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ARTIGO ORIGINAL

INTEGRATING DISASTER MEDICINE AND MANAGEMENT INTO MEDICAL EDUCATION: A CROSS-SECTIONAL STUDY ON CURRICULUM NEEDS

INTEGRANDO A MEDICINA E A GESTÃO DE DESASTRES NA EDUCAÇÃO MÉDICA: UM ESTUDO TRANSVERSAL SOBRE AS NECESSIDADES CURRICULARES

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RESUMO

Introdução: A discussão sobre desastres ganhou maior relevância nos últimos anos, principalmente devido à pandemia de COVID-19. Entretanto, atualmente a importância em formar e treinar profissionais da saúde para tais situações não condiz com a devida abordagem desse tema nas grades curriculares das escolas médicas. Este estudo buscou verificar a percepção de estudantes de medicina das universidades do extremo sul catarinense sobre a necessidade de implantar disciplinas/cursos de Medicina de Desastres e Gestão de Desastres no currículo da graduação médica. **Método:** Estudo transversal, por meio de questionário utilizando escala Likert de cinco pontos dividido em quatro etapas (demografia, conhecimento prévio sobre o tema, desejo pela implementação do curso, modalidade de ensino) sobre Medicina de Desastres e Gestão de Desastres aplicado com estudantes de três universidades do Extremo Sul de Santa Catarina. Os dados obtidos foram agrupados em planilhas sem identificação dos respondentes, organizados por variáveis categóricas e quantitativas, e analisados utilizando estatística descritiva. **Resultados:** Foram 105 participantes, a maioria mulheres (64,8%), com idade entre 20 e 24 anos (61%) e matriculados até o quarto ano do curso de graduação em medicina (92,4%). Observou-se a falta de familiaridade com a área de Medicina de Desastres e Gestão de Desastres, bem como o reconhecimento da necessidade de implantação de cursos/disciplinas na área, nos quais os alunos demonstraram grande interesse — a maioria dos participantes concordou (88,5%) com a necessidade de um curso desse tema. **Conclusão:** O estranhamento dos estudantes com a Medicina de Desastres e o Gerenciamento de Desastres e o desejo de aprender mais sobre o assunto demonstra fertilidade desse tema ainda pouco explorado.

Descritores: Desastres; Educação Médica; Estudantes de Medicina; Incidentes com Feridos em Massa; Medicina de Emergência.

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ABSTRACT

Introduction: The discussion about disasters has gained greater relevance in recent years, mainly due to the COVID-19 pandemic. Despite its importance, the effort of training health professionals for such situations is disproportionately diminished or non-existent in medical undergraduate curricula. This study aimed to verify the perception of medical students from universities in the extreme south of Santa Catarina about the need to implement disciplines/courses on Disaster Medicine and Disaster Management in medical undergraduate curriculum. **Methods:** A cross-sectional study was performed, through a five-point Likert scale questionnaire divided into four stages (demographics, prior knowledge about the theme, desire to implement the course, and teaching modality), about Disaster Medicine and Disaster Management applied with students from three universities in the Extreme South of Santa Catarina. The data obtained were grouped in spreadsheets without the identification of the respondents, and organized by categorical and quantitative variables, and analyzed using descriptive statistics. **Results:** There were 105 participants, most of them women (64.8%), aged 20-24 years old (61%), and enrolled up to their fourth year of undergraduate medical school (92.4%). A lack of familiarity with the Disaster Medicine and Disaster Management field was observed, as well as the recognition of the need to implement courses/disciplines in the area, in which the students showed great interest — the majority of the participants agreed (88.5%) with the need of implementation of a course with this theme. **Conclusion:** The students' unawareness with Disaster Medicine and Disaster Management and their desire to learn more about the subject demonstrates the fertility of this topic that is still little explored.

Keywords: Disasters; Emergency Medicine; Mass Casualty Incidents; Medical Education; Medical Students.

INTRODUCTION

A disaster is understood as a catastrophe incident whose material and health demands outweigh available resources[1]. The discussion about this theme grows in importance, mainly due to the coronavirus pandemic that has been established in recent years[2], but also due to the nature of the disasters and their usually unpredictable material and immaterial damage[3]. The management and handling of these events perpasses the areas of Disaster Medicine and Disaster Management, which act both in the preparation of civil society and in the immediate and late response to disasters[4]. Disaster medicine has been defined as "the science for analysis and development of the methodology requested to handle situations where available resources are insufficient concerning the immediate need of medical care"[5]. The overall objective of disaster medicine, consequent to this definition, is to "reduce or eliminate avoidable loss of life and health and physical and psychological suffering"[5] in these situations.

Any doctor, nurse, ambulance crew, and other health care providers can be involved in a major accident or disaster at any time and need to be able to function and react appropriately and efficiently during these scenarios[6,7]. Therefore, it is self-evident that basic knowledge of Disaster Medicine should be included in their undergraduate curriculum[6]. Traditional healthcare education needs to be adequately structured to provide realistic experiences concerning high-risk or infrequently encountered events. As

a result, many healthcare providers graduate into practice with inadequate exposure or skills to intervene in a disastrous event[7].

There are many ideas about what education in disaster medicine should include, but there are few common international guidelines, and the design and quality of education still vary widely. The International Society of Disaster Medicine, the oldest international society in this field (established in 1974), has as one of its main aims to promote and support the development of education in Disaster Medicine.

In 1993, The Scientific Committee presented a Curriculum in Education and Training in Disaster Medicine[8]. Several countries have currently stood out in the teaching of Disaster Medicine and Disaster Management, such as the USA[9], Japan[10], China[11], and Italy[12], although much still needs to be done to qualify professionals in this area. On the other hand, the Brazilian panorama of Disaster Medicine and Disaster Management education is outdated, with important gaps, including the training of health professionals[4]. This situation is even more unjustifiable given the range of disasters that usually occur in Brazilian territories, such as floods, mass slides, storms, fires, and violent attacks[13].

Therefore, it is understood that the importance of consolidating a robust scientific literature within this area, especially in Brazil, lies in filling such educational gaps and announcing the relevance of the theme, and repercussions desired by this research in Medical Education.

Thus, this study aims to verify the perception of students from universities in the extreme south of Santa Catarina about the need to implement disciplines/courses (mandatory or optional) on Disaster Medicine and Disaster Management in the medical undergraduate curriculum. With this issue developed, it was hypothesized that students may report a need to implement these disciplines/courses in their educational programs, besides suggesting the best modality of teaching for this subject.

METHODS

Study design and ethical considerations

It was performed a cross-sectional study according to the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement[14]. This study was submitted to the Ethics Committee for Research with Human Beings (CEPSH, in Portuguese) on April 15, 2021, and was accepted on June 23, 2021, under registration CAAE: 4.801.314. This step aims to comply with ethical standards related to research involving human beings and maintain the confidentiality of participating subjects. Their names do not appear in the database; only one identification number was provided for each individual.

Setting and participants

The present study is part of the theme of medical education, in particular on the teaching-learning of Disaster Medicine, and Risk and Disaster Management. We recruited all the students from three universities in the Extreme South of Santa Catarina (Brazil - SC) (Figure 1): Universidade do Extremo Sul de Santa Catarina (UNESC) - campus Criciúma, Universidade Federal de Santa Catarina (UFSC) - campus Araranguá, and Universidade do Sul de Santa Catarina (UNISUL) - campus Tubarão. The students were contacted by the coordinators of their respective courses, via institutional e-mail, asking for their cooperation on a total of three occasions. One hundred and five of them agreed to participate in the survey. No student refused to participate after reading the Informed Consent Form (ICF). The candidate recruitment period began on July 2, 2021, and ended on December 2, 2021, when a questionnaire was available to the research subjects. After approval by CEPSH, only subjects who met the study inclusion criteria were invited to participate in the research. The inclusion criteria were students over 18 years old who agreed to participate in the study through the ICF. In addition, only students enrolled in undergraduate courses in Medicine at the participating Universities of the Extreme South of Santa Catarina were included. The exclusion criteria, on the other hand, include individuals who are students not enrolled in undergraduate courses in Medicine at the Universities of the Extreme South of Santa Catarina, and subjects who refused to sign the ICF.

Data collection

From the questionnaire prepared for the research, a pilot form was applied to students from other universities (other than those covered by the research) and laypeople, in order to confirm the consistency and intelligibility of the questions. This previous step was performed to restrict the bias caused by misunderstanding. In addition, professionals and authorities in the field of Disaster Medicine and Disaster Management also reviewed it. In turn, research participants received a revised questionnaire, consisting of four stages, through the institutional e-mail previously used for contact.

In Step 1, the demographic characteristics of the participants were collected in six questions, which included data on age, gender, university, and semester in which they were enrolled. For this step, closed multiple-choice and open questions were used.

Step 2 aimed to measure the level of knowledge of medical students about Disaster Medicine and Disaster Management in nine questions, in order to identify gaps in knowledge and training, in addition to probing possible topics for eventual training. The topics covered were familiarity with: the concept of Disaster Medicine; terms used in disaster relief; classification of disasters; agents involved in disaster relief and their attributions; forms of communication between agents and between agents and the population; screening protocols; epidemiology and prevention of major injuries; contingency plans

and how to access information about the thematic. The answers were collected using a five-point Likert scale (1 = strongly disagree, 5= strongly agree), widely used in psychology and psycholinguistics, as it gives greater credibility to the measurement process[15]. The participants chose, among the alternatives, the one that best suited their meaning.

In Step 3, the need to implement a Disaster Medicine and Disaster Management course/discipline was verified in three questions. The topics addressed the importance of implementing courses and disciplines focused on Disaster Medicine and Disaster Management; the training gap in the area of Santa Catarina; and the impact of Disaster Medicine and Disaster Management training on the COVID-19 pandemic. The Likert scale was also used to elaborate on these questions.

Finally, in Step 4, the student's preferences regarding teaching and training methods were evaluated in five questions. The interest in participating in a course or discipline on the topic; the preferred modality for the execution of this course/discipline (classroom, online, or hybrid); for which audiences this course/subject should be offered; and which themes should be addressed by the course/discipline. For that, multiple-choice questions were created.

After the recruitment period and the data collection performed in the Google Forms software (Google LLC®, California, USA), all data were extracted into a Microsoft Excel 2019 software spreadsheet (Microsoft Corporation®, Redmond, USA), and confirmed by all of the authors.

Statistical analysis

The data obtained were grouped, recorded in Microsoft Excel 2019 software spreadsheets, and organized by categorical and quantitative variables. Subsequently, it was analyzed using descriptive statistics, through SPSS® Statistics v.27.0 for Windows (IBM®, Chicago, USA) software. Confounding factors were not identified by the research group, given the study design and the use of descriptive analysis.

RESULTS

Participants and demographic characteristics

In this study, 105 eligible students agreed to participate. All of them had their responses computed and analyzed. The reasons why some potential participants did not partake in the survey may include not viewing the email, and lack of interest or time to respond. Non-agreement with the ICF constitutes a reason for non-participation, but no one disagreed with the term. There was no missing data since all of the participants answered all 23 questions.

The socio-demographic characteristics of the participants (age, gender, undergraduate period, university, pre-training in the area, involvement with the area) are shown in Table 1. Most of the

participants were women (n = 68; 64.8%) between 20 and 24 years old (n = 64; 61%), who were enrolled up to their fourth year of undergraduate medical school (n = 97; 92.4%) at the time of response collection. Most of the subjects (n = 91; 86.7%) had no training in Disaster Medicine or Disaster Management, and only 6.7% (n = 7) of the respondents had previous involvement in the field.

General acknowledgment about Disaster Medicine and Disaster Management

Regarding the general knowledge of topics and concepts of Disaster Medicine and Disaster Management, it was found that the average of the answers to the questionnaire were between the options "I partially disagree" and "I neither agree nor disagree" for questions 7, 8, 9, 10, 13 and 15, as shown in Table 2. Moreover, it was noted that the average of the responses was between the options "I strongly disagree" and "I partially disagree" for questions 11 and 12. The only exception was question 14, which asked about the personal awareness of the research participants on the importance of contingency plans for the management of health facilities (e.g. hospital, emergency care, primary health unit), for which the average of the answers was between the options "I neither agree nor disagree" and "I partially agree".

Implementation needs of Disaster Medicine and Disaster Management course/discipline

Regarding a Disaster Medicine and Disaster Management course/discipline in the medical curriculum (Table 3), the majority of the participants reported that they either strongly agree (n = 79; 75.2%) or partially agree (n = 14; 13.3%) with the need for its implementation, with a mean of answers between these two options (4.60 ± 0.79). In addition, concerning training in Disaster Medicine and Disaster Management, a substantial number of the participants strongly (n = 61; 58.1%) or partially agreed (n = 20; 19%) with the lack of qualified professionals in this area, with the average response between these two options (4.29 ± 1.00). Finally, most of the survey subjects either strongly (n = 80; 76.2%) or partially agreed (n = 18; 17.1%) with the fact that training of health professionals in this area could reflect positively on the pandemic of COVID-19, with the average response between these two options (4.67 ± 0.70).

Student preferences about teaching and training modality

As shown in Table 4, the participants of the survey showed great interest in a course/discipline in the area of Disaster Medicine and Disaster Management, since only three respondents (n = 3; 2.9%) had no such interest. In regards to the best modality for this course/discipline in a non-pandemic context, the participants would prefer it to be given in-person (n = 78; 74.3%) or hybrid (n = 25; 23.8%). Whereas in a pandemic context of COVID-19, 58.1% (n = 61) of the participants would prefer the hybrid modality, while 29.5% (n = 31) of them would prefer the in-person modality.

In addition, two other questions aimed at refining students' preferences on the implementation of courses/disciplines in Disaster Medicine and Disaster Management. First, the preferred target audience for a course in the area indicated by the study participants were undergraduates in Medicine (n = 101; 96.2%) and other health areas (n = 90; 85.7%), and graduate physicians (n = 81; 77.1%). Regarding the topics that should be covered in this course, the subjects of the study mainly pointed out: triage protocols (n = 102; 97.1%); initial trauma care (n = 99; 94.3%), and basic life support (n = 96; 91.4%).

DISCUSSION

This study aimed to verify the perception of students from universities in the extreme south of Santa Catarina about the need to implement disciplines/courses (mandatory or optional) on Disaster Medicine and Disaster Management in the medical undergraduate curriculum. Taking this into account, it was noted that the subjects of this study reported a lack of familiarity with the terms, concepts, and theories of Disaster Medicine and Disaster Management.

This aforementioned outcome corroborates with findings already presented in the literature[16,17]. Barrimah et al. (2016) explored the familiarity of medical students regarding disaster medicine in Saudi Arabia, and they found that students have low knowledge of this area, rated by 24 questions on a 5-point Likert scale[16]. Also, Ragazzoni et al. (2013) showed that, among the Italian medical students, a substantial part (38.7%) had never heard about disaster medicine and most of the students (90.9%) had never attended elective courses in this field[17].

Furthermore, it is important to note that, in this research, most of the study subjects are attending the first four years of medical school, which may imply a greater possibility of not having had contact with the theme in undergraduate, although the literature in this area already showed that an increase in the participation of students in the final stages of the course does not necessarily reflect a greater familiarity with the subject[16,17].

Despite this lack of familiarity, the medical students have recognized the need for the implementation of a discipline/course in the subject mentioned above, since most of the respondents believe that there is a lack of qualified professionals in this area, especially in the pandemic context of COVID-19, in which the training of health professionals could reflect positively. In fact, the international literature already discusses the lack of health professionals' preparedness to act in disasters[18–21], demonstrating that this is not a reality only in Brazil[4]. In addition, respondents also reported being aware of the need for the practical application of knowledge in the area of Medicine and Disaster Management, through the creation of contingency plans for disasters, suggesting an interest in the subject beyond academic curiosity.

Another important point to be raised is the incongruity between the Brazilian Medical Ethical Code's resolutions and the curriculum of medical schools: according to the Code, the medical professional must respond to an emergency when faced with it[22]. Thus, the shortage of workshops and/or subjects of Disaster Medicine and Disaster Management in the medical undergraduate curriculum also expresses the lack of preparedness for what is legally required for the physician: assistance in emergencies and disasters.

Several studies emphasize how natural disasters affect human health unequally and in different ways depending on the characteristics of the disaster and the socio-environmental vulnerability of the territory[23]. Disasters are capable of exposing the latent conditions of socio-environmental vulnerability that are associated with social, economic, and environmental inequalities, especially affecting lower-income populations and countries[13,24].

In 20 years, 31,909 disasters have been registered in Brazil, affecting the lives of more than 96 million people and displacing more than 6 million from their homes[13,24]. The short-term impacts of these disasters led to almost 3,500 deaths and almost 490,000 people becoming ill or injured[13]. Over these 20 years, the South Region of Brazil, especially the state of Santa Catarina, has concentrated about 80% of these disasters, with 839 cities affected[13]. Among these events, the vast majority represent hydrological events followed by meteorological ones[13].

In the face of the recent COVID-19 pandemic, a systematic review on the impact of the pandemic and disaster medicine-themed training programs aimed at medical students pointed out that implementing disaster training programs for medical students improves preparedness, knowledge, and skills, which are important to the response phase of a disaster[25]. In addition, a recent project of the University of Alabama at Birmingham (USA) on a novel virtual course in disaster medicine and pandemic response resulted in a subjective improvement in third-year medical students' understanding of the content[26]. Similarly, at the University of Tübingen (Germany), a course in disaster medicine and humanitarian assistance produced a significant increase in students' understanding of disaster medicine and interest in this field[27].

Therefore, given the low familiarity of medical students with Disaster Medicine and Disaster Management and the significant impact that such events have on the health and quality of life of the local population, there is a need to implement disciplines/courses that address this topic in the Brazilian undergraduate medical curriculum.

The authors are aware that this study has some limitations, most of which are inherent to survey-based research. Also, our study is limited by the sample size and the regional restriction to the extreme south of a Brazilian state (Santa Catarina). However, our findings are encouraging, with the potential to

endorse the discussion at a national and international level, highlighting the importance of developing Disaster Medicine and Disaster Management courses or subjects in medical courses.

CONCLUSION

The discrepancy between the medical students' unfamiliarity with Disaster Management and Disaster Medicine and their desire to learn more about the field demonstrates the potential of this topic which is still unexplored around the globe, especially in the medical schools. This research showed that there is a need to implement disciplines/courses that address this topic in the undergraduate medical curriculum. Thus, it is expected that future professionals will be qualified to deal with disasters in the Brazilian public health system, as well as to contribute to similar experiences in other nations around the world.

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TABLES

Table 1. Participants and demographic characteristics.

Variable	Characteristic	Frequency of responses
Age	< 20 years old	7 (6.7%)
	20-24 years old	64 (61%)
	25-29 years old	20 (19%)
	30-34 years old	7 (6.7%)
	> 34 years old	7 (6.7%)
Gender	Men	37 (35.2%)
	Women	68 (64.8%)
Undergraduate period	1-4 semester/1-2 year	46 (43.8%)
	5-8 semester/3-4 year	51 (48.6%)
	9-12 semester/5-6 year	8 (7.6%)
University	UFSC - Campus Araranguá	47 (44.8%)
	UNESC - Campus Criciúma	28 (26.7%)
	UNISUL - Campus Tubarão	30 (28.6%)
Pre-training in the area	Yes	14 (13.3%)
	No	91 (86.7%)
Involvement with the area	Yes	7 (6.7%)
	No	98 (93.3%)

Descriptive analysis: number (%).

Table 2. Level of knowledge of medical students about Disaster Medicine and Disaster Management.

Questions	N	Min.	Max.	Mean	± SD
Q7	105	1.00	5.00	2.70	1.30
Q8	105	1.00	5.00	2.17	1.31
Q9	105	1.00	5.00	2.50	1.30
Q10	105	1.00	5.00	2.00	1.30
Q11	105	1.00	5.00	1.93	1.27
Q12	105	1.00	5.00	1.92	1.26
Q13	105	1.00	5.00	2.15	1.23
Q14	105	1.00	5.00	3.75	1.49
Q15	105	1.00	5.00	2.38	1.21

Q7 = I am familiar with the concept of Disaster Medicine. How much do you agree with this statement?; Q8 = I am familiar with the terminology used in the phases of disaster response (pre-disaster, response, and post-disaster). How much do you agree with this statement?; Q9 = I am aware of the classification of disasters according to their typology (natural and/or technological disasters). How much do you agree with this statement?; Q10 = I am familiar with the stakeholders involved in the disaster management chain and their roles. How much do you agree with this statement?; Q11 = I am familiar with the modalities of communication among the stakeholders involved in the disaster management chain and between them and the population. How much do you agree with this statement?; Q12 = I am familiar with triage protocols used in the field of Disaster Medicine. How much do you agree with this statement?; Q13 = I understand the epidemiology and prevention of major injuries caused by disasters of many types. How much do you agree with this statement?; Q14 = I recognize the importance of contingency plans for disaster management at various levels of management. How much do you agree with this statement?; Q15 = I am familiar with tools to reach information about Disaster Medicine (websites, protocols, courses, etc.). How much do you agree with this statement?.
Min. = Minimum; Max. = Maximum; SD = Standard deviation. Descriptive analysis: mean ± SD.

Table 3. Need to implement a Disaster Medicine and Disaster Management course/discipline.

Questions	N	Min.	Max.	Mean	± SD
Q16	105	2.00	5.00	4.60	0.79
Q17	105	1.00	5.00	4.29	1.00
Q18	105	1.00	5.00	4.67	0.70

Q16 = I judge it is necessary to implement optional courses and/or disciplines focused on the area of Disaster Medicine and Disaster Management. How much do you agree with this statement?; Q17 = I judge that there is a lack of training in Disaster Medicine and Disaster Management in the state of Santa Catarina. How much do you agree with this statement?; Q18 = I consider that training health professionals in Disaster Medicine and Disaster Management would reflect positively on the situation of the COVID-19 pandemic in Santa Catarina. How much do you agree with this statement?.
Min. = Minimum; Max. = Maximum; SD = Standard deviation. Descriptive analysis: mean ± SD.

Table 4. Preferences regarding teaching and training modalities.

Questions	Characteristic	Frequency of responses
Q19	Yes	83 (79%)
	No	3 (2.9%)
	Maybe	19 (18.1%)
Q20	In-person	31 (29.5%)
	Not in-person	13 (12.4%)
	Hybrid	61 (58.1%)
Q21	In-person	78 (74.3%)
	Not in-person	2 (1.9%)
	Hybrid	25 (23.8%)

Q19 = Would you be interested in a course/discipline in the area of Disaster Medicine and Disaster Management?; Q20 = If there were a course addressing this topic, what do you believe would be the best teaching modality to use? (consider a pandemic context of COVID-19); Q21 = If there were a course addressing this topic, what do you believe would be the best teaching modality to use? (consider a context WITHOUT the pandemic of COVID-19).
Descriptive analysis: number (%).

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FIGURE

Figure 1. Extreme South of Santa Catarina, Brazil.

Map of the extreme south region of Santa Catarina, Brazil