Utilization of Isolation Facilities in Post-SARS Era in Taipei

Tzong-Luen Wang, MD, PhD; Chien-Chih Chen, MD; Chi-Ren Hung, MD

Abstract

To investigate the evolution of isolation facilities in recent 3 years in Taipei, we evaluated and compared the number and occupancy rate of isolation beds available in Taipei at two different time points, that is, July 2003 and July 2005. We collected the data of all emergency response hospitals in Taipei provided by Department of Health, Taipei City Government. There were 12 administrative areas and overall 53 emergency response hospitals which accounted for 20,160 beds in Taipei City in 2005. According to the data obtained from Taipei City Government, the total isolation facilities in Taipei cities decreased from 630 beds to 598 beds in July 2005 ($P<0.05$). Of these isolation beds, 37.8% were distributed in 7 medical centers, 12.8% in Ho-Ping Hospital whereas the remaining 49.4% were distributed in other 16 hospitals. During the follow-up period, the overall bed occupancy rate was 68±7%. The occupancy rate for medical centers was 84±8%, that of Ho-Ping Response Hospital 16±3%, and that of the remaining non-medical hospitals 60±6% ($P<0.001$). In all, 61±8% were indicated due to air-borne or droplet-borne infectious diseases. In detail, there was 70±8%, 93±7% and 45±8% of the patients who fulfilled the criteria (or indication) of isolation ($P<0.05$). This study demonstrated that there is a tendency of decrease in available negative-pressure isolation beds in recent 2 years. It's an important warning phenomenon that the government and the hospitals should pay attention to and make immediate correction.*(Ann Disaster Med. 2006;4: 44-48)*

Key words: Isolation Beds; Emerging Diseases; Preparedness

Introduction

In the viewpoint of disaster medicine, the emerging or re-emerging diseases should be managed as bioterrorism. As stated by Advanced Health in America, the hospitals have multiple missions such as patient care, clinical education, clinical research and community service.[1] Among them, patient care and community care are two major tasks in the situation of community preparedness for emergencies or disasters. In 2003, severe acute respiratory syndrome (SARS) brings a global out-break and also attacks severely Taiwan. The physiological and psychological impacts of SARS urged rapid implementation of negative-pressure isolation facilities in Taiwan.[2]

Although WHO has warned the possible epidemics of another emerging disease, Avian

From Department of Emergency Medicine, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan; Department of Medicine, Taipei Medical University, Taipei, Taiwan; Department of Medicine, Medical School, Fu-Jen Catholic University, Taipei, Taiwan
Address for reprints: Dr. Tzong-Luen Wang, Department of Emergency Medicine, Shin-Kong Wu Ho-Su Memorial Hospital, 95 Wen-Chang Road, Taipei, Taiwan
Received: Nov 10 2005. Revised: Nov 18 2005. Accepted: Nov 25 2005.
TEL: 886-2-28389425 FAX: 886-2-28353547 E-mail: M002183@ms.skh.org.tw

Influenza (AI), the disease remains merely some epidemics so far. During a pandemic, health officials should be health authorities who assert good leadership to exercise and maintain medical resources for public health. According to World Health Organization (WHO), isolation precautions for suspected or confirmed epidemic influenza or other emerging infectious diseases include patient placement, cohorting, barrier precautions for the care of patients with respiratory illness or suspected or confirmed infection, and personal protective equipment (PPE) for the care of suspected or confirmed disease-infected patients. As to patient placement, it is still the first choice to place the patients in negative pressure rooms (airborne infection isolation room). Our past study ever demonstrated the evolution of the hospital capacity for SARS in Taipei. The total number of the isolation facilities instead of the overall HRC was the critical factor that limited the management of emerging infectious disease. After SARS, the hospitals in Taipei increased their isolation facilities immediately in July 2003 and accounted for 70 working days. Because of unpredictability of other emerging diseases such as AI, there should be a constantly available isolation beds or even a steady increase in such facilities. However, medical insurance and ED crowding may pose an impact on the policy of maintaining isolation beds at the usual times. We thus designed the following study to evaluate the evolution of isolation facilities in recent 2 years in Taipei.

Material and Methods

Definition

As stated before,[2] when the capacity of a region's medical resources are exceeded during an incident then it can be termed a disaster. Categories of casualties included: (1) dead and dead-on-arrival; (2) life threatening cases needing immediate attention; (3) non life-threatening cases requiring hospital treatment; (4) casualties not necessarily requiring hospitalization. The following three categories (or capacity) should be considered. The first was severity of an incident in terms of injury (S). It implied that if many seriously wounded casualties are expected (categories 2 and 3) then the S value is 1.5. If only many slightly injured persons are expected then the S value is 0.5. Intermediate situations such as traffic accidents have an S value of 1.0. Hospital treatment capacity (HRC) was defined to be the hourly treatment capacity is the number of category 2 and 3 casualties that can be treated according to normal medical standards in one hour. For general hospitals this is estimated as 3% of the total number of beds. Since most hospitals can work efficiently for up to 8 hours the total capacity is taken to be 8 times the hourly treatment capacity. Medical rescue capacity (MRC) meant that the rescue capacity depends on the number of trained medical professionals available at the disaster site. A trauma team with surgeon anesthesiologist nursing support and supplies can handle about 10 category 2 and 3 patients per hour. Under difficult conditions the capacity to deliver care is reduced. The rescue capacity should equal the hourly hospital treatment capacity of the region. Medical transport capacity (MTC) meant that the transport capacity depends on the number of ambulances with drivers and it is affected by the ease of evacuation the distribution plan and the size of the event. A typical ambulance crew can be expected to handle 2 patients per hour but this may be reduced by poor conditions.

The transport capacity should try to match the hourly hospital treatment capacity of the region. Medical severity index (MSI) was defined to be the result of casualty load times severity of incident divided by capacity of the region.

Data collection

We collected the data of all emergency response hospitals in Taipei provided by Department of Health, Taipei City Government. There were 12 administrative areas and overall 53 emergency response hospitals which accounted for 20,160 beds in Taipei City in 2005. Of the hospitals, seven were the tertiary care medical centers and the remaining 46 secondary hospitals. The isolation facilities of these hospitals and the average duration of hospitalization for the victims of emerging infectious diseases were measured. Emerging infectious diseases are defined as diseases of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future.

Statistical analysis

The categorical data were inputted in Microsoft Excel 2000 for descriptive statistics and further qualitative analysis. These results were analyzed using the chi-squared test. ANOVA with a Newman-Keuls post hoc test was used to determine whether any significant differences existed among continuous data. A $P<0.05$ was considered to be statistically significant.

Results

According to the data obtained from Taipei City Government, the total isolation facilities in Taipei cities decreased to 598 beds in July 2005 ($P<0.05$ vs. 630 in July 2003). Of the 598 isolation beds, 37.8% were distributed in 7 medical centers, 12.8% in Ho-Ping Hospital which was designed as the main isolation hospital in Taipei whereas the remaining 49.4% were distributed in other 16 hospitals. In other words, the overall percentage of isolation beds and their distribution were statistically insignificant different from July 2003 (P=NS).

During the follow-up period (from July 2003 to July 2005), the overall bed occupancy rate was 68±7%. The occupancy rate for medical centers was 84±8%, that of Ho-Ping Response Hospital 16±3%, and that of the remaining non-medical hospitals 60±6% ($P<0.001$). Of these administered to isolation beds, 61±8% were indicated due to air-borne or droplet-borne infectious diseases. In detail, there was 70±8%, 93±7% and 45±8% of the patients who fulfilled the criteria (or indication) of isolation ($P<0.05$). In other words, there were about 59±10%, 14±6% and 27±9% of true occupancy rate (which means the rate of occupancy by the patients fulfilling the criteria of isolation) among three different kinds of hospitals ($P<0.01$).

Discussion

This study demonstrated that there is a tendency of decrease in available negative-pressure isolation beds when emerging diseases did not occur in recent 3 years after SARS epidemics. The occupancy of the isolation at usual times were around two thirds but those who fulfilled true criteria of isolation accounted only about three fifths of total admissions.

Mass casualty incidents always overwhelm the resources of health institutions, and require a sustained demand for health services rather than the other short-acting smaller scale disasters. This situation imposes many new considerations and issues to preparedness planning for hospitals. Because of their emergency services all the time, hospitals will be considered by the public as a vital resource for diagnosis, treatment, and follow-up for both physical and psychological care. The question is whether SARS or other emerging disease endemics are also one of mass casualty incidents.[2] Because of its contiguous nature, the disease control of such infectious diseases needed more personnel than a usual mass casualty did. It should be logistic that the endemics be considered as a long-standing mass casualty. Furthermore, the long-standing character of the event caused the limiting step to be the total capacity (or the number of isolated facilities) instead of three categories of MSI, as our report demonstrated.

This study also revealed an important warning phenomenon, that is, disasters always underscore the importance of having a well-prepared workforce to recognize and respond to public health threats in a unified and coordinated manner. Although more and more emphasis has been placed on the use of exercises and drills to improve individual performance and enhance capacity of public health,[4-7] the true situation of preparedness may be opposite in Taiwan, as reflected by the above observation that the available isolation beds are declining. As stated in the guidelines of preparedness provided by WHO,[8] the additional threat to public health of disease caused by the possible occurrence of chemical and biological weapons events may impose just a moderate addition to the existing burden. Alternatively, such an event may completely overwhelm existing health care systems and resources. Widespread panic and fear are expected to follow any events and result in increased demand for medical and other emergency services. Remedies or countermeasures may be beyond the resources of many countries and therefore only available, if at all, through international cooperation. Prevention, the cornerstone of Public Health, requires a considerable investment in resources at local and national levels to ensure surveillance systems are in place to promptly identify syndromes that may suggest an emerging disease. It is critical to maintain a constant long-term preparedness. Novel cooperative agreements between agencies at national level would need to be operationalized well in advance in order to be effective. Improved surveillance systems specifically designed to rapidly identify common symptoms and alert appropriate personnel are necessary. Sufficient infrastructure to respond, contain, and mitigate an incident is required. In this study, although the occupancy rate of available isolation beds remains low, the decline in absolute number of the beds are still not an adequate condition in consideration of preparedness. In addition, a significant portion of these hospitals did not have an evidence-proven response planning for rapid and efficient bed accommodation. We therefore have to suggest that the department of surveillance should keep high attention to the evolution of isolation beds to avoid the recurrence of SARS phenomenon.

In conclusion, our data revealed that the absolute number of isolation beds is declining in recent 2 years in Taipei. It may suggest that the preparedness cannot be constantly maintained in our country. The government and the hospitals should pay attention to such a phenomenon and make immediate correction.

References

1. American Hospital Association. Hospital preparedness for mass casualty. Final report. August 2002.
2. Wang TL, Chen KC, Lin IY, Chen CC, Chao CC, Chang H. Evolution ofthe Hospital Capacity for SARS in Taipei. Ann Disaster Med. 2003;2:26-31.
3. World Health Organization. Avian influenza, including Influenza A (H5N1), in humans: WHO interim infection control guideline for health care facilities. http://www.wpro.who.int/NR/rdonlyres/EA6D9DF3-688D-4316-91DF-5553E7B1DBCD/0/Infection Control AIinhumans_WHOInterimGuidelines for 2.pdf Assessed on Nov. 12th 2005.
4. Brannen DE, Stanley SAR. Critical issues in bioterrorism preparedness: before and after September 2001. J Public Health Manag Pract. 2004;10:290-8.
5. Tilson H, Gebbie K. The public health workforce. Annu Rev Public Health. 2004;25:341-56.
6. Coffi JP, Lichtveld MY, Tilson H. A research agenda for public health workforce development. J Public Health Manag Pract. 2004;10:186-92.
7. Gebbie K, Merrill J. Public health worker competencies for emergency response. J Public Health Manag Pract. 2002;8:73-81.
8. World Health Organization. Strengthening national health preparedness and response for chemical and biological weapons threats. http://www.who.int/csr/delibepidemics/en/Preparednessproject.pdf Assessed on Nov 12th 2005.