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

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.  

How to cite this article: Panda M, Pathak R, Agarwalla R, Rasheed N. A sneak peek into the curriculum on disaster management medicine in India for health professionals: A mixed-methods approach. J Edu Health Promot 2020;9:13.
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 havoc” 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
| University                                      | Location                  | Certificate            | Mode                        | Domain                                                                 | Fee structure | Intake of students | Eligibility           | Duration | Intake of students |
|------------------------------------------------|---------------------------|------------------------|-----------------------------|------------------------------------------------------------------------|---------------|---------------------|------------------------|----------|---------------------|
| Arunachal University of Studies                 | Lohit, AP                 | Diploma in DM          | Faculty skill development   | Theory of disasters type and proneness, risk reduction and management  | 16 K          | 12th or equivalent  | 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  |                       |
| Rajiv Gandhi University                          | AP                        | Certificate course in DM| Direct and online           | Disasters, management, finance, legal, preparedness, risk reduction    | 21            | Any graduate        | 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% www.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 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 www.ignou.ac.in |
| APACC                                           | Kerala                    | Management degree      | Regular                     | Risk m/n, finance, hazard assessment, logics                          | 25,000/-       |                     | Bachelor's degree ac@assumptioncollege.ac.in |
| NEHU                                            | Shillong, Meghalaya        | Master's degree        | Regular degree, teaching, research, training and teaching | Environment education, global climate change, hazards, EIA, conservation, geophysical studies | About 6       | 3                   | Bachelor in any discipline deanshes@nehu.ac.in |
| TISS                                            | Maharashtra               | MA/MSc                 | Research, training, and teaching | Disaster practice, management, mitigation, preparedness, globalisation, rescue, and response | 1.2 lakh       | 40                  | Bachelors degree of 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/-       | -                   | Entrance exam nfsnagpur-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 | 50 weeks  |                      |
| NCDC                                            | Nagpur                    | Certificate course     | Training for different types of disaster | DM, basic life support, firefighting, rescue, emergency response | -             | Not fixed           | Nominations by government mail@ncdc.in |
| YCADA                                           | Maharashtra               | Certificate            | Training, capacity building | Emergency operations, awareness films, preparedness, mitigation, management plan | No fee         | -                   | Officers from various departments contact@yashada.org |

Contd...
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 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, avalanches, 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.
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 curricula 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.

In an evaluation study on the efficacy of DM curricula 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
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. Other than this meager theoretical knowledge, nowhere is a medicos 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 casualty 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.

**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.

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. Rotary 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.

Acknowledgement: We thank the certified trainer of Disaster Management in the institute as well as the external experts for helping us carry this forward.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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