	61,16
Women	29	60,42	from 34 to 77	51,14
Total	48	100		

Results and discussion

Structure of responders according to gender, presented in the Table 1, shows the patients who underwent the balneotherapy. The results show that from the total number (Table 1) 99 respondents for objective function tests (Table 2) were 44 men (44,42 %), 55 women (55,56 %). In the Table 3 classification according to the length of balneotherapy is presented (number of days possible - 14 or 21). 28 patients took 14 days balneotherapy from that number there were 15 men (53,6 %) and 13 women (46,43 %). 71 patients, e.g. 29 men (40,85 %) and 42 women (59,15 %) took 21 days balneotherapy treatment. Objective function tests of spine mobility were tests of Schober, Stibor, Thomayer. We evaluated all the tests in centimeters according to standard procedures and agreements and all of them were registered into tables. We watched and registered the results before and after complex spa treatment. The obtained results we evaluated by Student's pair t-test. We also evaluated in responders the length of spa stay, their age and gender. For another evaluating function we used the Slovak version of McGill-Melzack questionnaire of pain (Allen, Weimann 1982; Bartko et al. 1984; Bradley et al. 1978; Gúth 1994; Heřmánek 1981; Rýchliková 1987) and visual analogue scale, where the intensity of pain was evaluated as follows: 1. lower pain, 2. troublesome pain, 3. intensive pain, 4. cruel pain, 5. unbearable pain. The obtained results were statistically worked out by computer technique according to Microsoft Excell (Šťastný 1999; Sullivan 2018) and evaluated by student's pair t-test. Quantification of pain according to McGill-Melzack pain questionnaire is more complicated than VAS (Visual Analogue Scale) when a patient for a 10 cm abscissa indicates pain intensity in millimeters or numerical. This visual analogue scale graphically expressed pain intensity - was used for first time by Huskinson (1974) for clinical experiments with analgesics and for evaluating functional capacity of sick patients with

progressive polyarthritis. Here a similar experience was used by Tauchmanová (1979). Today VAS is considered to be the most suitable and quick way for a subjective evaluation of pain intensity (Huggard 2022). The Slovak version of pain questionnaire (Bartko et al. 1984) contains 60 descriptors, which are statistically of different importance to the pain intensity divided into 20 groups. Groups are assorted into four categories: sensory (1-10), affective (11-15), evaluating (16), mixed (17-20). The patient can choose — indicate words, which describe pain in the best way. He is allowed to choose one word from the most suitable group, referring mostly to the pain. He can leave out any group of words that are not suitable. Scoring of the questionnaire is detected with a certain help of 3 basic indexes, as NWC (Number of Words Chosen) that is the number of choosen words describing pain experience. PRI (Pain Rating Intesity) is the total scores of chosen descriptors and PPI (Present Pain Intensity) expressing the acute intensity of pain in scale extension 1-5a responsibility of actual numbers VAS (Bartko et al. 1984; Sullivan 2018). The calculated and obtained indexes were then compared before and after attending spa treatment, then according to two selections Student's t-test and equal disperses for every group separately (Drdková 1988; Sullivan 2018).

Sick people were cured by a complex spa treatment, which includes mirror pull, mud, hydrokinesitherapy, massotherapy, reflexology (Bender *et al.* 2005; Čelko, Zálešáková 2000; Mašán 2019; Golská *et al.* 2021; Korenčíková, Mašán 2021). The number of main procedures are usually twice a week (Mirror pull 2x, Mud pack 2x, Hydrokinesitherapy 2x, Massotherapy 2x).

In the respondents (Table 4) we observed significant improvement at the level of more than p < 0,0001. The observed parameter Stibor improved after spa treatment in 0,97 cm, that is in 10,5 % (p < 0,0001). The observed parameter Thomayer

after spa had improved in 7,0 cm that is in 29,5 % (p<0,001). By comparing results in men (n =44; Table 2), Schober after spa treatment had improved in 0,76 cm that is in 15,9 % (p<0,0001), Stibor in 1,0 cm, that is 11,6 % (p<0,0001), Thomayer after spa treatment had improved in 8,7 cm, that is 31,3 % (p<0,0001).

By comparing the results of women (Table 2; n = 55) Schober after spa treatment had improved in 0,68 cm that is in 13,9 % (p<0,0001), Stibor in 0,88 cm, that is 10 % (p<0,0001), Thomayer after spa treatment had improved in 6,45 cm, that is 28,0 % (p<0,0001). We can state, that the entire set after spa treatment came to a significant improvement on the level of importance (p<0,0001) for all the researched groups and in all the measured parameters. We didn't find out statistically significant differences according to sex. Objective parameters after spa treatment had nearly identically changed as in women, also in men. Comparing the results of the entire set of 28 responders - taking balneotherapy for two weeks - the observed parameters had improved; Schober according to middle value after treatment in 0,68 cm that is in 13,36 % (p<0,0001), Stibor in 0,88 cm, that is 10 % (p<0,0001), Thomayer after spa treatment had improved in 6,57 cm, that is 28,44 % (p<0,0001). The basic parameters in men during a two week spa treatment: The number of responders 15. Schober after speda treatment had improved in 0,67 cm that is in 13,7 % (p<0,0001), Stibor in 0,87 cm, that is 10 % (p<0,0001), Thomayer after spa treatment had improved in 7,86 cm, that is 31,8 % (p<0,0001). The basic parameters in women during a two week treatment: The number of responders 13.

Schober after spa treatment had improved in 0,62 cm that is in 13,0 % (p<0,0001), Stibor in 0,89 cm, that is 9,3 % (p<0,0017), Thomayer after spa treatment had improved in 5,08 cm, that is 24,0 % (p<0,002).

The basic tested parameters in 71 respondents taking balneotherapy for three weeks had improved in Schober after spa treatment in 0,74 cm, that is in 15,41 % (p<0,0001), Stibor in 0,95 cm, that is 10,92 % (p<0,0001), Thomayer after spa treatment had improved in 7,18 cm, that is 29,98 % (p<0,0001). For a treatment lasting three weeks - the number of men responders — 27. Schober after spa treatment had improved in 0,74 cm that is in 15,4 % (p<0,0001), Stibor in 0,95 cm, that is 11 % (p<0,0001), Thomayer after spa treatment had improved in 7,63 cm, that is 31,0 % (p<0,0001). With women a spa treatment lasting three weeks: Schober after spa treatment had improved in 0,69 cm that is in 14,2 % (p<0,0001), Stibor in 0,89 cm, that is 10,1 % (p<0,0001), Thomayer after spa treatment had improved in 6,87 cm, that is 29,2 % (p<0,0001). Evaluating statistically these basic set of groups we only proved the essence of spa treatment on the level of importance lower than 0,0001, but we didn't ascertain a significant statistical difference between individual groups.

However by the strength of attest we may assume a more effective treatment lasting three weeks rather than two. Also from these statistical calculations we may judge Schober's test as more sensitive than Thomayer's one.

While testing responders until 61 years, we also divided the set according the length of spa treatment to two and three weeks and according to sex to men and women. The basic evaluations of observed tests in the complete set of 13 respondents until 61 years and the length of a two week spa stay. Schober after spa treatment had improved in 0,73 cm that is in 14,5 % (p<0,0001), Stibor in 1,07 cm, that is 11,69 % (p<0,0002), Thomayer after spa treatment had improved in 6,23 cm, that is 26,47 % (p<0,0036). Men during a two weeks spa stay - Schober after spa treatment had improved in 0,58 cm that is in 11,4 % (p<0,029), Stibor in 0,75 cm, that is 8 % (p<0,0086), Thomayer after spa treatment had improved in 8.33 cm, that is 29,4 % (p<0,0153). Concerning a group of women until 61 years and the length of a two week stay, the results were comparable with men groups - Schober after spa treatment had improved in 0,86 cm that is in 17,5 % (p<0,0005), Stibor in 1,46 cm, that is 15 % (p<0,0021), Thomayer after spa treatment had improved in 4,43 cm, that is 22,8 % (p<0,0393).

The basic evaluation of observed tests of responders until 61 years and the length of a three week stay with the number of 36 responders, show that all were improved after the spa treatment — Schober after spa treatment had improved in 0,78 cm that is in 16,18 % (p<0,0001), Stibor in 1,04 cm, that is 11,94 % (p<0,0001), Thomayer after spa treatment had improved in 7,1 cm, that is 29,36 % (p<0,0001).

The questionnaire of pain, where the correlation analysis was used, led us to conclusion, that the evaluations correlate and complement each other. After the spa treatment we didn't find out accentuated changes in the affective pain in comparison with the sensory pain as described in most literature sources (Trnavský *et al.* 1988; Varsík *et al.* 1997; Loscalzo *et al.* 2022, Mašán 2019). In our set of patients the sensory pain and the affective pain was influenced equally (improvement represents 62 %). It could be probably caused by lower number in set of patients in comparison with other authors (Bradley *et al.* 1978; Heřmánek 1981; Huggard 2022; Huskisson 1974; Hyman, Cassen 1996).

While comparing the influence of spa treatment on status of patients, taking into considerations their age, the level of significance was lowered, speaking about the patients 61 years old and 2 weeks treatment duration. This may be caused by not numerous group of patients observed. Introduced values and calculations were not influenced by substitution with other patients, because the aim was to show the structure of patient in our spa, chosen by chance in a concrete time period. The fact, that the results are comparable with other authors and that slight differences can be caused by polymorbidity of patients in our set, may be announced as well (Allen and Weinmann 1982; Heřmánek 1981; Rýchliková 1987; Šimkovič 1995; Thurzová 1985; Loscalzo *et al.* 2022).

Conclusion

In the observed work we were concerned with the problem of vertebral disease in the part of lumbar spine and with the potential influence of complex spa treatment on this disease. This disease takes the top position while talking about its prevalence and thus its negative influence on the economy of society. Set of studies was compound from subacute and chronic states of vertebral syndrome. The following conclusion was achieved from the obtained results and their statistical evaluation:

- 1. Spa treatment has the possitive influence on the course of the disease. This was proved in significant level of importance p<0,0001 in our set of 147 patients. According to the results significant improvement of objective measurements of mobility of spine was observed (Schober, Stibor, Thomayer) on the level of significance according to parametric Student's pair t-test (p<0,0001). McGill-Melzack test (Slovak version) showed a marked influence of pain, mainly in the zone of sensory pain and on the same level of significance in the zone of affective pain. Chronic states of the disease would correspond to the introduced results. According to our research spa treatment has a positive influence on the sensory pain that represents acute disease.
- 2. Evaluating, whether the length of spa treatment influences the course of disease and the result of treatment we didn't get significant statistical difference, but according to intensity of statistical indicators we can say that *three weeks stay is more suitable than two weeks stay.*
- 3. Thus, according to the results of the test, we have to be moderate while evaluating the influence of the length of spa treatment stay on the course of vertebral disease. Empirical results in the past though stand for longer stay than two weeks.
- 4. Evaluating the differences in the influence of spa treatment according to sex we didn't get significant difference in results of objective measurements in patients up to 61 years old undergoing the treatment of 2 weeks length. There was a lowering of the level of significance, but it was not marked as important. This fact was evaluated in the results as caused by low set of patients. No significant difference was found while talking about sex of patients on the whole as well as while talking about distinction among men and women up to 61 and above 61 years old.
- 5. The goals of our research were fullfilled. We have proved the effective place of complex spa treatment in complex nursing process in vertebral diseases. The results have proved that the importance of spa treatment in direct curative balneo-rehabilitation process can be claimed as

well as in prevention. Our findings correspond to many sources in literature and to our present experience. We have also proved that rehabilitation nursing is by no means replacable and the constant education of health care staff in the field of rehabilitation nursing is important and necessary, as this represents a new field in science with a board and highly professional degree of activities interrelated with other scientific branches. The main task of rehabilitation nursing is prevention of secondary changes, early mobilization and psychical activation of patients. It is applied in all medical branches and in some of them takes even the most important part.

It is necessary to conclude that it is important for a doctor to analyze case history, objective findings, paraclinical examinations, to make diagnose and to compound appropriate therapeutical procedure in a nursing-rehabilitation process. But the interaction of a doctor — a nurse and a nurse a patient is also necessary. On the base of this interaction the decisions and demands of a doctor are realised in practice by the physiotherapist and a nurse.

Conflict of interest

I declared that I have no conflict of interest.

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Variabilities in the formation of the spinal nerve roots Variability vo formovaní sa miechových nervov

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ABSTRACT

Introduction: Work was aimed at pointing out the intraspinal anatomical variations of the nerve roots and their possible participation in radiculopathy.

Methods: The anatomical study was performed in 43 cadavers. All intradural and extradural rami communicantes between nerve roots were excised and examined histologically for the presence or absence of nervous tissue.

Results: Normotyped plexus formation occurred in 30 cases, variabile formation was observed in 13 cases. Dissection revealed intradural rami communicantes in all cases of the lumbosacral plexus; 28x in cases of cervical roots and thoracic region 4x. Extradural anatomical variations occurred 26x, they were more frequent on left side (13x), bilaterally 4x. In 9 cases the atypical spacing, including 4x in lumbosacral region was observed. In 9 cases rami communicantes between the nerve roots were observed. Multiple extradural rami communicantes were observed 6x, including the simultaneous occurrence of multiple intradural and extradural ones 5x.

Conclusions: Study allowed us the identification of intraspinal anatomical variations of nerve roots and their interrelationships throughout the spinal canal with their potential influence on clinical picture. Anatomical preparations revealed a higher incidence of intraspinal intradural variations, particularly between sacral roots and their reliance to the type of plexus.

Keywords: intraspinal nerve roots, intradural nerve roots, extradural nerve roots, nerve roots variations

Úvod: Práca bola zameraná na odhalenie intraspinálnych anatomických variácií nervových koreňov a ich možnú účasť na radikulopatii.

Metódy: Anatomická štúdia bola vykonaná na 43 ľudských telách. Všetky intradurálne a extradurálne rami communicantes medzi nervovými koreňmi boli excidované a histologicky vyšetrené na prítomnosť alebo neprítomnosť nervového tkaniva.

Výsledky: Normotypý typ plexu sa vyskytol v 30 prípadoch, variabilná typ bol pozorovaný v 13 prípadoch. Pitva odhalila intradurálne rami communicantes vo všetkých prípadoch lumbosakrálneho plexu; 28x pri krčných koreňoch a v hrudnej oblasti 4x. Extradurálne anatomické variácie sa vyskytli 26x, častejšie na ľavej strane (13x), bilaterálne 4x. V 9 prípadoch bol pozorovaný atypický odstup, vrátane 4x v lumbosakrálnej oblasti. V 9 prípadoch boli pozorované rami communicantes medzi nervovými koreňmi. Viacnásobné extradurálne rami communicantes boli pozorované 6x, vrátane súčasného výskytu viacerých intradurálnych a extradurálnych 5x.

Závery: Štúdia nám umožnila identifikovať intraspinálne anatomické variácie nervových koreňov a ich vzájomné vzťahy v celom chrbticovom kanáli s ich potenciálnym vplyvom na klinický obraz. Anatomické preparácia odhalila vyšší výskyt intraspinálnych intradurálnych variácií, najmä medzi sakrálnymi koreňmi a ich závislosť od typu plexu.

Kľúčové slová: intraspinálne nervové korene, intradurálne nervové korene, extradurálne nervové korene, variácie nervových koreňov.

Introduction

This paper aims to point out the intraspinal anatomical variations of the nerve roots and their interrelationships throughout the spinal canal as well as their possible impact on the clinical picture. Very few studies have reported occasional intradural and extradural communications between adjacent roots (Arslan 2011; Tubbs 2009). These studies mostly focus on lumbosacral regions followed by cervical regions, and rarely in the thoracic region. Additionally, such communications are primarily between the dorsal rootlets, while ventral root intercommunications have been rarely reported (Marzo 1987; Moriishi 1989).

To our knowledge, no study has reported interconnections between intradural and extradural nerve roots in the cervical, thoracic, and lumbosacral region in reference to a normal, prefixed, or postfixed type of brachial and lumbosacral plexuses. Most of the papers on the intraspinal variations of nerve roots dealt with extradural anatomical variations of lumbosacral nerve roots (Boden 1990; Burke 2013; Chotigavanich 1992; Haijiao 2001; Kadish 1984; Kikichi 1984; Neidre 1983; Postacchini 1982; rask 1977; Scarf 1981; Solmay 2015; Stambough 1988; Yilmaz 2014).

The submitted paper comprehensively evaluates the topic of intraspinal intradural and extradural variations of nerve roots. Therefore, the present study was undertaken to determine if there is any relationship between the level and concentration of root interconnections and these variations in the formation of the plexuses.

The anatomical data collected from 43 cadavers with nerve root variations represent the basis of the report. Such data may be important for the diagnosis of radiculopathy and may help understand nerve root injuries and other intrathecal pathological processes.

Material and Methods

The anatomical study was carried out in 43 fresh cadavers without congenital or detected abnormalities, tumour diseases, orthopaedic deformities and spinal operations within 24 hours from the death. The study included 32 men (74.4 %) aged 30 to 75 years and 11 women (25.6 %) aged 45 to 77 years. The subjects had died from a violent death, most often in car accidents, when the spine had not been damaged. The study was conducted with the approval of the Ethics committee. In the prone position, we separated paravertebral muscles from processus spinosi and laminas on both sides from the cervico-cranial transition to the sacrum. Processus spinosi were removed using bone punches and Stryker's saw. Laminas on both sides, as well as parts of articular projections, were removed with the Kerisson rounger. Such "roofing off" allowed the direct visualization of

the spinal canal without damaging the spinal cord and nerve roots. A wide laminectomy from cervical-cranial transition to the sacrum revealed the whole spinal canal to examine each cervical, thoracic, lumbar, and sacral nerve root from its protrusion out of the spinal cord to its exit from the spinal canal through the intervertebral foramen and hiatus sacralis. Subsequently, we made a longitudinal incision of the dura and we removed it entirely from the spinal ganglion to allow direct visualization of the spinal cord, conus medullaris, and spinal nerve roots. The exposed segments of the spinal cord and nerve roots were examined, monitored and reviewed, including a detailed examination of the intradural and extradural rami communicantes.

All intradural and extradural rami communicantes between nerve roots were excised and then examined histologically to find out the presence or absence of nervous tissue. The type of the plexus was defined by subtracting from the root C2. The type of plexus was determined based on the formation of intradural and extradural roots. Normal anatomical levels of cervical intumescences (cervical enlargement) are C4-T1 segment (C4-T1 vertebra level) brachial plexus. Lumbosacral intumescences (lumbosacral enlargement) are L1-S3 segment (T9-T12 vertebra level) lumbosacral plexus.



Figure 1. Scheme of normal, prefixed and postfixed type.

In the normotyped plexus from the top of the cervical intumescence, the C6 root was retracted. In the prefixed type, the C5 root and in the postfixed type C7 and C8 roots were retracted.

From the top of lumbar intumescence in the normotyped plexus the L3 root, in the prefixed type the L2 root and the postfixed type L4, and L5 roots were retracted (Figure 1).

Table 1. Intraspinal intradural variations of nerve roots

Results

Findings with the normotyped plexus in 30 cases (69.8 %) of intraspinal intradural and extradural formation of the brachial and lumbosacral plexus were dominant (Table 1, 2, 3). Variations of the formation were observed in 13 cases (30.2 %). The prefixed type occurred in 9 cases (20.9 %) (Figure 2), postfixed type in 4 cases (9.3 %) (Figure 3, 4). The

Plexus type	Number	Rami communicantes between dorsal roots		Rami communicantes between ventral roots			Ram between o	i communica lorsal and ve	intes ntral roots	Multiple rami communicantes			
		C	Т	LS	C	Т	LS	C	Т	LS	C	Т	LS
Normo- type	30	12	_	30	1	1	6	1	_	6	6	_	30
Prefix. type	9	3	2	9	1	_	2	_	_	3	1	1	9
Postfix. type	4	2	_	4	_	_	1	1	_	1	_	_	1
Total	43	17	2	43	2	1	9	2	0	10	7	1	43

Prefix. – prefixed, Postfix. – postfixed, C – cervical, T – thoracic, LS – lumbosacral

Table 2. Atypica	l spacing —	intradural	variations
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Plexus type	Number	Common of root	Common or close double spacing of roots from one segment			Asymetry of roots			ing of ventra	l root	Missing of both ventral and dorsal roots		
		C	Т	LS	C	Т	LS	C	Т	LS	C	Т	LS
Normo- type	30	2	2	15	2	1	22	—	_	4	_	_	_
Prefix. type	9	_	_	5	3	1	5	_	_	7	_	_	3
Postfix. type	4	1	_	2	2	1	4	_	_	2	_	_	_
Total	43	3	2	22	7	3	31	0	0	13	0	0	3

Prefix. – prefixed, Postfix. – postfixed, C – cervical, T – thoracic, LS – lumbosacral

Table 3. Intraspinal extradural variations of nerve roots

Plexus type	Number	Aty	pical spac of roots	ing	Two roo ne	ots leading uroforam	j to one en	Ext cor	radural ra nmunican	mi tes	Ex of	tradural la nerve roo	ıck ts	Al	oberant ro	ot
		C	T	LS	C	T	LS	C	T	LS	C	T	LS	C	T	LS
Normo type	30	1	2	2	_	2	1	4	1	1		_	_	1	_	_
Prefix. type	9	1	_	_	_		_	_	_	1	_		3		_	_
Postfix. type	4	1	_	2	1		_	1	1		_		_		_	
Total	43	3	2	4	1	2	1	5	2	2	0	0	3	1	0	0

Prefix. - prefixed, Postfix. - postfixed, C - cervical, T - thoracic, LS - lumbosacral

formation of the isolated prefixed or postfixed type of brachial and lumbosacral plexus was not observed.

The frequency of intradural and extradural rami communicantes between nerve roots showed variations among spinal levels. Rami communicantes are mostly concentrated in lumbosacral regions — in all cases, followed by cervical regions 28 times (65.1 %) and rarely in the thoracic region 4 times (9.3 %). Rami communicantes between the dorsal roots prevailed in all cases. All intradural rami communicantes were excised and examined histologically and the presence of nervous tissue was found in all of them (Figure 5).

They occurred more frequently in variations of formation of the plexus. In the prefixed type, we observed absence of ventral roots S3, S4, S5. In one case, the common spacing of the root L1 and L2 sin. was observed.

The ventral root L4 was thicker or of the same thickness as the ventral roots L5, S1 and S2. The thickness of the anterior branch of the root L3 was equal to the anterior branch of the roots L5 and S1. Ramus communicans above 1-2



Figure 2. Prefixed type, lumbosacral plexus, dorsal view. Asymmetry of roots, roots L4, L5 thicker than S2, S3. Missing front roots S3, S4, S5.

roots occurred in one case. In one case, we observed rami communicantes between the roots L2 and L3 bilaterally. In one case we observed cross-ramus communicans between dorsal roots S3 dx. — S3 sin.

The asymmetry of roots was more pronounced in the lumbosacral plexus (31 cases, 72.09 %), particularly at the level of spacing of roots L4-S3, maximum at the level of S1-S2. Their atypical spacing, multiple rami communicantes between dorsal sacral roots, at a short as well as at a longer distance from the spinal cord, or the absence of the ventral root occurred in 13 cases (30.2 %), the absence of ventral and dorsal roots in three cases (7 %), rami communicantes between the ventral and dorsal roots in 10 cases (23.3 %). Rami communicantes only between ventral roots were present in 12 cases (27.9 %) out of which there were three cases in the prefixed type. In eight cases (18.6 %), they were present between sacral and lumbar roots.

In the cervical region, rami communicantes between the dorsal roots prevailed. Intumescences had a different scale of shape and information. In the normotyped plexus, from the



Figure 3. Postfixed type, front view. The common sleeve of roots C4-C5 sin, asymmetry of roots. Roots L3, L4 were thinner, and sacral roots S3, S4 clearer. The assimilation of segments in the region of spacing of sacral roots. Close and distal rami communicantes.

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top of the cervical intumescence, the C6 root was retracted. In the prefixed type C7, C8 roots were retracted. In the postfixed type, the cervical intumescence extended to the spacing of roots Th11—Th2.

From the top of lumbar intumescence in the normotype the L3 root, in the prefixed type the L2 root and the postfixed type L4, L5 roots were retracted.



Figure 4. Dorsal view, asymmetry of roots. The roots L3, L4 were thinner, sacral roots S3, S4 clearer. The assimilation of segments in the region of spacing of the sacral roots. Close and distal rami communicantes.



Figure 5. Longitudinal section of the nerve with perineurium, no inflammation, fibrosis, 200x HE.

Extradural anatomical variations occurred in 26 cases (60.5 %). They were more frequent on the left side in 13 cases (30.2 %), and bilateral in 4 cases (9.3 %).

The asymmetry of roots was observed. It was more pronounced in the lumbosacral plexus, particularly at the level of spacing of the roots L41 - S3, maximum at the level of S11 - S3. In 9 cases (20.9 %), the atypical spacing, including four in the lumbosacral region, was observed

After an extradural course of different lengths, the nerve roots remained close to each other and in 4 cases (9.3 %) left the spinal canal through one neuroforamen. Two incidents of two roots in the thoracic region in one neuroforamen and one incident of two roots in one neuroforamen in the cervical and lumbosacral regions. In two cases (4.65 %), the absence of nerve roots (S3), and in one case the root (L2), on the right side was observed and in one case an aberrant root between roots of C21—C3 (Figure 6).

In 9 cases (20.9 %), extradural rami communicantes between the nerve roots were observed (Figure 7). Two adjacent nerve roots were connected by ramus communicans shortly after they emerged from the dura. In one case, we observed cross-dx sin extradural anastomosis in the lumbosacral area (Figure 8).

Multiple extradural rami communicantes were observed in 6 cases (13.95 %), including the simultaneous occurrence of multiple intradural and extradural ones in 5 cases (11.6 %). In the cervical region in 3 cases (Figure 9) and in 2 cases in the lumbosacral region. Rami communicantes were mostly — in 6 cases — unilateral.

Discussion

We have not met with the papers describing intraspinal intradural and extradural nerve root variations throughout the spinal canal, as well as their differences on individual levels.

Our anatomical preparations allowed us to identify and describe a higher incidence of intraspinal intradural variations mainly between sacral roots.

Variations were observed at sacral levels from 0% (15) to 20-30% (Chotigavanich 1992; Neidre 1983).

We observed intradural rami communications in all cases of the lumbosacral plexus. Their number increased, especially among sacral roots.

In the cervical region, they were less frequent — 28 times (65.1 %). And in the thoracic region, they occurred rarely — 4 times (9.3 %). Our results were evaluated concerning the type of the plexus. Prefixation of the brachial plexus is more common than postfixation.

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Figure 6. Back view, asymmetry of the roots. Aberrant root between the roots C2-C3 dx.



Figure 8. Back view, asymmetry of the sacral roots, atypical spacing of the root S3 sin. Extradural ramus communicans between S3 sin and S4 dx.



Figure 7. Front view, extradural ramus communicans between C5-C6 dx. Intradural ramus communicans between the roots C2-C3 dx.



Figure 9. Intradural ramus communicans between the roots C5-C6 dx. Extradural rami communicantes between the roots C6-C7-C8 dx.

Prefixation of the brachial plexus was reported in 28 % and 5 % were postfixed (Tubbs 2009). We found differences in 9 specimens (20.9 %) that were prefixed and in 4 specimens (9.3 %) that were postfixed.

Intradural variations prevailed in their atypical formation in the lumbosacral region. Our findings have indicated that the location of variations throughout the whole segment of the spinal cord is different as well as the form of variations.

In some cases, they are few and located at a short distance from the spinal cord. In other cases, rami communicantes are multiple, they flow further away from the spinal cord.

These data may help us understand nerve root injuries according to various pathologies, such as disc herniation, space-occupying lesions, and trauma.

Interneural interconnections may cloud clinical interpretation (Arslan 2011; Arslan 2012; Kitab 2009). Some patients with hernias of intervertebral discs do not have a typical symptomatology characteristic of this type of disease. In disc operations, sometimes, anatomical variations in nerve roots are found which results in monitoring these variations by examination of cervical, thoracic, lumbar, and sacral nerve roots at cadavers. The aetiology of these variations has to be elucidated. The most likely explanation of variations is that they result from defective migration of the nerve roots during the first four weeks of embryonic development (Marieb 2005; O'Rahilly 1990).

Embryologic evidence can account for the frequent occurrence of intradural variations. The presence of an unbroken ridge of neural crest tissue travelling along the length of the spinal cord may provide the means for neighbouring dorsal roots to intercommunicate during the development (Tubbs 2009; Marieb 2005; O'Rahilly 1990)

At the 4-mm stage in the embryo, the spinal ganglia develop processes, which are directed toward the spinal cord to become the dorsal roots. This period of dorsal root expansion and fusion with the spinal cord lasts up to the 10-mm stage and may depict the route by which connections between adjacent segments can be formed.

Moreover, the dorsal roots are much slower to form than their ventral counterparts and do not begin to separate until approximately day 30 of development (Marzo 1987).

This may be the reason for not identifying many more interconnections between the ventral roots. It would, to some extent, explain the fact that migrations are usually unilateral.

Most papers refer to extradural anomalies of lumbosacral nerve roots (Burke 2013; Chotigavanich 1992; Haijiao 2001;

Kadish 1984; Postacchini 1982; Rask 1977; Stambough 1988; Yilmaz 2014), what resulted in analysis and comparing mainly this part of our observations. We observed extradural variations in 26 cases (60.5 %), 10 cases (23.3 %) of the lumbosacral plexus. In variations of its formation, the variations were observed in five out of eight cases with dominant left-side localization.

Symptoms of radiculopathy may manifest extradural variations of lumbosacral nerve roots even in cases of the absence of pressure on nerve roots (Boden 1990; Burke 2013; Kadish 1984, Bedeschi 1956). Some papers are based on surgical findings (Goffin 1987); others are based on anatomical studies (Kadish 1984; Postacchini 1982). Their incidence ranges from 1.3 % found during the operation (6) to 2-6.7 % detected by imaging methods before surgery (Kadish 1984; Postacchini 1982; Stambough 1988; Kyoshima 1986), and from 8.5 % to 30 % during the study of cadavers (Burke 2013; Bedeschi 1956).

They occur most frequently unilaterally at the level of L5-S1 (Kadish 1984; Neidre 1983; Ethelberg 1952; Chin 1997; Zagnoni 1949), and can be the cause of failure in the operations of discs (Neidre 1983).

This explains the importance of recognizing variations of the nerve roots of different types, which may increase the number of successful operations (Kikuchi 1984; Keegan 1947).

Variations of nerve roots can cause symptoms at more than one level because of the pressure, e.g. by the herniated disc. The pressure placed on an abnormally situated nerve root may give incorrect information about the level of hernia of the disc.

Variations are the major cause of the failure of surgical therapy and are particularly sensitive to the retraction of nerve roots. Dissectomy is, therefore, more complicated. The nerve roots cannot be mobilized safely and the possibility of their damage increases (Chotigavanich 1992; Haijiao 2001; Ethelberg 1952).

Variations of roots occupy more space in the spinal canal, so even a small bulging of an intervertebral disc may be the cause of symptoms. Variations themselves can cause pain.

The spinal cord is mobile during normal flexion and extension. Therefore, larger traction forces may be produced with variations in nerve roots, as well as with normal movements of the spinal column (Transfeld 1982). Intradural and extradural nerve roots can be damaged by stretching (Kitab 2009; Petraco 1996).

Stretch-induced nerve root injury may be related to changes in the length of the spinal canal and the length of the nerve root. The perineurium and endoneurium have considerable mechanical strength and serve to protect neural tissues against mechanical forces. However, the intrathecal nerve roots do not have such a protective sheath (Kitab 2009; hasue 1993). Excessive flexion of the torso during variations in surgical procedures may be one of the risk factors for injury of the tethered roots in the presence of intrathecal pathologies (Arslan 2011). Therefore, the intradural nerve roots are vulnerable to mechanical stretch, including operative manoeuvres and trauma. Interneural interconnections may cause symptoms at more than one level and may give incorrect indication of the disc herniation level, therefore, the results of decompression may be poor (Kitab 2009).

The anatomical studies have revealed extradural variations of a lumbosacral root in 8.5 % of cases (Bardeen 1901; Keon-Cohen 1968), 14 % incidence (Postacchini 1982) and 30 % incidence (Bedeschi 1956). In our study, it was in 10 cases (23.3 %).

The atypical spacing of two nerve roots is most frequently observed in the lumbosacral region (Kadish 1984; Zagnoni 1949). The occurrence of such disorders was observed in 30 % of cadavers (Neidre 1983; Posctacchini 1982; Scarff 1981; Bedeschi 1956; Goffin 1987; Ethelberg 1952). In our study, they occurred in 4 cases (9.3 %). In two cases, it was the level of L5-S1, which is lower in comparison to other reports (Burke 2013; Kadish 1984; Neidre 1983; Postacchini 1982; Yilmaz 2014; Goffin 1987).

In two cases, there was the extradural absence of a nerve root at the S3 level on the right side. Extradural rami communicantes between lumbosacral nerve roots were described in some studies (Chotigavanich 1992; Kadish 1984; Neidre 1983; Postacchini 1982). They revealed the extradural rami communicantes ranging from 1 % to 25 % of cases. In our study, it was in 2 cases (4.6 %).

Comparing our anatomical findings with previous results of other authors (Boden 1990; Kikuchi 1984; Neidre 1983; Scarff 1981), it appears that the percentage rate was lower, and the types of extradural variations were partially different. We did not frequently observe atypical spacing of nerve roots, as commonly observed in other studies (Burke 2013; Kikuchi 1984; Postacchini 1982).

Preoperative diagnosis of variations in nerve roots is difficult. The lack of preoperative vigilance can lead to iatrogenic damage to the nerve roots. We believe that data obtained from anatomical dissection will be helpful to many surgeons.

Our study is affected by some factors such as strong regional focus, and a small number of cadavers. This limitation affects the interpretation of our data quality, and the ability to generalise our findings.

Conclusion

We found intraspinal intradural and extradural neuroanatomical variations of nerve roots and their interrelationships through the spinal canal with their potential impact on the clinical picture.

Anatomical preparations revealed a higher incidence of intraspinal intradural variations mainly between sacral roots and extradural variations mainly between cervical roots. Reliance of their incidence of the type of plexus was observed. We believe that the data obtained will be helpful for spinal surgeons in improving the success rate of spinal operations.

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Ethical standards

Pictures of intraspinal variations of nerve roots were obtained by careful dissection and within the forensic expertise with the approval of the ethics committee HCSA, Bratislava, Slovak Republic.

The study was made with the written consent of the competent bodies and followed all applicable standards, rules, regulations, and laws and supervised by the responsible officials.

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The issue of disaster medicine is actual and belongs to the complex professional training of Health workers Problematika medicíny katastrof je aktuálna a patrí do vzdelávania komplexnej profesionálnej prípravy zdravotníckych pracovníkov

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Introduction: The need to ensure the safety of the citizen and the safety of the community is guaranteed by the Department of Health through the provision of health care, the scope and quality of which, during extraordinary events, is conditioned by a comprehensive set of knowledge, skills and abilities of medical personnel of all levels (strategic management — operational — tactical), high-quality and efficiently functioning logistics base, the seamless exchange of current and necessary information within the information system for crisis situations in the healthcare sector and the possibilities of security research in the field of population approaches to health during extraordinary events.

Core of work: Ensuring tasks at the level of the global geopolitical situation, including the consequences of climate change, requires rigorous training of health professionals at the undergraduate and postgraduate levels in the field of disaster medicine and the basics of crisis management. In the absence of any of the elements, the overall response of the state's health system to save the life and health of individual citizens and population groups during emergency events may be weakened.

Conclusion: Experience shows that students of all disciplines come to medical faculties with minimal information about disaster issues, or with significantly modified information from social networks.

Key words: Disaster medicine, crisis, terrorism, START

Úvod: Potreba dosiahnúť bezpečnosť občana a bezpečnosť komunity je garantovaná rezortom zdravotníctva prostredníctvom poskytovanej zdravotnej starostlivosti, ktorej rozsah a kvalita sú za mimoriadnych udalostí podmienené obsiahlym súborom vedomostí, zručností a schopností zdravotníckeho personálu všetkých úrovní (strategická manažérska — operačná — taktická), kvalitne a efektívne fungujúcou logistickou základňou, bezproblémovou výmenou aktuálnych a potrebných informácií v rámci informačného systému pre krízové riadenie v zdravotníctve a možnosťami bezpečnostného výskumu v oblasti populačných prístupov ku zdraviu za mimoriadnych udalostí.

Jadro práce: Zabezpečenie úloh na úrovni globálnej geopolitickej situácie, vrátane dôsledkov klimatických zmien, si vyžaduje dôslednú prípravu zdravotníckych pracovníkov na pregraduálnej aj postgraduálnej úrovni v oblasti medicíny katastrof a základov krízového manažmentu. Pri absencii ktoréhokoľvek z prvkov môže dôjsť k oslabeniu celkovej odpovede zdravotného systému štátu na záchranu života a zdravia jednotlivých občanov i populačných celkov za mimoriadnych udalostí

Záver: Skúsenosti ukazujú, že na zdravotnícke fakulty všetkých smerov prichádzajú študenti s minimálnymi informáciami o problematike katastrof, prípadne s výrazne modifikovanými informáciami pochádzajúcich zo sociálnych sieti.

Kľúčové slová: Medicína katastrof, kríza, terorizmus, START

Adrián Fabiny

The issue of disaster medicine is actual and belongs to the complex professional training of Health workers

Introduction

Basics tasks of disaster medicine

Every major change in conditions is a disaster in its own way. But with joint efforts, people survived situations that at first glance appeared to be deadly, associated with permanent change and conditions. All events that negatively affect the life of society reveal how important the safety literacy of the population is.

Core of work

History and characteristics of the department

The development of medical sciences and the medical experience gained from extensive health activities in the world, in difficult conditions when it was necessary to deal with the serious consequences of natural elements, but also as a result of human activity, are still being implemented into a comprehensive scientific system. The goal of this scientific system is to systematically deal with the issue of expedient and effective management of the consequences of devastating events through an effective tool (Bazyar, Farrokhi, Khanked 2019; Ciottone *et al.* 2015, Klement 2011).

Disaster medicine has become a tool for the field of managing health consequences, which coordinates the specific focus of individual medical departments focusing on the permanent study of individual medical disciplines and targeted information for the health care provision system while respecting the lawfulness of the so-called catastrophic cycle.

The scope of interests defined in this way determines the basic goal of the medical understanding of disaster medicine, i.e. to cover the needs of prevention, immediate assistance and subsequent solutions to possible health consequences arising in direct relation to the disaster and, in cooperation with other non-medical activities, to participate in the creation of a common system, a disaster management system.

Disaster medicine is an interdisciplinary and multisectoral field. It includes a variety of activities — from purely medical to technical, which have one goal — to help victims of all kinds of disasters. The construction of such a system is always a reflection of the time in which it was created, the level of

knowledge and the level of science in the society that will create it, as well as use it.

Disaster medicine is an effective management and performance tool of the health system, using a comprehensive method of activities covering all phases and aspects of the disaster cycle (Table 1), including preparation, prevention, immediate deployment, provision of on-site assistance, recovery of subsequent development in the affected area.

A disaster is understood as a serious event — suddenly or slowly arising — of such magnitude that the affected society must make extraordinary efforts to cope with it. Often with the help of other regions or the international community. (S. W. Gunn).

WHO defines a disaster as: "...a sudden ecological phenomenon of sufficient degree that requires external assistance." (Heller et al. 2017; MacGarty, Nott 2013; Masár et al. 2013; Masár et al. 2016).

In the conditions of Czechoslovakia, the concepts of disaster medicine were gradually developed when applying information from emergency medicine and war medicine. After the breakup of Czechoslovakia, a comprehensive concept of disaster medicine was developed under the conditions of Slovakia. In both newly formed republics, there was an attempt at a comprehensive medical concept, and for this a new system of health care provision was being organizationally built in conditions of mass disability of persons.

The basic step in the realization of the concept of disaster medicine was the transformation of the healthcare system in the years 1990-1 993 and it took place synchronously with the transformation of rescue services. The essence of these changes became the so-called the rescue chain, which is the carrier of the requirements for ensuring available and effective help in situations of sudden threat to the life and health of an individual and is the skeleton of the medical rescue service system (Pereja *et al.* 2020; Law no. 129/2002 Coll).

Preparation of the state and healthcare to face emergency events and crisis simulations

By adopting the law on security of the Slovak Republic, the

 Table 1. Classification of extraordinary events

Event	The number of affected	Characteristics of the event
Accident	2-5	
Mass accident limited	5 — 10	A situation where up to 10 people are affected, with at least one person in critical condition.
Mass accident	< 50	A situation where more than 10 people are affected and will not exceed 50.
Extensive disaster	> 50	A situation in which more than 50 people are affected, regardless of the number of dead, seriously or lightly injured.

construction of a legislative environment for implementation was started for the so-called crisis management both at the highest level of ensuring security (in the sense of uniformly understood external and internal security in the understanding of non-military and military crisis situations) of the Slovak Republic, and mainly within the scope of the individual departments. The provisions of the aforementioned law, which regulate that state authorities are obliged to participate in ensuring the security of the Slovak Republic, became key (Fedorová 2021; Heller *et al.* 2017; Cristian 2019; Jain *et al.* 2015).

This broadened the scope of all state administration bodies, and for the level of central bodies, the requirement of this law is given, according to which all ministries examine social issues within their sphere of competence, analyze the results achieved, take measures to solve current issues and develop concepts for the development of entrusted industries.

The health care provision system, which is based on the existence of independent health care providers, is thus faced with the difficult task of ensuring the readiness of its functioning even under conditions that will be induced by such events that force the declaration of a certain state of crisis, and this with the full use of departmental legislation and department management acts.

Covering the spectrum of requirements for the provision of health care — both in standard and non-standard conditions — requires a systemic and systematic solution, based on the current and real possibilities of care providers, mainly at the following levels:

- I. Standard pre-hospital emergency care through the rescue system resp.in terms of the law on the Integrated Rescue System.
- II. The tool of the rescue system is the rescue chain with its chain of survival from the area of occurrence of the disability to the area of hospital care, using the most effective integration of all components of pre-hospital care (Pereja *et al.* 2020; Law no. 129/2002 Coll; Walls *et al.* 2018).

Law no. 129/2002 Coll. Law on Integrated Rescue System

(1) An integrated rescue system is a coordinated procedure of its components (§ 7) in ensuring their readiness and in carrying out activities and measures related to the provision of assistance in times of need.

- (2) For the purposes of this Law, it shall be understood
- a) an emergency situation in which life, health, property or the environment are in immediate danger and the affected person is dependent on the provision of assistance,
- b) by intervention, a summary of the necessary actions and measures of the rescue units of the integrated rescue system (§ 7), which are related to the immediate provision of assistance in distress,

- c) aid provision plan method of activation and coordination of rescue components of the integrated rescue system dispatched to intervene for the purpose of providing aid in distress,
- d) the place of intervention in which the rescue units of the integrated rescue system provide help in an emergency,
- e) Dispatching workplace means the workplace of the other rescue unit, which, based on a call to carry out an intervention from the coordination center of the integrated rescue system (hereinafter referred to as the "coordination center") or the emergency call operation center, ensures the performance of its subordinate components,
- f) communication and information infrastructure, a summary of the technical conditions and organizational measures necessary to ensure voice and data transmission between coordination centers, emergency call operation centers, dispatching workplaces, the Ministry of Interior of the Slovak Republic (hereinafter referred to as the "Ministry") and the Ministry of Health of the Slovak Republic (hereinafter referred to as the "Ministry healthcare") through telecommunications networks, telecommunications equipment, radio networks and mutually compatible software,
- g) an integrated security center, a space for the joint deployment of the coordination center and emergency call operation centers,
- h) the plan of common procedures, the method of coordinating the activities of the rescue units of the integrated rescue system for the purpose of providing assistance in an emergency (Law no. 129/2002 Coll).

The law also defines the organization of IRS intervention

(1) At the site of the intervention, the intervention commander from the Fire and Rescue Service manages and coordinates the activities of the rescue units of the integrated rescue system; in mountain areas during rescue operations according to a special regulation, the leader of the intervention from the Mountain Rescue Service. If a member of the Police Force assigned to the operation center of the Police Force decides that it is an intervention, which mainly concerns the fulfillment of the tasks of the Police Force, the activity of the rescue services at the scene of the intervention is managed and coordinated by a member of the Police Force designated by him. The Operations Center of the Police Force immediately informs the relevant coordination center of the assumption of command in accordance with the second sentence.

(2) If at the site of the intervention there is no intervention commander determined according to paragraph 1, the intervention commander is the commander or head of the rescue unit of the integrated rescue system designated by the relevant coordination center (hereinafter referred to as the "authorized person"), in the case of searching for aircraft or providing assistance in plane crash, designated by the body responsible for searching for planes and saving human lives.

(3) The intervention commander does not interfere in the professional activities of other rescue units of the integrated rescue system.

(4) If the situation at the scene of the intervention requires it, the intervention commander establishes a staff as his advisory body composed of representatives of the intervening rescue units of the integrated rescue system.

(5) Natural persons who are at the site of an intervention are obliged to submit to the decisions and orders of the intervention commander, as well as to endure actions related to the performance of the activities of the rescue units of the integrated rescue system during an intervention.

(6) The intervention commander can, in cooperation with the coordination center or the operation center, request additional rescue units of the integrated rescue system to intervene.

The intervention commander, in cooperation with the coordination center or the operation center, can also request assistance(§ 13, paragraph 1) from legal entities, natural persons — businessmen and other natural persons who have the technical means to provide assistance that is immediately necessary to carry out the intervention.

Adaptation of the rescue system to the environment of mass accidents through and within the territorial emergency system, in accordance with the requirements of the Law on the Prevention of Serious Accidents, either independently within the scope of the pre-hospital emergency care provider, or in cooperation with other providers of emergency services in the environment of the Integrated Rescue System, the medical part is then represented by the traumatological planning process. The health care tool within the emergency plan of the administrative unit is the traumatological plan, which addresses the needs of health care and the options of providers in the event of a mass disability of persons. The central role in the coordination of pre-hospital emergency care and the interdependence of health care providers (ambulatory, emergency hospital and inpatient care, including hygienic care) is played by the local or regionally relevant medical rescue service.

Adaptation of the entire system of health care providers, including the rescue system, to the mechanism of ensuring the necessary supplies of health services and needs through the crisis system. The tool for ensuring the necessary supplies of works and services is the crisis plan of the administrative unit, which contains the necessary supplies of health works and services to the population of the affected administrative unit, without which it is impossible to overcome the crisis situation, and suppliers ensure these needs with the Crisis Preparedness Plan. The purpose of the entire set of "system measures" is to ensure the gradual increase of possibilities within the health sector in order to ensure the functionality of the health care provision system through optimal use of the system's structure, its availability, including the necessary support from non-departmental capacities (supply of inputs for the system's functionality).

Crisis Management. Crisis management is a set of scientific knowledge, professional procedures and application tools of preventive, decision-making and technological measures enabling responsible workers to solve crisis situations. Phases of crisis management include analysis of a potential source of threat, correction of an existing potential source of threat, prevention, rescue and restoration of life and activities in new conditions after liquidation of the consequences of the crisis (Klement 2011).

Crisis management authorities of the Slovak Republic:

- a) Government of the Slovak Republic, Security Council of the Slovak Republic
- b) Ministries and other central state administration bodies
- c) National Bank of Slovakia
- d) Regional Security Council
- e) District Office
- f) District Security Council
- g) Municipal authorities
- h) Higher territorial unit

Forces and resources of the Slovak Republic to deal with mass disasters. In the event of a mass disaster, the Slovak Republic has an integrated rescue system at its disposal, which is defined by law:

International disaster relief. Disasters usually have a large scale, so depending on the situation, it is necessary to ask another country or several countries for help based on pre-concluded international agreements or as part of humanitarian aid (Klement 2011; Pokorný 2008; Šín 2017).

For the correct and efficient organization of medical transport, it is necessary:

- trouble-free contact to the operation center,
- correct evaluation of transport options (with a physician, air or ground means, length of transport, etc.),
- primary routing (to avoid overcrowding of the nearest hospitals and thereby eliminate acute secondary transports, to ensure definitive treatment as quickly as possible through properly designated transports), properly determined removal and transport priorities, sufficiently qualitatively and quantitatively equipped and available means for transport.

The Triage of the wounded. Since the performance of the emergency medical service is limited both by the number of workers, equipment and medicines, and also by the medical equipment itself, the Triage of the wounded is carried out. It is a dynamic process where patients are separated into certain categories according to the severity of their injuries. JIt is an effective way to save as many victims as possible. As the Triage is time-dependent and the patient's condition changes

rapidly, it is necessary to perform this Triage after each stage of treatment. Triage is not perfect and certainly cannot be called democratic, it is not specific or sensitive, but it definitely reduces overall losses. *The examination must not last more than 3 minutes and no treatment is given during the Triage, at most the bleeding is stopped improvised, an oral airway is introduced or the head is tilted.*

The most famous triage scheme is the so-called START scheme (Simply Triage And Rapid Therapy)

Patients are labeled (Picture 1):

- RED emergency critical condition characterized by respiratory or circulatory failure, shock, bleeding, unconsciousness. Help is essential within minutes.
- YELLOW urgent polytraumas, abdominal and chest wounds, burns may be present. Help is needed within 1-2 hours.
- GREEN nonurgent or walking those affected most often have minor injuries to soft tissues, fractures of the upper limbs, minor burns, but they are mostly able to walk. Help is needed within 4-6 hours.
- BLACK dead or terminally wounded injuries incompatible with life, dying and dead. Those affected have extensive craniocerebral injuries, II degree burns. and III. degree above 60 % of the body surface, polytrauma with hemorrhagic shock in the terminal phase, but even these patients will be provided with at least analgesia, analgosedation and psychological assistance (Pokorný 2008).

Triage at the emergency department:

- Category I obviously urgent such as stoppage of blood circulation, angina pectoris, hematemesis, unconsciousness, injuries with unconsciousness,
- Category II significantly urgent such as dyspnoea, abdominal pain, disorientation, severe pain,
- Category III potentially urgent such as abdominal pain, high temperatures, sudden back pain, limb injuries, large wounds,
- Category IV non-urgent such as swellings, contusions, chronic disease with worsening, slight increase in blood pressure (Šín 2017).

Problems and shortcomings in the management of the intervention by the commander of the medical unit. At the present time, the commander of the medical unit during an emergency may encounter the following problems in the organization of a medical intervention: low level of layman first aid, obtaining healthy and capable volunteers, lay people



Picture 1. Sample triage card in case of an accident with mass disability of persons

(Source: http://www.sciencedirect.com/science/article/pii/ S1084804509000769#gr1)

to cooperate in the intervention, lack of physicians in the initial phase, overestimating the speed of removal at the expense of the quality of treatment (failure to provide drugs, infusions, failure to perform endotracheal intubation, failure to provide ventilation support), uncoordinated spontaneous transport of the wounded without triage and first aid, incorrect distribution of the wounded to hospitals (take into account capacities), delayed supply of medical supplies or insufficient medical logistics, delayed / neglected supply of drinks and refreshments for members of the rescue teams, medical documentation, ensuring routine health care in the affected area and its surroundings and the entire catchment area, low erudition of general practitioners and ambulatory specialists in providing first aid in emergencies.

Conclusion

Presented partial summary, which essentially contains an introduction to the issue of disaster medicine, but mainly the status of individual components. The aim of the work is to draw attention to the fact that the changing geopolitical situation, technical accidents, climate changes, but also group or individual terrorism expose the population to a huge threat to their lives, health and property.

The logical consequence of these changes will be the pressure on healthcare workers to respond to these changes. The absence of available protective equipment, antidotes in case of mass poisoning with warfare agents (Sarin in the Tokyo subway), places to hide (vegetable warehouses) causes a feeling of frustration for all who deal with the issue and possibly also educate at medical and health faculties.

An indisputable benefit will be the application of the cited law on the Integrated Rescue System, when the Slovak Police is included in the basic structures of the IRS, the benefit should be very positive in the event of mass accidents. In France, the emergency medical service is integrated into the fire brigade, which is also related to the performance of the state service (from which competences are also derived) and the protection of the medical worker in the performance of his profession.

It is evident that the number of disasters worldwide has been increasing rapidly in recent decades, the probability of a large-scale natural disaster is at the level of 1 % every year, and for the 21st century, such a disaster must be expected. This is joined by extreme climatic phenomena, which are also increasing in destructiveness (also in the territory of the Czech Republic, e.g. Kyril, Emma, tornadoes). This significantly increases the likelihood that national health systems will one day be forced to face the consequences of catastrophic events.

The need of the hour is the permanent preparation of health care systems in all its components, and the dominant role will be played by a targeted program of education and training of personnel, not only medical rescuers, but also the entire professional community and the public. Because every catastrophic event causes enormous pressure and stress.

Targeting education and training is made possible by the large number of disasters (Japan — earthquake, USA — hurricanes, Indonesia — tsunami, etc.) about which we have a large amount of knowledge. Education must always respect national specificities and local conditions. It is a law of disasters that the biggest burden is always carried by local authorities and local health services.

Conflict of interest: No conflict.

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19. medzinárodná vedecko-odborná konferencia

SPOLUPRÁCA POMÁHAJÚCICH PROFESIÍ POĽSKO – ČESKO – SLOVENSKÉ ŠTÚDIE



Vysoká škola zdravotníctva a sociálnej práce sv. Alžbety, n. o., v Bratislave v spolupráci so Slovenskou Komorou sestier a pôrodných asistentiek a Slovenskou Komorou sociálnych pracovníkov a asistentov sociálnej práce a v spolupráci s Sliezskou lekárskou univerzitou, Fakultou zdravotníckych vied v Katowiciach, Katedrou fyzioterapie



18.-19.10.2024

