

Components of an Updated Disaster Medicine Curriculum Included in Emergency Medicine Residency and Emergency Medical Services Fellowship in the United States

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Abbreviations:

ABEM: American Board of Emergency Medicine
ABMS: American Board of Medical Specialties
ACGME: Accreditation Council of Graduate Medical Education
CBRNE: chemical, biological, radiation, nuclear, and explosives
DM: disaster medicine
EM: emergency medicine
EMS: Emergency Medical Services
GME: graduate medical education
SAEM: Society of Academic Emergency Medicine

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Abstract

Introduction: Disaster medicine (DM) is a unique field that has undergone significant development as disaster events become increasingly complicated to respond to. However, DM is not recognized by the American Board of Medical Specialties (ABMS) or Accreditation Committee of Graduate Medical Education (ACGME), and therefore lacks board certification. Furthermore, prior studies have shown that there is unique body of DM knowledge not being addressed in emergency medicine (EM) residency or Emergency Medical Services (EMS) fellowship, resulting in fundamental DM topics not being covered amongst graduate medical education (GME) programs most prepared to produce DM physicians. A recently published DM core curriculum addresses this knowledge gap and seeks to promote standardization of DM training.

Study Objective: The objective of this study is to analyze EM residency and EMS fellowship curricula for the inclusion of DM major curriculum topics and subtopics, using the most recently published DM core curriculum as a control.

Methods: Both EM residency and EMS fellowship curricula were analyzed for inclusion of DM curriculum topics and subtopics, using the DM curriculum recommendations published by Wexler, et al as a control. A major curriculum topic was deemed covered if at least one related subtopic was described in the curricula. The included and excluded DM topics and subtopics were analyzed using descriptive statistics.

Results: While all the DM major curriculum topics were covered by either EM residency or EMS fellowship, EMS fellowship covered more major curriculum topics (14/15; 93%) than EM residency (12/15; 80%) and EMS fellowship covered more DM curriculum subtopics (58/153; 38%) than EM residency (24/153; 16%). Combined, EM residency and EMS fellowship covered 65 out of 153 (42%) of the DM curriculum subtopics.

Conclusion: Although this study finds that all the DM major curriculum topics will be covered in EM residency followed by EMS fellowship, over one-half of the subtopics are not covered by either program (16% and 38%, respectively) or both programs combined (42%). Increasingly relevant subtopics, such as climate change, droughts, and flooding, are amongst those not covered by either curriculum. Even amongst the DM topics included in GME curricula, an emphasis on themes such as mass treatment, preparedness, and mitigation is likely under-represented. Accreditation from ACGME for DM fellowship would further promote uniform implementation of the updated core curriculum and ensure optimal training of disaster-ready physicians.

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Introduction

Disaster medicine (DM) represents a unique field of emergency medicine (EM) that has recently experienced significant professional development. Over the last several decades, war-related humanitarian crises, climate change disasters, and emerging infectious diseases, among other events, have required increasingly complex responses. An effective strategy must incorporate national and international assistance networks, be sensitive to local religious and political views, and consider the local availability of resources, or lack thereof. The shortcomings in these domains became acutely apparent following the 2010 earthquake and floods in Haiti and Pakistan, with leading organizations calling for improved “coordination, accountability, transparency, stringent oversight and control, and professionalism,” both during and after crisis events.^{1,2}

Currently, DM is not recognized by the American Board of Medical Specialties (ABMS; Chicago, Illinois USA), the most prominent organization that sets professional standards and provides board certification for member subspecialties and physicians. As of 2023, there are eleven ABMS-approved EM subspecialties – Anesthesiology Critical Care Medicine; Emergency Medical Services (EMS); Health Care Administration, Leadership, and Management; Hospice and Palliative Medicine; Internal Medicine-Critical Care Medicine; Medical Toxicology; Neurocritical Care; Pain Medicine; Pediatric EM; Sports Medicine; and Undersea and Hyperbaric Medicine.³ Additionally, the ABMS recognizes Advanced EM Ultrasonography as a Focused Practice Designation (FPD), which represents physicians who spend a large portion of their practice in a specific area of a subspecialty.⁴

For a subspecialty to be recognized by the ABMS, it must represent a unique body of knowledge not adequately addressed in other curricula, contain a significant number of physicians practicing in the field, and have a proportionate amount of fellowship programs.⁵ Additionally, in order for an individual physician to qualify for ABMS board certification, they must have completed graduate medical training at a program accredited by the Accreditation Council of Graduate Medical Education (ACGME; Chicago, Illinois USA), which is the governing body that sets educational standards for graduate medical education (GME).^{6–8} However, DM fellowships are not currently accredited by the ACGME, and therefore, no standardized DM curriculum exists.

In the absence of a formal curriculum, the Society of Academic Emergency Medicine (SAEM; Des Plaines, Illinois USA) has previously developed a DM curriculum that they may recommend fellowship programs to adopt, allowing the program to be classified as “SAEM approved.”^{9,10} However, a recent study analyzed EM residency and EMS fellowship curricula for inclusion of SAEM-recommended DM topics and highlighted a significant gap in the unique DM body of knowledge covered, showing that only 40% of the DM curriculum subtopics will be covered in the course of an EM residency followed by EMS fellowship.¹¹

A new article by Wexler, et al provides the first standardized curriculum to be used as a foundational course of study for DM fellowship programs in the United States. This curriculum was developed by members of the Council of Disaster Medicine Fellowship Directors and seeks to contribute to the development of DM board certification by defining relevant content and topics for future examinations.¹² This present study will analyze the components of this curriculum for topics that are currently addressed by EM residency and EMS fellowships in the United States. The hypothesis is that there is a large body of DM

knowledge outlined in this curriculum that is not being addressed by either EM residency or EMS fellowship.

Methods

Control Curriculum

The DM curriculum topics and subtopics were derived from *The 2023 Model Core Content of Disaster Medicine*.¹² This curriculum was chosen as it represents the most current content recommendations for DM fellowships and was developed by members of the Council of Disaster Medicine Fellowship Directors. This curriculum is organized by fifteen major topics with related subtopics, which can be viewed in Figure 1, and has been cross-referenced with the ACGME and ABMS Core Competencies.

EM and EMS Training Curricula

The EM residency curriculum was obtained from *The 2019 Model of the Clinical Practice of Emergency Medicine*. This curriculum was chosen because it has been approved and is continuously reviewed by leading EM organizations, including the American Board of Emergency Medicine (ABEM; Lansing, Michigan USA), the Council of Emergency Medicine Residency Directors (CORD; Irving, Texas USA), American College of Emergency Physicians (ACEP; Irving, Texas USA), the Emergency Medicine Resident's Association (EMRA; Irving, Texas USA), the Residency Review Committee for Emergency Medicine (RRC-EM; Chicago, Illinois USA), SAEM, and the American Academy of Emergency Medicine (AAEM; Milwaukee, Wisconsin USA). This curriculum has been cross-referenced with the ACGME six core competencies for the practice of medicine.¹³

The EMS fellowship curriculum was obtained from *The 2019 Core Content of Emergency Medical Services Medicine*. This curriculum was chosen because it was developed and is continuously reviewed by leaders in EM and EMS, including the National Association of EMS Physicians (NAEMSP; Washington, DC USA) and ABEM. This curriculum has also been cross-referenced with the ACGME six core competencies for the practice of medicine.¹⁴

Study Design

The EM residency and EMS fellowship curricula were reviewed for inclusion of the DM major curriculum topics and subtopics, using the DM curriculum recommendations published by Wexler, et al as a control.¹² The initial curriculum review for included topics was performed by one author with subsequent review by all authors. A DM major curriculum topic was considered to be covered by EM residency or EMS fellowship if at least one of the related subtopics were described in the curriculum. Furthermore, a DM major curriculum topic or subtopic was only considered as being included in the EM residency or EMS fellowship curriculum if the wording was an identical match to the control DM fellowship curriculum. Included and excluded DM topics and subtopics were analyzed using descriptive statistics.

Results

The control DM curriculum was organized into major curriculum topics with related subtopics, which can be viewed in Figure 1. While all the DM major curriculum topics were covered by either EM residency or EMS fellowship, EMS fellowship covered more major curriculum topics (14/15; 93%) than EM residency (12/15; 80%). A comparison of the DM major curriculum topics included in EM residency and EMS fellowship may be viewed in Table 1.

<p>1. Principles of Disaster Medicine</p> <p>1.1. Conventional Standards of Care 1.2. Contingency Standards of Care 1.3. Crisis Standards of Care 1.4. Disaster Triage Concepts 1.5. Scarce Resource Allocation Protocols</p> <p>2. Medical Oversight of Emergency Management Systems</p> <p>2.1. The Disaster Cycle 2.2. Evolution of Emergency Management 2.3. Local Disaster Response 2.4. National Disaster Response 2.4.1. Disaster Medical Assistance Teams (DMAT) 2.5. National Response Framework 2.5.1. National Incident Management System 2.5.2. ICS Basics 2.5.3. Hospital Preparedness Program 2.5.4. Strategic National Stockpile 2.5.5. National Disaster Management System 2.6. International Systems 2.6.1. UN Cluster System 2.6.2. Emergency Medical Teams & the World Health Organization 2.6.3. International Search and Rescue Advisory Group (INSARAG) 2.7. Non-governmental Organizations (NGO) 2.8. Exercise Design and Evaluation</p> <p>3. Public Health and Disaster Medicine</p> <p>3.1. Role of Public Health Agencies in Disaster Medicine 3.2. Public Health Surveillance 3.3. Needs Assessments 3.3.1. Sphere Standards; Water, Sanitation and Hygiene (WASH) 3.4. Complex Public Health Emergencies 3.4.1. Displaced Populations 3.4.2. Medical care for refugee populations 3.5. Climate Change and Disaster Medicine 3.6. Vaccine and Pharmaceutical Distribution 3.7. Quarantine/Isolation</p> <p>4. Healthcare Disaster Preparedness</p> <p>4.1. Hazard Vulnerability Analysis 4.1.1. Drill and Exercise Design 4.2. Hospital Incident Command Systems 4.3. Emergency Operations Plans for the Healthcare Environment 4.4. Command Center Operations 4.5. Healthcare Coalitions and Community Integration 4.6. Information Management/Communications 4.7. Medical Surge Capacity 4.8. Medical Surge Capability 4.9. Mass Casualty Incidents</p> <p>5. Disaster Preparedness and Resiliency</p> <p>5.1. Personal Preparedness 5.2. Organizational Preparedness and Resiliency 5.2.1. Business Continuity 5.3. Hospital Preparedness 5.4. Community Preparedness and Resiliency 5.5. National Preparedness 5.6. Rehabilitation and Reconstruction</p> <p>6. Operations and Logistics</p> <p>6.1. Field Operations and Logistics 6.2. Mass Casualty Care in The Field 6.3. Field Disaster Triage 6.4. Field Stabilization, Treatment, and Transport 6.5. Disaster Operations 6.6. Decontamination in the Field 6.7. Volunteer Management 6.8. Operational Continuity 6.9. Care of Animals 6.10. Alternative Care Sites 6.11. Mass Fatality and Mortuary Care</p> <p>7. Psychological Aspects of Disaster Medicine</p> <p>7.1. Psychological Effects and Trauma of Disaster 7.2. Psychological First Aid 7.3. Personal Mental Resiliency</p> <p>8. Ethical and Legal Issues in Disaster Medicine</p> <p>8.1. Ethics of Disaster Medicine 8.2. Liability in Disaster Response 8.3. Disaster Finance 8.3.1. Stafford Act 8.4. Vulnerable Populations</p> <p>9. Prehospital Disaster Medicine</p> <p>9.1. EMS Disaster Operations 9.1.1. Transportation Disasters 9.1.2. Search and rescue 9.1.3. Tactical EMS 9.2. Active Threats 9.2.1. Care Under Fire 9.3. Scene Safety and Security in the Field 9.3.1. Fireground Safety 9.3.2. Structural Collapse 9.3.3. Vehicle Extraction</p>	<p>10. Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)</p> <p>10.1. Chemical Agents 10.1.1. Recognition and Clinical Treatment 10.1.2. Blister Agents 10.1.3. Lewisite 10.1.4. Mustard 10.1.5. Choking Agents 10.1.6. Anhydrous Ammonia 10.1.7. Chlorine 10.1.8. Phosgene 10.1.9. Asphyxiant Agents 10.1.10. Cyanide 10.1.11. Nerve Agents 10.1.12. MCI Triage and Considerations for Chemical Agents 10.1.13. Pediatrics and Chemical Exposure 10.1.14. Chemical Safety 10.1.15. Decontamination</p> <p>10.2. Biological Disasters 10.2.1. Category A Bioterrorism Agents 10.2.2. Anthrax 10.2.3. Botulism 10.2.4. Smallpox 10.2.5. Tularemia 10.2.6. Viral Hemorrhagic Fevers 10.2.7. Yersinia Pestis 10.2.8. Clinical Diagnosis and Treatment 10.2.9. MCI Triage and Considerations for Biological Agents 10.2.10. Biological Safety 10.2.11. Epidemiologic and Medical Countermeasures</p> <p>10.3. Radiation/Nuclear Events 10.3.1. Acute Radiation Syndrome 10.3.2. Timing of Medical and Surgical Interventions 10.3.3. Contamination and Irradiation 10.3.4. Decontamination 10.3.5. Medical Countermeasures for Radiation Contamination 10.3.6. MCI Triage and Considerations for Radioactive/Nuclear Events</p> <p>10.4. Pandemics/Emerging Infectious Diseases 10.4.1. Epidemiology 10.4.2. Mass Care During Pandemics 10.4.3. Medical Countermeasures 10.4.4. Pandemic Triage</p> <p>10.5. Hazardous Materials (HAZMAT) 10.5.1. Personal Protective Equipment (PPE)</p> <p>10.6. Blast Injuries 10.7. Crush Injuries 10.8. Burns 10.8.1. Mass Burn Care</p> <p>11. Mass Care and Environmental Disasters</p> <p>11.1. Climate Change 11.2. Drought 11.3. Earthquakes 11.4. Flooding 11.5. Heat Emergencies 11.6. Hurricanes/Cyclones/Typhoons 11.7. Tornadoes 11.8. Volcanic Eruptions 11.9. Wildfires 11.10. Winter Storms</p> <p>12. Mass Gathering Medicine</p> <p>12.1. Mass Gatherings 12.1.1. Event Medicine Planning 12.1.2. Stampede Injuries</p> <p>13. Communications</p> <p>13.1. Crisis and Emergency Risk Communication 13.1.1. Media Engagement 13.2. Communication Systems and Informatics 13.3. Social Media and Disasters</p> <p>14. Technology and Disaster Medicine</p> <p>14.1. Technological Disasters 14.1.1. Utility Failure 14.2. Informatics 14.2.1. Electronic Health Record Compromise 14.3. Disaster Modeling and Simulation 14.4. Crisis Mapping 14.5. Patient Tracking 14.6. Telemedicine 14.7. Ultrasound</p> <p>15. Disaster Medicine Research</p> <p>15.1. Journal Club 15.2. Research basics</p>
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Figure 1. Disaster Medicine (DM) Fellowship Core Curriculum.

Alone, EMS fellowship covered more DM curriculum subtopics (58/153; 38%) than EM residency (24/153; 16%). Combined, EM residency and EMS fellowship covered 65/153 (42%) of the DM curriculum subtopics. A comparison of the inclusion of DM curriculum subtopics by GME programs can be viewed in Table 2.

Of note, the DM major curriculum topic chemical, biological, radiological, nuclear, and explosives (CBRNE) represented the largest topic covered in EM residency and EMS fellowship, with 14/46 (30%) and 22/46 (48%) of subtopics being represented in the curriculum, respectively. A sub-group analysis of the DM curriculum subtopics was performed excluding the CBRNE major curriculum topics and may be viewed in Table 3. In this analysis,

EMS fellowship covered 36/153 (24%) of subtopics, while EM residency covered 10/153 (7%) of subtopics. Combined, EM residency and EMS fellowship covered 39/153 (25%) of CBRNE subtopics.

Discussion

This study contributes to the previously reported findings that there is a substantial body of DM knowledge that is not being covered in EM residency or EMS fellowship curricula. Using the most current and inclusive DM curriculum as a control, this study found that although a physician training in EM residency followed by EMS fellowship will have touched upon each of the DM major

DM Curriculum Component	EMS Fellowship	EM Residency	EM + EMS
1. Principles of Disaster Medicine	Yes	Yes	Yes
2. Medical Oversight of Emergency Management Systems	Yes	Yes	Yes
3. Public Health and Disaster Medicine	Yes	Yes	Yes
4. Health Care Disaster Preparedness	Yes	Yes	Yes
5. Disaster Preparedness and Resiliency	No	Yes	Yes
6. Operations and Logistics	Yes	No	Yes
7. Psychological Aspects of Disaster Medicine	Yes	Yes	Yes
8. Ethical and Legal Issues in Disaster Medicine	Yes	Yes	Yes
9. Prehospital Disaster Medicine	Yes	No	Yes
10. Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)	Yes	Yes	Yes
11. Mass Care and Environmental Disasters	Yes	Yes	Yes
12. Mass-Gathering Medicine	Yes	No	Yes
13. Communications	Yes	Yes	Yes
14. Technology and Disaster Medicine	Yes	Yes	Yes
15. Disaster Medicine Research	Yes	Yes	Yes
Total	14/15 (93%)	12/15 (80%)	15/15 (100%)

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Table 1. DM Major Curriculum Topics Covered by GME Programs

Abbreviations: DM, disaster medicine; EMS, Emergency Medical Services; EM, emergency medicine; CBRNE, chemical, biological, radiation, nuclear, and explosives; GME, graduate medical education.

DM Curriculum Component	EMS Fellowship	EM Residency	EM + EMS
1. Principles of Disaster Medicine	2/5	1/5	2/5
2. Medical Oversight of Emergency Management Systems	6/17	1/17	7/17
3. Public Health and Disaster Medicine	2/10	1/10	2/10
4. Health Care Disaster Preparedness	5/10	0/10	5/10
5. Disaster Preparedness and Resiliency	0/7	1/7	1/7
6. Operations and Logistics	7/11	0/11	7/11
7. Psychological Aspects of Disaster Medicine	2/3	1/3	3/3
8. Ethical and Legal Issues in Disaster Medicine	1/5	1/5	1/5
9. Prehospital Disaster Medicine	3/10	0/10	3/10
10. Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE)	22/46	14/46	26/46
11. Mass Care and Environmental Disasters	1/10	1/10	1/10
12. Mass-Gathering Medicine	2/4	0/4	2/4
13. Communications	2/4	1/4	2/4
14. Technology and Disaster Medicine	2/9	1/9	2/9
15. Disaster Medicine Research	1/2	1/2	1/2
Total	58/153 (38%)	24/153 (16%)	65/153 (42%)

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Table 2. DM Curriculum Subtopics Covered by GME Programs

Abbreviations: DM, disaster medicine; EMS, Emergency Medical Services; EM, emergency medicine; CBRNE, chemical, biological, radiation, nuclear, and explosives; GME, graduate medical education.

curriculum topics, they will be covered less than one-half (65/153; 42%) of the curriculum subtopics (Table 1 and Table 2).

In the analysis, a DM major curriculum topic was deemed covered if at least one of the related subtopics was described in the program's standardized curriculum. However, a large portion of fundamental DM major curriculum topics, such as Medical Oversight of Emergency Management Systems, contained subtopics that were only marginally covered by either EM residency

(1/17; 6%) or EMS fellowship (6/17; 35%), as shown in Table 2. Additionally, the DM major curriculum topic Mass Care and Environmental Disasters, which includes increasingly relevant subtopics such as climate change, drought, and flooding, as seen in Figure 1, is technically covered by both EM residency and EMS fellowship curricula. However, further analysis shows both EM and EMS training curricula only cover the single subtopic heat emergencies.

DM Curriculum Component	EMS Fellowship	EM Residency	EM + EMS
1. Principles of Disaster Medicine	2/5	1/5	2/5
2. Medical Oversight of Emergency Management Systems	6/17	1/17	7/17
3. Public Health and Disaster Medicine	2/10	1/10	2/10
4. Health Care Disaster Preparedness	5/10	0/10	5/10
5. Disaster Preparedness and Resiliency	0/7	1/7	1/7
6. Operations and Logistics	7/11	0/11	7/11
7. Psychological Aspects of Disaster Medicine	2/3	1/3	3/3
8. Ethical and Legal Issues in Disaster Medicine	1/5	1/5	1/5
9. Prehospital Disaster Medicine	3/10	0/10	3/10
11. Mass Care and Environmental Disasters	1/10	1/10	1/10
12. Mass-Gathering Medicine	2/4	0/4	2/4
13. Communications	2/4	1/4	2/4
14. Technology and Disaster Medicine	2/9	1/9	2/9
15. Disaster Medicine Research	1/2	1/2	1/2
Total	36/153 (24%)	10/153 (7%)	39/153 (25%)

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Table 3. Subgroup Analysis of DM Curriculum Subtopics, Excluding CBRNE

Abbreviations: DM, disaster medicine; EMS, Emergency Medical Services; EM, emergency medicine; CBRNE, chemical, biological, radiation, nuclear, and explosives.

Furthermore, the focus of a DM topic covered in EM residency or EMS fellowship may be dependent upon the educational goals of the program. Although EM residency and EMS fellowship both cover a large portion of the CBRNE subtopics, the way these topics are covered likely differs greatly than that of a DM fellowship. While EMS will primarily focus on initial triage and prehospital management in individual exposed civilians and responders, a DM curriculum will place an additional emphasis on mass treatment, emergency preparedness, and resource management on a mass scale. Coverage of DM topics may also be limited by the length of these existing training programs. The EMS fellowship, which constitutes a yearlong fellowship with its own unique base of knowledge, is unlikely to have sufficient time and resources to cover additional DM topics in sufficient depth to produce optimally trained DM physicians.

As the field of DM continues to evolve, it is instructive to consider the pathway to ABMS and ACGME recognition for other subspecialties of EM. In the mid-1990s, the field of EMS developed a task force to petition for board certification by the ABMS, led by Dr. Jon Krohmer. They concluded that “physicians who provide medical direction for EMS systems should meet standardized minimum requirements for training and certification,” ultimately becoming officially recognized as a subspecialty by the ABMS in 2010.^{15,16} This certification paved the way for the standardization of an EMS curriculum by the ACGME, as graduation from an ACGME-accredited GME program is required for a physician to be board certified by the ABMS. This helped to facilitate the maturation of EMS fellowships as well as the specialty itself.^{5,7,17}

It is increasingly important that a formalized training and certification structure exists within DM to ensure uniform clinical competence amongst responding physicians as disaster response becomes more complex. An ABMS board certification process would stimulate the development of DM by establishing and upholding professional standards, thus fostering trust amongst the public and other responders. Accreditation by the ACGME would allow for the development of a standardized curriculum to promote

the development of disaster-ready physicians, as well as an educational pathway for physicians to become ABMS board certified in DM.

Limitations

A limitation of this study is the binary nature of how a DM major curriculum topic was considered to be covered by EM residency or EMS fellowship. A major curriculum topic was considered to be covered if at least one of the related subtopics was described in the EM residency or EMS fellowship curriculum. However, the extent and focus with which these subtopics are taught was not assessed and may have resulted in the over-reporting of the amount of DM major curriculum topics covered in current GME programs.

Additionally, a DM major curriculum topic or subtopic was only considered as being included in the EM residency or EMS fellowship curriculum if the wording was an identical match to the control DM fellowship curriculum. However, a DM curriculum topic or subtopic that appears to be excluded from either GME curricula may instead be covered in a separate curriculum heading. For example, although the subtopic “Medical Surge Capacity” (4.8) is not specifically listed in the EMS curriculum, it may be included in the subtopic “Hospital Preparedness” (5.3); Figure 1. This may have resulted in the under-reporting of major topics and subtopics included in the EM residency and EMS fellowship programs. Further analysis of the specific educational objectives of each curriculum topic and subtopic in GME programs will be required for complete assessment of included DM components. This study analyzed residency and fellowship programs available in the United States only, and as such, findings presented are not externally valid for programs located outside of the United States.

Conclusion

This study sought to update the coverage of DM curriculum topics and subtopics, using the most current and inclusive suggested DM curriculum available, currently being addressed in EM residency and EMS fellowship curricula in the United States. Although it finds that all the DM major curriculum topics will be covered in

EM residency followed by EMS fellowship, over one-half of the subtopics are not covered by the either program (16% and 38%, respectively) or both programs combined (42%). Increasingly relevant subtopics, such as climate change, droughts, and flooding, are amongst those not covered by either curriculum.

Even among DM topics and subtopics included in GME curricula, there is no educational standard for the way in which these topics are addressed. This may result in inconsistencies in DM knowledge and skills, even amongst the most disaster-prepared EM and EMS physicians.

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