Are Belgian military students in medical sciences better educated in disaster medicine than their civilian colleagues?

Luc J M Mortelmans,1,2 J Lievers,3,4 G Dieltiens,1 M B Sabbe2,4

ABSTRACT

Introduction Historically, medical students have been deployed to care for disaster victims but may not have been properly educated to do so. A previous evaluation of senior civil medical students in Belgium revealed that they are woefully unprepared. Based on the nature of their military training, we hypothesised that military medical students were better educated and prepared than their civilian counterparts for disasters. We evaluated the impact of military training on disaster education in medical science students.

Methods Students completed an online survey on disaster medicine, training, and knowledge, tested using a mixed set of 10 theoretical and practical questions. The results were compared with those of a similar evaluation of senior civil medical students.

Results The response rate was 77.5%, mean age 23 years and 59% were males. Overall, 95% of military medical students received some chemical, biological, radiological and nuclear training and 22% took part in other disaster management training; 44% perceived it is absolutely necessary that disaster management should be incorporated into the regular curriculum. Self-estimated knowledge ranged from 3.75 on biological incidents to 4.55 on influenza pandemics, based on a 10-point scale. Intention to respond in case of an incident ranged from 7 in biological incidents to 7.25 in chemical incidents. The mean test score was 5.52; scores improved with educational level attained. A comparison of survey data from civilian senior medical master students revealed that, except for influenza pandemic, military students scored higher on knowledge and capability, even though only 27% of them were senior master students. Data on willingness to work are comparable even though only 27% of them were senior master students.

Conclusions The military background and training of these students makes them better prepared for disaster situations than their civilian counterparts.
circumstances was also assessed. Questions were multiple choice, and self-rated scores were given on a visual analogue scale from 0 to 10. Knowledge was tested by a mixed set of 10 theoretical questions and practical cases, each correct answer counting as 1 point out of 10. The survey was developed at the Center for Research and Education in Emergency Care (CREEC) at the University of Leuven and was based on the results of a literature search. It was validated by several disaster specialists. Data were compared with the results of a similar survey are presented in Table 3. Self-estimated knowledge and capability were well correlated (Spearman p<0.005). Self-estimated capability for all incident types was significantly higher in the group that knew how to deal with CBRN patients and those students who were involved in EMS. Willingness to assist was strongly correlated with the different scenarios (Spearman p<0.0005). Students who planned to be pharmacists were significantly less willing to respond to infectious/contagious incidents. Test scores were significantly better in students who had attained higher educational levels. Results on the theoretical–practical questions of the survey are presented in Table 3.

RESULTS
The response rate of military students in medical sciences was 77.5%, a mean age of 23 years and a male to female ratio of 59:41. Overall, 54% of the military students were currently at a bachelor level, 19% were at a junior master level and 27% were at the senior master level; 46% wanted to become an emergency physician, 39% another type of physician, 12% pharmacists and 3% dentists. Some CBRN training (2/3 basic level) had been received by 95% and 22% had other disaster management training; 71% felt that they could deal with patients of CBRN incidents. Only 17% were involved in emergency medical service (EMS) in their spare time but 44% believed it was absolutely necessary that disaster management should be incorporated in the regular curriculum; only 2% stated that this training was useless.

Scores on self-estimated knowledge and capability, willingness to work at disasters and mean theoretical–practical test scores of military and civilian students are presented in Table 2. Self-estimated knowledge and capability were well correlated (Spearman p<0.005). Self-estimated capability for all incident types was significantly higher in the group that knew how to deal with CBRN patients and those students who were involved in EMS. Willingness to assist was strongly correlated with the different scenarios (Spearman p<0.0005). Students who planned to be pharmacists were significantly less willing to respond to infectious/contagious incidents. Test scores were significantly better in students who had attained higher educational levels. Results on the theoretical–practical questions of the survey are presented in Table 3.

DISCUSSION
In the event of a mass casualty incident all unaffected, available personnel are expected to help in controlling the situation; every local physician, regardless of specialty, should be able to assist. When communities become isolated, as in some natural disasters, Family Practice physicians might be the only source of medical expertise available until external help is organised; for this reason, the Association of American Medical Colleges recommends that all medical schools should thoroughly educate their students in CBRN. Although this training was not part of the regular curriculum; only 2% stated that this training was useless.

Table 2 Mean scores on the 0–10 Visual Analogue Scale on the theoretical–practical case mix test, self-estimated knowledge, self-estimated capability and willingness to work in the listed disaster situations compared with the figures of the senior civilian medical students

<table>
<thead>
<tr>
<th></th>
<th>Military</th>
<th>Civilian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean test score</td>
<td>5.52/10</td>
<td>4.34/10*</td>
</tr>
<tr>
<td>Knowledge nuclear incidents</td>
<td>3.97/10</td>
<td>1.81/10*</td>
</tr>
<tr>
<td>Knowledge chemical incidents</td>
<td>4.05/10</td>
<td>2.19/10*</td>
</tr>
<tr>
<td>Knowledge biological incidents</td>
<td>3.75/10</td>
<td>2.09/10*</td>
</tr>
<tr>
<td>Knowledge influenza pandemic</td>
<td>4.55/10</td>
<td>4.61/10 ns</td>
</tr>
<tr>
<td>Knowledge Ebola outbreak</td>
<td>4.1/10</td>
<td>2.79/10*</td>
</tr>
<tr>
<td>Capability nuclear incident</td>
<td>3.02/10</td>
<td>1.61/10*</td>
</tr>
<tr>
<td>Capability chemical incident</td>
<td>3.32/10</td>
<td>2.05/10*</td>
</tr>
<tr>
<td>Capability biological incident</td>
<td>3.1/10</td>
<td>1.99/10*</td>
</tr>
<tr>
<td>Capability influenza pandemic</td>
<td>4.29/10</td>
<td>4.3/10 ns</td>
</tr>
<tr>
<td>Capability Ebola outbreak</td>
<td>3.23/10</td>
<td>2.55/10*</td>
</tr>
<tr>
<td>Willing to work on nuclear incident</td>
<td>7.1/10</td>
<td>7.11/10 ns</td>
</tr>
<tr>
<td>Willing to work on chemical incident</td>
<td>7.25/10</td>
<td>7.48/10 ns</td>
</tr>
<tr>
<td>Willing to work on biological incident</td>
<td>7.0/10</td>
<td>7.36/10 ns</td>
</tr>
<tr>
<td>Willing to work on influenza pandemics</td>
<td>7.15/10</td>
<td>7.7/10 ns</td>
</tr>
<tr>
<td>Willing to work Ebola outbreak</td>
<td>7.1/10</td>
<td>7.03/10 ns</td>
</tr>
</tbody>
</table>

*p<0.05, ns, not significant.

Table 1 Questions used in the survey. CBRN Chemical, Biological, Radiological, nuclear

| 1. What’s your native language? Dutch or French |
| 2. What’s your gender? Male or female |
| 3. Age in years? |
| 4. What is your educational study level? Bachelor, Junior Master or Senior Master |
| 5. What is the professional level you hope to reach? Emergency physician, physician, dentist, pharmacist, veterinarian |
| 6. What’s the highest level of your CBRN training up to now? None, Basic, CBRN school |
| 7. What is the timeframe since your last CBRN training period? Less than 1 year, 1–3 years, 3–7 years, longer than 7 years |
| 8. Do you live within a 20km range of a: nuclear installation or high risk chemical installation (Seveso type)? |
| 9. Do you have any association with EMS or disaster management besides your military career? |
| 10. Have you had any lectures or training in disaster medicine/management? |
| 11. Do you have any knowledge on how to deal with CBRN incidents and/or affected patients? |
| 12. Do you think that your university training should prepare you one way or another to deal with disaster situations? Absolutely, could be useful, useless |
| 13. On a visual scale from 0 (null) to 10 (expert) what’s your estimation of your knowledge on: nuclear incidents, chemical incidents, biological incidents (eg anthrax), epidemic, very contagious disease (eg swine or bird flu), epidemic very contagious disease with high morbidity/mortality risks (eg Ebola)? |
| 14. On a visual scale from 0 to 10 what’s your estimation of your capability to deal with patients of: nuclear incidents, chemical incidents, biological incidents (eg anthrax), epidemic, very contagious disease (eg swine or bird flu), epidemic very contagious disease with high morbidity/mortality risks (eg Ebola)? |
| 15. If you were confronted with the following scenarios during your apprenticeship would you engage yourself to actively participate in patient care (on a visual scale from 0 (not at all) to 10 (absolutely))? Nuclear incidents, chemical incidents, biological incidents (eg anthrax), epidemic, very contagious disease (eg swine or bird flu), epidemic very contagious disease with high morbidity/mortality risks (eg Ebola)? |
| 16. Set of theoretical questions: see table 3 |
Table 3 Summary of the answers on the theory–case mix questions. The correct answers are in italics. The ‘don’t know’ option was added to eliminate wild guess bias.

1. Chain collision, possible contaminated patients
   - Isolate in distant corner 7.5%
   - Put them in waiting room 20%
   - Put them in garage 5%
   - Wait separately outside 67.5%
   - No action, instead hide 0%

2. Iodine tablets protect against
   - External radiation 15%
   - Internal radiation 42.5%
   - Both external and internal 10%
   - No radiation protection at all 17.5%
   - Don’t know 15%

3. The regulator means
   - Operational leader of overall disaster management 7.5%
   - Controlling arriving ambulances 7.5%
   - Field hospital supplies 2.5%
   - Deciding which patients go where 25%
   - Don’t know 57.5%

4. Postman with necrotic lesions on his hands, possible diagnosis
   - Frostbite 7.5%
   - New chemical product in post handling 17.5%
   - Possible anthrax infection 50%
   - Don’t know 25%

5. First step in chemical decontamination
   - Oral antidote 2.5%
   - Antidote body smear 20%
   - Antidote spray special military cabin 32.5%
   - Wash with water and soap 7.5%
   - Don’t know 37.5%

6. What limits radiation damage the most?
   - Protective clothing 2.5%
   - Fast decontamination 2.5%
   - Oral iodine tablets 2.5%
   - Limit time of exposure, increase distance and shielding 90%
   - Don’t know 2.5%

7. Two most important objects to take along in evacuation (more than 1 possible)
   - Smartphone 15%
   - Laptop 0%
   - ID/health insurance cards 80%
   - Syllabus/handbook 2.5%
   - Six-pack of beer 5%
   - Normally used medication 7.5%
   - Photo of loved one 2.5%
   - None of the above 12.5%
   - Don’t know 0%

8. Superficial cuts and first degree burns after an explosion at a student party, go to
   - Nearest hospital 20%
   - Nearest hospital with burn unit 10%
   - Home (recover and sleep) 12.5%
   - Hospital ED further away 57.5%
   - Don’t know 0%

Table 3 Continued

9. First step in nuclear decontamination
   - Shower patient 25%
   - Administer iodine tablets 10%
   - Take off clothes and shoes 47.5%
   - Put on lead apron 2.5%
   - Don’t know 15%

10. Traffic accident with 2 trucks (one leaking tanker) and 2 victims, what to do?
    - Stop, call 112 and help lying victim 10%
    - Stop, call 112 and help limping victim 2.5%
    - Stop at safe distance and wait for clearance fire brigade 87.5%
    - Drive by and call 112 at hospital 0%
    - Act as if nothing happened 0%

If these military student data are compared with those of a similar survey given to civilian senior master medical students, significantly higher score on self-estimated knowledge and capability is observed, although only 27% were senior master students; one exception regards the knowledge and capability of influenza pandemics. Results on willingness to work in various disaster scenarios are comparable between the two groups, and the results of the theoretical question/case section were significantly more favourable for the military student group.

The data support our study hypothesis that a military background makes students in medical sciences better prepared and educated for disaster situations. They score better in self-estimated knowledge and capability, as well as in the theoretical questions/practical case mix part of the survey. Taking into account that only about one quarter of the study population were senior master students and that seniority was an important promoting factor, we are compelled to notice the positive impact of basic military training on disaster management. The only exception was for the influenza pandemic scenario, in which both civilian and military students performed comparably, which is probably because this subject is now extensively covered in the regular medical science curriculum, after it was seen to be lacking before the most recent influenza pandemic threats. It should also be stressed that this survey was administered before the recent West African Ebola outbreak emerged so publicly, so the virtual Ebola outbreak scenario in the survey was recognised only as a dangerous unknown.

The scores on the set of 10 practical and theoretical questions were compared with those obtained in the study with civilian
Involvement of the military in disaster medicine training and civilian counterparts. This result suggests the need for greater training and background makes the military medical sciences student 65% of them believe that they protected against external radiation compared with 47% of civilians and only 10% of military students would use iodine tablets as a first step in nuclear decontamination versus 48% of civilian students. Knowledge that limiting time of exposure, increasing distance and shielding limits radiation damage the most was higher in the military students (90% vs 78%) and more would not go uninformed and unprotected into a traffic accident involving leaking tanker versus (87.5% vs 63%).

Giving this outcome, it can be stated that basic military training and background makes the military medical sciences student better educated and prepared for disaster situations than their civilian counterparts. This result suggests the need for greater involvement of the military in disaster medicine training and education, as is common in other countries. The ideal situation would be one that evolves into a basic disaster medicine education in the regular national medical education curriculum with a clear input from military knowledge and experience. However, up to now this possibility is not even in a nascent stage. Our centre is delighted to have an established joint venture with the military in its disaster management course but unfortunately this is only at a postgraduate level. This study has some limitations in that the use of surveys and self-reported data could result in collecting bias; on the other hand, we compared these data with those of a similar study using the same methods and bias, so we may conclude that the comparison is at least consistent.

CONCLUSION
Basic military training and its associated background make the military population better educated and prepared for disaster situations than their civilian counterparts.

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Contributors LJM, MG wrote the manuscript, was involved in the survey design and performed the literature search. JL adapted the survey to the military situation and recruited the respondents. GD performed the statistical analysis. MBS launched the study concept, was involved in the survey design and was the liaison with the command system. LJM is responsible as guarantor.

Competing interests None declared.

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Provenance and peer review Not commissioned; externally peer reviewed.

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