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A sneak peek into the curriculum on disaster management medicine in India for health professionals: A mixed-methods approach

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Abstract:

INTRODUCTION: India being a disaster-prone country necessitates us to be able to act proactively for any sort of preparedness and prevention. This necessitates a curriculum which can bring all the aspects related to disaster under one umbrella and thus impart training.

AIM: The aim of the study was to assess the responses of students about the importance of disaster management (DM) in their MBBS course, take up suggestions about the important inclusions to be made in their curriculum, and get an insight of the higher education and research of DM domain in the Indian context.

METHODOLOGY: A cross-sectional study with a batch of 100 MBBS students purposively sampled were part of the questionnaire. Besides, a thorough Internet search for institutes providing training on DM was done, and relevant details were noted down. Later on, the students were given guest lectures and demonstrations by certified trainers and experts along with a know-how of where to go for getting a hands-on training and whom to respond to.

RESULTS: Seventy-two percent of the students felt the portion of DM being taught to them to be insufficient, and 95% never got any training or demonstration for DM although 22% felt that it is not so important for them as a doctor. Only 23% of them knew about any sort of DM courses or certifications in India, and almost 16% of the students were confident enough to tackle any incidence of public health emergency.

CONCLUSION: Making an earlier start will impart seriousness and accountability in the mindset of budding physicians.

Keywords:

Disaster management curriculum, disaster medicine, public health emergency

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Introduction

India is one of the most disaster-prone countries of the world. The factors accelerating the intensity and frequency of disasters are responsible for heavy toll of human lives and disruption of the life support system in the country. The natural geological setting of the country, tectonic features, river systems, and extreme weather conditions along with some of the human-induced factors such as deforestation, faulty agricultural practice, unplanned urbanization, and migration are responsible for accelerated impact and increase in frequency of disasters. Thus, occurrences of human-induced disasters, which depend on all such man-made conditions, can be decreased to a huge extent if these uninterrupted activities of human beings are checked. On the other hand, we can decrease the impact caused by natural disasters by controlling the loss and destruction caused to human race.[1,2]

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Many parts of the Indian subcontinent are susceptible to different types of disasters owing to the unique topographic and climatic characteristics. About 54% of the subcontinent's landmass is vulnerable to earthquakes, whereas about 12% is vulnerable to floods, 28% is vulnerable to droughts, and 8% of the land is vulnerable to cyclones. India is mostly prone to floods causing a number of deaths and property loss which affect the overall development of the country.[1,2]

The increased incidences of disasters in the recent decades as well as increase in the awareness of disasters and related phenomena have generated the need to produce systematic knowledge on all aspects of disasters. Since the past two decades, the need and importance of scientifically validated knowledge on disasters has been felt. It is also a fact that universities, as a citadel of knowledge, are the right places where such scientific knowledge can be cumulatively and fruitfully generated.[2,3]

Adapting to climate change is an added challenge in the realms of disaster risk reduction due to uncertainty of future climate, difficulties in downscaling global changes to local impacts, and assessing future development–environment–disaster interactions.[4]

Disaster mitigation strategies include higher education and research in the field of disasters, which in turn lead to better understanding of the causes and effects of disasters and also of the ways of effective mitigation of disasters. Universities and research institutions have a vital role to play in this regard. Adequate higher education and research policies coupled with allocation of sufficient resources result in long-term effective mitigation practices at regional level. Higher education system at the national level has the most vital role to play.[4,5]

Disasters and disaster management (DM) in India are not new. The country has "Himalaya" in the North, having very high seismicity. The Northeast region of the country, Uttarakhand, part of Jammu and Kashmir, and Gujarat are in seismic zone 5. We have a very long coastal region which is prone to cyclones. Floods and droughts are occurring in almost every state and causing enormous economic loss. The International Decade for Natural Disaster Reduction, UN initiative, sensitized all developed as well as developing countries for shifting their strategy from relief toward mitigation and preparedness. Ministry of Agriculture (Government of India) set up the "National Centre for Disaster Management" (NCDM) at the Indian Institute of Public Administration in 1995. The mandate of NCDM was "Capacity Building of concerned officers in disaster management." This was the beginning of paradigm shift in India from relief toward preparedness. Every state was requested to start a DM cell and start research and training in this area.[6,7]

The National Disaster Management Authority (NDMA) has been established at the center and the State Disaster Management Authority at the state level. In addition to this, the National Crisis Management Committee also functions at the center. The nodal ministries, as identified for different disaster types, also function under the overall guidance of the Ministry of Home Affairs which is the nodal ministry for DM. This makes the stakeholders interact at different levels within the DM framework.[8,9]

This article attempts to assess the awareness of medical undergraduates about the DM curriculum imparted in India, note the responses of students about the importance of DM in their MBBS course, take up suggestions about the important inclusions to be made in their curriculum, get an insight of the higher education and research of DM domain in the Indian context, and provide them the know-how of mitigation strategies beyond basics.

As the saying goes, "The eyes don't see what the mind doesn't know." In order to be able to act proactively for any sort of preparedness, mitigation, risk reduction, or prevention, we need to have a thorough vision of what, how, and where we stand. This necessitates a curriculum which can bring all the aspects related to disaster under one umbrella and thus impart training.

Methodology

To obtain the best available insights into the imparting of DM teaching in India, we adopted an iterative process. A detailed Internet search was carried out in December 2018 to identify the courses using the Google search engine with "disaster management, mitigation, disaster preparedness, risk reduction strategies, prevention of hazards, epidemic preparedness, and havocs" as the keywords. The websites of the Association of Indian Universities, Indian Council of Medical Research, University Grants Commission, Medical Council of India, Indian Nursing Council, and Ministry of Health and Family Welfare were searched.[10-14] We then collected the list of renowned institutes offering DM education, retrieved the data about the course contents from the website or through telephonic conversation, and broadly enlisted the main domains being dealt with syllabi of community medicine in undergraduate medical, dental, nursing, and allied health sciences which were analyzed to map the specific content. Further, masters/diploma in disaster and management programs were examined to identify DM teaching, if any. The curriculum of environmental technology and ecology was also examined.

We analyzed the course for: (1) whether DM is a part of the teaching curriculum, (2) the mode of teaching, (3) the broad contents, (4) the instructional formats or methods being used to teach, (5) assessment, if any, and (6) the students' selection process. The specification on where, how, and what is taught was summarized and compiled into a matrix. Salient characteristics of relevance to the programs were also noted down.

A group of 100 MBBS students toward the end of their fifth semester studying in Hamdard Institute of Medical Sciences and Research located in South Delhi were chosen by a purposive sampling technique, and a cross-sectional study was performed on them in February 2019. They were given a predesigned semi-structured questionnaire which had the sociodemographic details, knowledge about the various courses available for DM, interest about getting a certified knowledge on the DM courses, and suggestions as to what would they most love to include in their course.

Data collection and representation were done in Excel and were further analyzed. Privacy was ensured while conducting interviews. Confidentiality and anonymity were maintained during the procedure. Informed consent was obtained from the participants. The participation was purely voluntary with necessary ethical approval and no conflict of interest.

After the data collection and analysis, an intervention strategy was adopted to provide them knowledge about the list of institutes with details of certifications and duration. For this, we included session on lectures and demonstrations to them by faculties of departments. These faculties were pretrained by a certified trainer.

The lecture which was previously limited to 1 h to be covered in their sixth semester was increased to 3 h by moderation of the head of the department, with 1 h of theory, 1 h of demonstration, and 1 h of guest lecture.

Demonstration classes consisted of teaching them about mapping, geographic information system, giving them exercises related to epidemic emergencies, and simulation exercises in community.

A workshop on teaching the basic life support during emergency situation was conducted by trainers and experts in the medical college for the students to give them a firsthand knowledge about emergency dealings.

Guest lectures by experts gave them a detailed account of the jobs being done at national level as well as provide them hands-on training on certain aspects. They stressed upon few important domains and opened their channels of communication to accept any further queries of students.

We thus prepared a booklet with few details so that we could distribute them to the students which consisted of the following things:

- A matrix with details of institutes imparting courses or certifications and hands-on training. Contacts numbers and mail id of all these institutes were also enlisted [a picture form of Table 1]
- A column on the role of public health experts and doctors during emergencies
- Picturesque depictions of do's and don'ts during such panicky situations
- An example of a DM plan
- Few success stories from Odisha and Andhra Pradesh.[15,16]

Results

A detailed Internet search was carried out to identify the courses using the Google search engine which was then listed as regards to the contents, main domains being dealt with and compared. Detailed information about the courses was collected from the institutions' designated websites as well as through mail and telephonic contacts. The specification on where, how, and what is taught was summarized and compiled into a matrix. Salient characteristics of relevance to the programs were also noted down.

A group of 100 students from MBBS courses in Jamia Hamdard University were surveyed regarding their perception about inclusion of DM course in the curriculum. The response rate was cent percent, and the results are as follows: nearly 20% of the students were above 22 years and 42% were female. There were 60% Muslims, and 38% of them were from Delhi National Capital Region itself [Table 2].

The response of students to the importance of DM in curriculum found that nearly 72% of the total number of students felt the portion of DM in the present curriculum being taught to them to be insufficient. Nearly 95% never got any training or demonstration for DM although 22% felt that DM is not so important or somewhat for them as a doctor. Only 23% of them knew about any sort of DM courses or certifications in India, and almost 16% of the students were confident enough to tackle any incidence of public health emergency.

Most of the students (37%) said that it was the hands-on training and demonstrations which they wanted to be included in their curriculum and this was followed by 25% students who wanted to know more about mitigation strategies as part of their curriculum. Eighteen

Table 1: Institute correlates about courses on disaster management

University	Location	Certificate	Mode	Domain	Fee structure	Intake of students Intake	Eligibility	Duration	Intake of students
Arunachal University of Studies	Lohit, AP	Diploma in DM	Faculty skill development and vocational training	Theory of disasters type and proneness, risk reduction and management	16 K		12th or equivalent	1 year	info@arunachaluniversity.ac.in
Indian Institute of Technology	Roorkee	M Tech in DM	Direct	Theory and practical related to mapping, geospatial relations and their uses, risk assessment	1.7 L	2	B Tech	2 years	www.iitr.ac.in
Rajiv Gandhi University	AP	Certificate course in DM	Direct and online	Disasters, management, finance, legal, preparedness, risk reduction		21	Any graduate	1 year	www.rgu.ac.in
Pondicherry University	Pondicherry	MSc Ph.D. in coastal DM	Department with GIS laboratory, training, practical, and fieldwork	Basic knowledge of disasters, geodynamics, GIS, ERDAS, GPS, EIA, climate change, hazard mapping	67,170	7	Master degree with min of 55%	3 years	Pondiuni.edu.in
Amity Institute of DM	Noida, UP	Certificate course	Train a pool of professionals	Introduction, risk assessment, warning systems, management, rehabilitation, field visits		Depends on head	Professionals from various fields	12/24 dfs	www.amity.edu/aidm
Institute of Land and Disaster Management, Kerala	Kerala	Internship, certificate	Training of DM and relief, fieldwork	Introduction, field trips, research, warning systems					Ilmsecretary[a] yahoo.com
Techno Global University	Meghalaya	Management degree	Regular	Fire safety m/n, hazard m/n, climate change, industrial m/n	15,000/ semester	-	B Tech - 50% marks	2 years	www.technoglobaluniversity.o
IGNOU	New Delhi	PG Diploma, certificate course	Distance learning	Preparedness, rehabilitation, risk assessment, vulnerability assessment, rescue	5000	40	Graduate in any discipline	1-4 years	www.ignou.ac.in
APACC	Kerala	Management degree	Regular	Risk m/n, finance, hazard assessment, logics			Bachelor's degree	1 year	ac@assumptioncollege.ac.in
NEHU	Shillong, Meghalaya	Master's	Regular degree, teaching, research, training	Environment education, global climate change, hazards, EIA, conservation, geophysical studies	About 25,000/-	6	Bachelor in any discipline	3 years	deanshes@nehu.ac.in
TISS	Maharashtra	MA/MSc	Research, training, and teaching	Disaster practice, management, mitigation, preparedness, globalization, rescue, and response	1.2 lakh	40	Bachelors degree of 3 years	3 years	pgadmission@tiss.edu
National Fire service college	Nagpur	BE - Fire and safety	Training, field practice, capacity building	Introduction, management in case of disaster, rescue operation, preparedness	15,000-2,0000/-	-	Entrance exam	50 weeks	nfscnagpur-mha@nic.in
NIDM	New Delhi	Certificate	Online, training, research, workshops	Disaster awareness, mitigation, preparedness, rehabilitation, rescue, emergency operation	Varies	Depends	Sponsored	2-3 years	http: nidmsspssp.in
NCDC	Nagpur	Certificate course	Training for different types of disaster	DM, basic life support, firefighting, rescue, emergency response	-	Not fixed	Nominations by government	1 month	mail@ncdc.in
YCADA	Maharashtra	Certificate	Training, capacity building	Emergency operations, awareness films, preparedness, mitigation, management plan	No fee	-	Officers from various departments	Within 4 weeks	contact@yashada.org

Contd...

Table 1: Contd...

University	Location	Certificate	Mode	Domain	Fee structure	Intake of students Intake	Eligibility	Duration	Intake of students
IIEE	New Delhi	Master's	Degree	Ecology, environment, DM, rehabilitation, prevention	26,000	40	Graduation in discipline	2 years	
Annamalai University	Tamil Nadu	MA	Distance education	Environment, disaster, and its management	47,000	-	With master's	2 years	Annamalaiuniversity.ac.in
Punjab University	Punjab	MA	Master's	GIS, finance, research, legal aspects, mitigation, rehabilitation	-		With graduation	2 years	Puchd.ac.in
		Certificate course	Training, capacity building	Disasters, management, and approaches	-	Depends	Any professional	4 semester	

DM=Disaster management, AP=Arunachal Pradesh, MSc=Master of science, MA=Master of arts, PhD=Doctorate in philosophy, GIS=Geographic information system, GPS=Global positioning system, EIA=Environment impact assessment, UP=Uttar Pradesh, HOD=Head of department, IGNOU=Indira Gandhi National Open University, APACC=Archbishop Powathil Assumption Community College, NEHU=North Eastern Hill University, TISS=Tata Institute of Social Science, BE=Bachelor of engineering, NIDM=National Institute of Disaster Management, NCDC=National Civil Defence College, YCADA=Yashwantrao Chavan Academy of Development Administration, IIEE=Indian Institute of Ecology and Environment

percent were interested mostly in triage and 10% in the health impacts of common disasters. Just 4% wanted to learn more about policies and programming.

Table 1 shows that Amity University of Disaster Management, Rajiv Gandhi University, National Institute of Disaster Management, Indira Gandhi National Open University (IGNOU), National Civil Defence College (NCDC), Yashwantrao Chavan Academy of Development Administration (YASHADA), Annamalai University, and Punjab University provide certified courses with or without a distance learning mode for DM teaching in India. On the other hand, TGU and North-Eastern Hill University, Meghalaya; Archbishop Powathil Assumption Community College, Kerala; Punjab University; and IEEE in New Delhi provide master's degree for DM learning, whereas Indian Institute of Technology Roorkee provides an M Tech in DM. The duration of certified courses spans over 1 or 2 months, whereas the master's and degree course span over 1–2 years. The distance learning mode of learning as provided by IGNOU, Annamalai University, and Punjab University takes 1–4 years. Fee structure ranges from as low as 10,000 to as high as 2 lakhs depending on the type of courses offered. The main domain of teaching includes risk assessment, preparedness, recovery, and related project work. NCDC in addition on to the above also includes industrial and civil defense management and medical operations. National Fire Service College, Nagpur, imparts an on-field training to the BE students enrolled through an entrance examination and caters to fire and safety.

Discussion

India is often exposed to disasters which include droughts, floods, severe cyclones, tsunamis, volcanic eruptions, hurricanes, landslides, avalanche, snowstorms, and earthquakes. Greater vulnerability to natural disasters is mostly due to the tropical climate and unstable landforms, coupled with high population density, poverty, illiteracy, and lack of adequate infrastructure.[17-20]

Indian Institute of Ecology and Environment offers a master's program with ecology, environment, DM, rehabilitation, and prevention as the main domains, whereas institutes such as NCDC, IGNOU, and YASHADA mostly cater to certificate courses with training and capacity building.[21-23]

For improving DM strategies, there is a need to have knowledge of cause-effect relationships for many climatic disasters. Based on this information, plans for prevention and preparedness can be drawn for minimizing damage to life, property, and environment. The best way to effectively manage natural disasters

is to provide the basic knowledge about the facts and figures related to many types of natural/anthropogenic disasters at the level of higher education by suitably adding/amending the curriculum.[24,25]

The recurring disasters continue to erode all the progress made over a period of time. This necessitates a paradigm shift from a culture of response to a culture of preparedness. The United Nations tried to alert us by remarking that the focus of attention should be shifted from rescue and relief to prevention, mitigation, and preparedness. In fact, warning systems and preparedness measures reduce and modify the scale of disasters. A little investment in disaster preparedness can save many valuable lives and vital economic assets, thereby reducing the cost of overall revenue relief.[26]

The response of students to the importance of DM in curriculum found that nearly 72% of the total number of students felt the portion of DM in the present curriculum being taught to them to be insufficient. Nearly 95% never got any training or demonstration for DM although 22% felt that DM is not so important for them as a doctor. Only 16% of them knew about any sort of DM courses or certifications in India, and almost 76% of students were interested to take up any certified courses or training in DM as depicted in Table 3.

Table 2: Demographic profile of respondents

Variables	Character	Frequency (*n*=100)
Age	<22	81
	>22	19
Sex	Male	58
	Female	42
Religion	Hindu	28
	Muslim	60
	Others	12
Origin	Delhi	38
	Outside Delhi	54
	NRI	8

DM=Disaster management, NRI=Non resident Indians

In an evaluation study on the efficacy of DM curriculum designed for Saudi Arabia medical students by Bajow *et al*., it was found that the mean score of a test before and after the test was 41% and 68%, respectively.[27] Medical graduates have taken up the community-based curriculum on DM in most of the Western and Middle Eastern countries. Its high time, we put up a proposal for such a course too.[25,28,29]

As depicted in Table 1, it was found that the location and distribution of most of the institutes providing courses on DM in the country are usually sparse and nonuniform. Even if students in health sector would like to go in for short courses in DM during vacations, they will have to leave station and mess up with their already hectic schedule. Moreover, the central and good institutes mostly provide training in the form of sponsorship or nominations or entrance examination, whereas certificate courses have less hands-on training.

Table 1 depicts the correlates of the various institutes and details. It clearly shows that all institutes cannot train public health specialists and would-be doctors cannot enroll in all institutes. This is a dim situation since disasters never differentiate and rule it out. For instance, if a doctor is expected to manage a hell lot of patients who are disaster struck after a fire hazard or a chemical hazard, etc., they should also be made a part of the institutes which impart training on fire and safety. However, this is practically so not possible. Students cannot keep doing a training hop of each domain with each hazard. However, the retro or role reversal, i.e., bringing all forms of hazardous situation and their practical management tips for public health specialist or future doctors and making them part of their own

Table 3: Responses of students about the importance of disaster management in curriculum

Question number	Questions	Options	Frequency (*n*=100), *n* (%)
1	Do you think the portion of DM taught to you in your MBBS is sufficient?	Yes	28
		No	72
2	Are you ever given any practical or hands-on training for DM?	Yes	5
		No	95
3	Do you think DM will be important for you as a doctor	Yes	78
		No	14
		Can't say	8
4	Are you interested to be certified in any DM courses?	Yes	76
		No	24
5	Are you confident enough to deal an incidence of public health emergency	Yes	16
		No	72
		Somewhat	12
6	Do you know about any DM curriculum in India?	Yes	23
		No	77

DM=Disaster management

curriculum is feasible and a better option. Rather, a community-based DM curriculum should be made available in all medical colleges.[28,29]

The present curriculum of DM for medical students consists of theories on (1) DM cycle, (2) triage, (3) few points about the authorities and management, and (4) strategies.[30] Other than this meager theoretical knowledge, nowhere is a medico taught how to manage a disastrous situation on any scale, but is no doubt expected to take care of the A to Z of patients when hampered. Even as interns, the casuality postings train them to manage individual emergencies, but management during disasters needs more vigilance, better channelization, communication prowess in dealing with mass or groups, the intellect to decide whom not to attend to or in other words triage, being more proactive, and less humane since there is no time for sympathy during such wee hours and working with a team spirit.

The article by Francesco *et al*. suggests that even though courses in disaster medicine have been taken up at undergraduate level, a master's degree offers the advantage of advanced tailored training. This is true as far as academics are concerned, but can we afford to have just a few specialist cadres in disaster medicine to look after such huge losses of humanity during disasters. Such situations do not warrant specialist treatments rather a group approach to deal with the mass.[31-33]

Conclusion and Recommendations

Although higher education and research on DM in India has been a near success story, it is yet to get a uniform, consolidated, integrated, and practical shape. Internalizing of disaster studies and research into other domains and branches of study in India needs to be given more importance and focus. As regards to the field of medicine, making an earlier start will impart seriousness and accountability in the mindset of budding physicians.[34,35]

In wake of these challenges, the few prime recommendations as suggested by us are:

1. Increase the hours of teaching in the MBBS curriculum and include both theory and demonstrations unlike the present scenario which has a mere 1 h of lecture with theory
2. Impart hands-on training or practical demonstrations
3. Mandatory participation of each student in mock drills or simulation exercises during internship
4. Evaluation and assessment based on hours of guest lectures and integrated learning attended
5. Prepare community-based DM curriculum for medical undergraduates.
6. Learning by doing principle of teaching needs to be stressed more often
7. Rotatory duties in hospital administration and management units to instill in them the skills of systemic planning and coordination
8. Field visits to communities during the community medicine postings during internship to preach them about the presence of kits, contact numbers, and other necessities for the mitigation strategies
9. Institutional visits to central institutes during their third semester to get a firsthand knowledge regarding management and authorities
10. All graduates need to take compulsory rotatory training under the NDMA from time to time
11. Increase scope of research in this arena
12. Bring up a new subspecialization as DM medicine.

Challenges posed by the changing climate, growing natural hazards, and deteriorating ecosystem services can be a best dealt by integrating the various disciplines and drawing synergies from each other to produce informed "leaders of tomorrow" and also to reinforce existing human resource capabilities. This can be best done by offering appropriate curricula to today's graduates and by training in-service professionals. Enhancing mutual learning and knowledge sharing with other countries and forming partners would go a long way in dealing the problems together as a mass in unity.[29,35]

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There are no conflicts of interest.

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