

# Are Belgian Senior Medical Students Ready to Deliver Basic Medical Care in Case of a H5N1 Pandemic?

Luc J.M. Mortelmans, MD;<sup>1</sup> Harald G. De Cauwer, MD;<sup>2</sup> Evi Van Dyck, MD;<sup>3</sup>  
Pieter Monballyu, MD;<sup>3</sup> Roel Van Giel, MD;<sup>3</sup> Ellen Van Turnhout, MD<sup>3</sup>

1. Department of Emergency Medicine, Klina General Hospital, Brasschaat, Belgium,
2. Department of Neurology, Klina General Hospital, Brasschaat, Belgium
3. Department of Internal Medicine, Klina General Hospital, Brasschaat, Belgium

#### Correspondence:

Luc J.M. Mortelmans, MD  
Department of Emergency Medicine  
AZ KLINA  
Augustijnslei 100  
B2930 Brasschaat  
Belgium  
E-mail: luc.mortelmans@klina.be

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#### Abbreviations:

ARDS = acute respiratory distress syndrome  
H5N1 = avian influenza  
HCP = health care providers  
SARS = severe acute respiratory syndrome  
WHO = World Health Organization

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#### Abstract

Medical care systems will be overwhelmed if a human H5N1 pandemic should occur. Several national disaster plans, including that of Belgium, focus on maximal treatment at home with senior medical students supporting frontline care. To evaluate the knowledge and preparedness of Belgian senior medical students, an e-mail survey of senior medical students (last two years of education) attending Flemish universities was conducted.

A total of 243 students (30%) replied. Only 21.8% of them were aware of the possibility of being involved in this planning. A total of 77.4% estimated H5N1 to be a possible threat to national health. Seventy percent of respondents reacted positively towards the idea of being involved in implementing primary care, and only 9.5% were absolutely opposed to the idea. A total of 82.3% would care for pandemic patients if necessary, but only 41.2% would do so if these patients were children. Only 18.9% estimated themselves to be sufficiently educated regarding H5N1. Ninety-one percent were convinced that care for H5N1-influenza patients should be incorporated into their regular curriculum. Several antiviral products were reported by the students to be efficient for treating H5N1, but only 34.6% correctly chose oseltamavir and/or zanamavir and 35.4% replied "I don't know". A total of 95.5% correctly answered that the regular influenza vaccination doesn't protect against H5N1. The risk for human-to-human transmission was rated to be small by 50.6% (none 21%, high 27.6%). The human infection risk was rated to be small by 74.1% (none 1.6%, high 23%).

There is a high level of willingness to participate among senior medical students. However, in the case of pediatric patients they're more reserved. It would be useful to incorporate a focused session on preparedness in the regular teaching program. A legal base for their actions should also be provided. Ethical guidelines on rights and duties in case of a pandemic should be prepared by an international, multidisciplinary group of experts.

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#### Introduction

Avian influenza is a subject of many doomsday scenarios. Highly virulent infections, such as severe acute respiratory syndrome (SARS), proved that we are not prepared for a massive infectious outbreak. Influenza viruses have caused previous pandemics.<sup>1</sup> In 1918, >50 million people died during the Spanish flu pandemic. The avian influenza virus (H5N1), with a rapid progression to acute respiratory distress syndrome (ARDS) and a mortality rate of 50–80%, is very pandemic prone. The only factor preventing a massive H5N1 outbreak is its low capacity for human-to-human transmission.<sup>1,2</sup> While previous pandemics were a surprise, the present situation gives the world an advance warning and a rare opportunity to prepare for the mutations of H5N1. The World Health Organization (WHO) urges all countries to take

	Yes (%)	No (%)
Studies in tropical medicine?	46.1	43.9
Are you vaccinated?	37.4	62.6
Are you aware of this plan?	21.8	78.2
Are you educated enough to participate?	46.4	53.6
Would you participate?	82.3	17.7
Even in case of children as patients?	41.2	58.8
Ethically acceptable?	86.6	13.4
Sufficiently educated on influenza?	91.8	8.2
Sufficiently educated on avian influenza?	18.9	81.8
Sufficiently educated on SARS?	36.6	63.4
Sufficiently educated on highly contagious diseases?	53.9	46.1
Sufficiently educated on epidemics?	44.4	55.6
Should this be included in regular teaching programs?	90.9	9.1
Could avian influenza become a healthcare threat?	77.4	22.6
Does the flu vaccine protect for avian influenza?	4.5	95.5

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**Table 1**—Answers to the yes/no questions (SARS = severe acute respiratory syndrome)

action to assess their levels of preparedness, identify priority needs, and develop a national preparedness plan.<sup>3</sup> These plans help to create increasing bed availability in hospitals and to maximize the use of out-of-hospital based health care, as hospital capacity will be insufficient.

One of the strategies to deal with medical staff shortages is to use retired physicians and senior medical students to administer care, a strategy recommended by the Royal Medical Academy in of Belgium.<sup>4–6</sup> The Royal Medical Academy suggested that the shortage of general practitioners in frontline pandemic care in Belgium should be dealt with by using senior medical students to fill the gaps. However, a description of specific tasks and responsibilities was not provided. No educational programs or training were planned. During the 1918 Spanish Flu pandemic, medical students were placed in the field hospitals after a single lecture on influenza.<sup>7</sup> The hypothesis of the current study is that Belgian senior medical students are not aware of these plans and that their knowledge on avian influenza, pandemics, and disaster medicine is insufficient for them to be prepared to assist on short notice if a pandemic should arise.

## Methods

A questionnaire (Appendix) was sent by e-mail to all senior medical students enrolled in Flemish universities (Catholic

	%
Television	85.2
Newspaper	74.1
College	46.5
Internet	40.3
Medical journal	25.1
Other journal	17.7
Internship	11.1
Not informed at all	1.2

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**Table 2**—Sources of information on avian influenza

University of Louvain, University of Antwerp, University of Ghent, and Free University of Brussels). All students in the sixth and seventh year of basic medical education during the academic year 2006–2007 were included. The mailing was distributed by the first author at the start of the academic year (October 2006). Students were able to reply by e-mail until December 2006, and a reminder e-mail was sent to non-respondents before the end of December.

Besides demographic data, the questionnaire was used to assess the students' knowledge on avian influenza, and the source from which the students got this information. It was stressed that the intent was to identify what was known by the students, and that they should not look-up the answers in handbooks or on Websites. Their level of motivation for participating if a pandemic should occur was assessed, as well as if they were aware of the risks associated with "mobilization". Their opinion on the ethics of this issue also was recorded. The collected data were processed using SPSS V12.0 (SPSS, Inc., Chicago, IL, USA). Multivariate analysis was performed using Pearson's chi-square test. A  $p < 0.05$  was considered to be statistically significant.

## Results

A total of 243 students responded (30% response rate). A total of 43.6% of them were students in their final year of medical school. The majority (61.3%) of the respondents were female. The mean value for the ages was 23.8 years (22–42 years). A total of 21.4% planned to become general practitioners and 55.6% planned to become specialists. Forty-six of the respondents had completed a course in tropical medicine. Only 37.4% had been vaccinated with the human influenza vaccine. A total of 77.4% estimated avian influenza presented a possible healthcare threat (Table 1).

Almost all (98.8%) of the students had heard about avian influenza, mainly from television (85.2%) and newspapers (74.1%). Less than half of them (46.5%) obtained their information on H5N1 from university courses. Other information sources included the Internet (40.3%), journals (25.5% medical, 17.7% others), and internship experience (11.1%) (Table 2).

Only a minority (21.8%) of the respondents was aware of the plan for their deployment in case of a pandemic. Nevertheless, 70.8% felt positive about this while only 9.8% were opposed. A total of 82.3% of respondents were willing to treat patients with influenza in case of a pandemic, but in the event that those patients were children, only half of

Antiviral therapy scored as effective	% positive answers
Aciclovir	3.3
Amantadine	20.2
Foscarnet	2.1
Ganciclovir	2.9
Oseltamivir	56.8
Ribavirine	8.2
Zanamivir	33.3
Zidovudine	4.9
"I don't know"	35.4
Oseltamivir and/or Zanamivir alone	34.6

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**Table 3**—Antiviral products scored as effective in the treatment of avian influenza. Multiple answers were possible, so the sum is higher than 100%. The combination of oseltamivir and/or zanamivir with another product was scored as a false answer.

them (41.2%) agreed. Female students were significantly more reluctant to treat children than were their male counterparts ( $p = 0.01$ ). A total of 86.6% reported having no ethical problems with the plan. Only 46.5% thought they were sufficiently educated. A total of 90.9% wanted a thorough education on this matter to be a part of their regular curriculum.

Although 91.8% said they were educated on human influenza, only 18.9% were knowledgeable with regard to the avian influenza threat. When reporting knowledge regarding other topics, 36.6% of respondents felt they were sufficiently educated on SARS, 44.4% on epidemics, and 53.9% felt to be sufficiently educated on highly contagious infectious diseases in general.

The last part of the questionnaire assessed general knowledge regarding avian influenza. Almost all of the students (95.5%) answered correctly that the regular human influenza vaccination doesn't protect for avian influenza.<sup>3</sup> Knowledge on effective antiviral medication was weaker. A list of eight virostatics, including oseltamivir and zanamivir, was presented (Table 3). The use of oseltamivir and/or zanamivir without mentioning the others was scored as a correct answer. Although the latest WHO recommendations suggest oseltamivir with amantadine as a back-up medication,<sup>8</sup> the former combination was the recommendation at the time of the study.<sup>9</sup> Only 34.6% of the respondents were correct. A total of 35.6% answered that they had no idea as to what medication to prescribe. There was no statistically significant difference between the sixth and seventh year students. The infective risk at that moment was appropriately estimated as low (Table 4).<sup>10,11</sup> There were no statistically significant interuniversity differences on the scaled variables.

## Discussion

It is obvious that in case of a H5N1 pandemic, health systems will be overwhelmed, even in countries with highly

	None (%)	Very low (%)	Moderate (%)	Serious (%)
Human infection risk	1.6	74.1	22.2	0.8
Human-to-human transmission risk	2.1	50.6	20.2	7.4

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**Table 4**—Scores on the infection and human-to-human transmission risk

developed healthcare systems. A simulation in the Netherlands (population of 15 million) predicted 10,000 influenza-related hospital admissions and >4,000 deaths.<sup>12</sup> The Director General of the World Health Organization fears that in a new pandemic, 20% of the population will be involved.<sup>13</sup> Two of the cornerstones in national planning are maximizing extramural care and mobilizing retired physicians and senior medical students to cope with staff shortages. In these plans, the students will be used mainly in the prehospital setting as reinforcements to cope with the deficit of general practitioners. Unfortunately, there is no clear description of planned tasks and responsibilities in this setting. The lack of direct supervision and coaching—in contrast with the in-hospital setting—and minimal clinical practice will place the students in the face of an enormous challenge. If their theoretical background also is insufficient, it raises doubts about their usefulness as frontline caregivers.

The theoretical background of this study population was weak. The limited knowledge that they have was derived mainly from media sources, not from classes in medical school. Despite this, and despite the fact that they're hardly aware of the possibility of their "mobilization", a majority was very willing to help if needed. Only the care for children frightens them. The 82.3% of respondents willing to treat pandemic patients if necessary is a much higher number than the 50% of healthcare workers that would come to work in another survey.<sup>14</sup> The students were not fully aware of the implications of providing care during a pandemic. Some of them even asked if this would interfere with their regular study time. It suggests that they were not informed well enough to make an informed decision. However, most of them point out the necessity of incorporating proper training in their regular curriculum. Indeed, a short lecture of one hour as in the Spanish flu era was inadequate.<sup>7</sup>

Apart from issues of training and knowledge, there are serious ethical and legal issues. If the government plans to use these students in independent, active, multi-casualty medicine under severe stress conditions, arrangements for medico-legal coverage must be made. Currently, there is no legal framework to cope with this situation, so these students lack any protection.

The ethical considerations are even more profound. Can these ill-prepared and ill-protected students be forced to treat highly contagious patients, prone to a life-threatening disease? A previous study indicated that hospitals are not prepared to care for these patients in a way that is safe for the healthcare providers.<sup>15</sup> Organized prophylaxis in the

prehospital setting will even be weaker or unavailable. Healthcare providers were disproportionately infected during the SARS outbreak, with a cluster of infection among medical students exposed to one patient.<sup>13,16</sup> This illustrates the high risk of being part of the second wave of infection for all parties involved. A conflict will arise within caregivers between the duty-of-care for the patients and the risk of putting themselves and their relatives in danger.<sup>17–19</sup> In a survey, 28% of healthcare providers agreed that it would be professionally acceptable to abandon their workplace during a pandemic in order to protect themselves and their families.<sup>20</sup> In the case of hospital administrators, 37% agreed. In the current group, the majority had no ethical objections to participation, but again, it is not clear whether they are truly aware of the risks involved. A multidisciplinary group of experts should provide guidelines regarding professional rights and responsibilities, as well as ethical duties and obligations as a part of the national pandemic preparedness plan.<sup>19</sup>

The limited group of respondents is a weakness of this study and whether or not this sample is an accurate repre-

sentation of the population could be debated. On the other hand, those participating in a study like this are the ones most committed to the cause. Probably the overall willingness and knowledge in the total population will be lower than the figures presented. The distorted risk perception and limited ability to make informed decisions regarding this matter is another limitation of this study. However, in case of a pandemic, these students are the ones who will be brought into action as frontline caregivers.

### Conclusions

Despite limited education, there is a high level of willingness among senior medical students to cooperate in the medical care of patients with avian influenza during a pandemic. However, if these patients are children, students are more reserved. If the authorities plan to include the deployment of medical students in their pandemic disaster plan, it would be wise to include some education on influenza and pandemics in the regular medical curriculum. A legal base for their actions also should be provided. Ethical guidelines on rights and duties in case of a pandemic should be prepared by an international, multidisciplinary group of experts.

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## Appendix—Questionnaire sent to the students

Please scratch or delete false answers and send your document in reply.

### 1. GENERAL INFORMATION

1. Age and sex:
2. University: Antwerp, Brussels, Ghent, Louvain.
3. Study time: 6<sup>th</sup> year, 7<sup>th</sup> year.
4. Professional planning: GP, specialist, uncertain, others
5. Experience in ambulance services or Red Cross. Y/N
6. Did you follow a course in tropical medicine or are you planning to do so? Y/N
7. Do you regularly read medical literature? Y/N  
*Belgisch tijdschrift voor geneeskunde, Nederlands tijdschrift voor geneeskunde, huisarts nu, NEJM, BMJ, Lancet, Medline, others:*
8. Did you get an influenza vaccination yourself? Y/N

### 2. INFLUENZA-RELATED QUESTIONS

1. What's your source of information on avian influenza? (more than one answer possible)  
 College, training, medical literature, lay literature, newspaper, television, Internet, nothing at all.
2. Are you aware of the plan for engaging senior medical students in primary care in case of a pandemic? Y/N
3. What's your opinion on this? Positive, indifferent, negative
4. Would you participate if asked? Y/N
5. Do you think you can do this from technical point of view? Y/N
6. Do you think that you're well educated to do so if necessary? Y/N
7. Even if you have to treat children? Y/N
8. Do you think they can ask this from ethical point of view? Y/N
9. Was your education sufficient on
  - a. Influenza? Y/N
  - b. Avian influenza? Y/N
  - c. SARS? Y/N
  - d. Highly contagious infectious diseases? Y/N
  - e. Epidemics? Y/N
10. Do you think that any engagement in disaster plans should clearly be included in the regular education programs? Y/N
11. Do you think that avian influenza could become a threat to our healthcare? Y/N
12. Does the regular flu vaccine offer any protection for avian influenza? Y/N
13. Which products are indicated in the treatment of avian influenza? (more than 1 answer is possible)
  - a. Aciclovir (Zovirax)
  - b. Amantadine (Amantan)
  - c. Foscarnet (Foscavir)
  - d. Ganciclovir (Cymevene)
  - e. Oseltamivir (Tamiflu)
  - f. Zidovudine (Retrovir)
  - g. Ribavirine (Rebetol, Virazole)
  - h. Zanamivir (Relenza)
  - i. I don't know.
14. How do you estimate the avian influenza infection risk for humans? None, very low, moderate or serious
15. How do you estimate the human to human transmission risk of avian influenza? None, very low or serious?

Thank you for your cooperation.

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