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Original Research

Mortality of hospitalized prisoners compared with other in-patients in a university hospital in Mashhad, Iran

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Abstract

Aim: Prisoners housed in overcrowded jails suffer increased rates of health problems, especially in regard to communicable diseases. If hospitalized, they become a threat to the staff and other patients by the transmission of pathogens, such as HIV and hepatitis viruses. Their higher mortality rate and the costs of their care, compared with other in-patients, are also of concern.

Method: In this retrospective analytical study, the medical and cost-accounting records of all prisoners admitted over a period of 12 months, from March 2010 to March 2011, to the Imam Reza University Hospital in Mashhad, northeastern Iran, were reviewed.

Results: During this period, 65 106 patients were hospitalized, of whom only 390 (0.6%) were prisoners. Nevertheless, this group accounted for 1.7% of the annual hospital administrative costs. The average daily cost of a prisoner was 1.3 times that of the other in-patients. Moreover, the mortality rate for the prisoners was 12.7% compared with 5% for other in-patients (RR= 2.47).

Conclusion: The growing number of hospitalized prisoners have an unfavorable outcome but still incur considerable care costs. It therefore seems reasonable to look for substantial reform in the system of detention, screening and registration of prisoners with health problems as well as adhering to infection control measures, harm reduction and early diagnosis and referral to treatment facilities.

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INTRODUCTION

The world's prison population has increased by varying rates among countries, based on socioeconomic and political factors. The turnover of prisoners is high, and there are currently over 10 million prisoners worldwide. [1] Prisoners have increased rates of mental and physical ill-health, in particular infectious diseases, such as tuberculosis, HIV infection and viral hepatitis, but there is uncertainty as to whether this increased morbidity is associated with raised mortality. [2] The variation in mortality in prisoners is probably influenced by factors such as the virulence or resistance of pathogens, the immune and nutritional status of prisoners with underlying chronic illnesses or under-nutrition, and/or specific behaviors, such as injecting drugs. To date, apart from tuberculosis, blood borne

pathogens, STDs and staphylococcal infections, there have been no controlled studies of the aetiological causes of infection among the prison population. One study reported an outbreak of pneumococcal infection in a large prison in Atlanta, USA, over a four week period involving 46 prison inmates who were found to be suffering from either acute pneumonia or invasive pneumococcal disease due to streptococcus pneumonia serotype 12. Severe overcrowding, inadequate ventilation and altered host susceptibility had all contributed to this outbreak. [3] Another study from Alberta, Canada showed that the rate of bacteraemic pneumococcal pneumonia (BPP) is markedly higher in pregnant women, homeless people and those in prison. In 129 patients with BPP, 4 died within 24 hours of arrival in hospital. Of the *S. pneumonia* isolates, 12.5% were not susceptible to penicillin. [4] Kohli *et*

al. reported two cases of MRSA (Methicillin-resistant *Staphylococcus aureus*) community-acquired pneumonia in correctional officers employed in two separate prisons within the California prison system, one of whom died. [5] Abad-Pérez *et al.* reported that the most common primary and secondary diagnoses among the prison population in Valencia were HIV, hepatitis C, drug dependence, pneumonia and tuberculosis. [6] While, in another study of male prisoners in English and Welsh prisons over a 20-year period, 26 deaths from infectious diseases and 44 from respiratory pneumonia occurred. [2]

Data from the Prisons General Office of Khorasan Razavi Province revealed that the number of prisoners held at the Mashhad Central Prison was nearly four times the prison capacity. In recent years an increasing number of critically ill prisoners from the prison have been hospitalized, requiring ICU care and early intubation. Some have died but others have recovered with considerable morbidity. This study examined the hypothesis that prisoners admitted to the medical departments, had a higher mortality rate compared with non-prisoner patients. We conducted a retrospective study to ascertain whether prisoners admitted with medical conditions (frequently respiratory infections, including pulmonary tuberculosis) differ from other in-patients with the same conditions in regard to the overall mortality rate, poor outcome and the costs of diagnosis and treatment.

MATERIALS AND METHODS

The medical and cost-accounting records of all prisoners admitted from March 2010 to March 2011 to the medical beds at the Imam Reza University Hospital in Mashhad, northeastern Iran, were reviewed. The costs of daily medical care of prisoner and non-prisoner patients were also obtained from the Hospital's Medicare cost records. The data obtained on each prisoner using HIS (Hospital Information System) - that is, the final diagnosis and outcome, as well as the care costs involved - were analyzed by IBM SPSS Statistics 19.0. The Imam Reza University Hospital, with 856 beds, is one of the largest general hospitals in Iran. Its medical wards include Departments of Internal Medicine (91 beds plus 8 ICU beds), Infectious and Tropical Diseases (24 beds plus 6 ICU beds), Dermatology (34 beds), Toxicology (33 beds), Cardiology (40 beds plus 18 ICU beds), a burns ward (60 beds) and an Emergency Ward of Internal Medicine (25 beds) where medical patients can be admitted if there are no beds available in the appropriate departments. Besides, there is a general emergency unit (20 beds) which aims to take care of critically ill patients in their first few hours of admission. Imam Reza is the only hospital to admit prisoners from the

Mashhad Central Prison.

RESULTS

During a period of 12 months, 390 prisoners were admitted to the Hospital. Of these, 179 (45.8%) were admitted to the medical wards; 92.5% were male and 7.5% were female and their mean age was 40.7 ± 12.8 years old (16-85). This male sex predominance was not, expectedly, observed in non-prisoner patients (54.7% male vs. 45.3% female). However, their mean age (51.4 ± 19.9) showed no significant difference. 115 out of 179 prisoners with medical illness (including 44 with intoxication) had been admitted with non-infectious diseases. The 55 remaining prisoners had been admitted with confirmed or suspected infection. Of these, 31 had pneumonia, 12 pulmonary tuberculosis, 3 meningoencephalitis, while 5 were suffering from a sepsis-like syndrome of unknown aetiology (e.g. sepsis syndrome with negative blood cultures and no obvious source of infection yet no other explicable cause such as intoxication, drug overdose or any other medical condition) and 4 from other infectious diseases. Of the 179 prisoners, 57 (31.8%) the reason for admission was a respiratory illness, either infectious or non-infectious. The mean length of stay (LOS) in hospital for prisoners was 10.1 ± 10.7 days, highest for those admitted to the Department of Infectious and Tropical Diseases (15 vs. 8.3 days, p value=0.00), with the Departments of Internal Medicine, Cardiology, the Emergency Ward of Internal Medicine, and Toxicology ranked in descending order. Interestingly, 23.8% of prisoners in the medical wards occupied an ICU bed for at least some days as part of their hospitalization, although the actual numbers who needed ICU care were significantly higher. The number of prisoners with an infection admitted to the ICU was higher in comparison with other prisoners (RR= 1.56). According to the final diagnosis, the LOS was highest for patients with meningoencephalitis (26 ± 14.4 days), compared to those with pneumonia (18.8 ± 16.2 days), other infectious diseases (14 ± 7.3 days), pulmonary tuberculosis (13.2 ± 11.8 days), non-infectious diseases (7.9 ± 9.4 days), and a sepsis-like syndrome of unknown aetiology (7.4 ± 4.1 days). Over the period of this study, 65 106 patients (including 390 prisoners) were hospitalized at the Imam Reza University Hospital. Although the prisoner group comprised 0.6% of all admissions, it was responsible for 1.7% of the annual hospital administrative costs. The average daily cost per patient was 1.3 times higher for prisoners compared with other in-patients, but this was not statistically significant (1940030 vs. 20330530 Rials, p value= 0.66). It was highest for those prisoners admitted to the Department of Cardiology; others in descending order were the Department of Infectious and Tropical

Diseases, Toxicology, Internal Medicine and the Emergency Ward of Internal Medicine. The mortality rate for prisoners in medical wards was 12.7% compared with 5% for other in-patients (RR= 2.47). Those prisoners admitted to the Departments of Infectious and Tropical Diseases (24.4%), the Emergency Ward of Internal Medicine (13.7%), the Departments of Internal Medicine (10.7%), Toxicology (5.1%), and Cardiology (3%) provided the highest rate of in-hospital mortality, respectively. The mortality rate for prisoners with respiratory diseases was 20.6%, compared with other in-patients (9.2%).

In the Department of Infectious and Tropical Diseases, the highest mortality rate was related to those prisoners with respiratory infections and a sepsis-like syndrome of unknown aetiology (29.7%). No deaths occurred in those with other infections. Of the 11 prisoners who died, two suffered from a sepsis-like syndrome of unknown aetiology, 4 had pulmonary tuberculosis, all with a high degree of sputum smear positivity, and 5 had pneumonia. 2 prisoners with sepsis-like syndrome and 2 with pneumonia died in general emergency unit before transferring to the infectious diseases ward. Overall, the highest in-hospital mortality was related to the patients with sepsis-like syndrome of unknown aetiology (80%), pulmonary tuberculosis (33.3%), and pneumonia (22.6%). A quarter of the prisoners with pulmonary TB died within three days following admission. Despite their higher mortality rate, the mean age of these patients was lower than the prisoners admitted to the other medical departments (37.43 and 41.8 years old, respectively; p value= 0.01). When the risk of each medical outcome was compared between prisoners with either infectious or non-infectious illnesses, there were significant differences in mortality (RR=3.1) and in the length of stay in hospital (15 vs. 8.3 days, p value=0.00), but not in costs of care (p value= 0.66). The mortality rate was also significantly higher among prisoners with infection compared with the other in-patients admitted by the Department of Infectious Diseases (RR= 2.06).

The mean length of stay in hospital was not significantly different between these two groups of patients and the other medical (non-infectious) patients during the same time (10.1 vs. 7.9 days, p value=0.559).

DISCUSSION

This study has demonstrated that mortality in hospital was significantly higher for the prisoners who presented with respiratory infections compared with other infections and also non-infectious conditions (RR= 1.2 and 2.6, respectively).

One study showed that the standardized mortality ratios (SMR) for all natural causes is apparently lower in prisoners, but the SMR for respiratory pneumonia and infections is higher. They concluded that, as the turnover of prisoners is high, treatment of infectious diseases during custody would have wider public health implications, especially for the families and partners of inmates, and for the communities to which they return. [2] In a pilot study previously conducted by Sheybani and Naderi at the Imam Reza University Hospital to evaluate the aetiological pathogens of respiratory infection in prisoners admitted over a period of six months (January to June 2012), 13 prisoners were found to have been hospitalized with respiratory infections (unpublished data). Of these, 6 had pulmonary tuberculosis, 5 pneumococcal pneumonia, one MRSA pneumonia, while one had a lung abscess complicated by a pulmonary hydatid cyst. The mortality rate for these prisoners was 38.4%. The present study demonstrated that approximately one half of the admitted prisoners had a medical condition as the reason for hospitalization (179 out of 390 patients, 45.8%). The final diagnosis in a third of these medical patients was a respiratory disease, either due to infectious or non-infectious causes (57 out of 179, 31.8%). Of these, more than 20% had pulmonary tuberculosis, with a constant high degree of sputum smear positivity (12 out of 57, 21%). Over the period of this study, at least 2 patients with smear positive pulmonary tuberculosis were also HIV positive (2 out of 12, 16.6%) with 100% in-hospital mortality. Prisoners with pulmonary tuberculosis requiring hospitalization had a very poor outcome with a mortality rate of 33.3% and with 25% dying by the third day from admission. The risk of tuberculosis in prisons is, on average, 23 times higher than the level in the general population. [7] However, transmission to the general population can occur when prisoners are moved (upon being released or transferred to another facility) or via prison staff and visitors. This phenomenon is better documented and understood now and, consequently, analysts recognize that public health strategies to curb TB should be uniform and comprehensive to include prisons, since they are communities that have higher TB prevalence and incidence rates. Unfortunately, the local TB registry of the Mashhad Central Prison only recorded the names of two of the prisoners with TB in this study; there were in fact 23 inmates (18 of these were new cases) who were on anti-tuberculosis drugs. Of these, 19 had pulmonary tuberculosis. All were sputum smear positive, and 2 had extra-pulmonary tuberculosis. It was observed that most of the prisoners remained too long in the general emergency unit next to other patients, including immune-compromised cases. Some of these prisoners died during the first few hours of

hospital admission. The general emergency unit has just 20 beds, but is usually forced to admit more patients than its capacity. It was also found that the length of stay (the time between hospital admission and transfer to the appropriate medical department) in the general emergency unit, with limited facilities for isolation, was more than 6 hours for over 90% of patients, and more than 24 hours for nearly 30%. Interestingly, most of the prisoners were admitted to this emergency unit during the evening and night shifts (47.5% and 40.8%, respectively), by which time it was usually overcrowded. In this study, according to their case histories, most of the prisoners with pulmonary TB had had symptoms for months. If left untreated, a person with active TB can infect an average of 10-15 people a year, so the total number of prisoners who can become infected in overcrowded jails can be extremely high. Unfortunately, the trend shows that the number of prisoners who are hospitalized now is increasing dramatically, compared with the period of this study. Accordingly, this means more hospitalizations, more costs, and more deaths.

In conclusion, the high number of hospitalized prisoners with likely unfavorable outcomes, but considerable care costs, imposes a great danger in respect to the transmission of virulent and possibly more resistant pathogens to other patients, health care employees and the general community. It thus seems reasonable to look for substantial reform in the system of detention, screening and registration of prisoners with health problems and, in particular, those with contagious diseases. The current situation of overcrowded jails with an inaccurate registry system, and where isolation precautions seem infeasible, continues to generate dangers for the medical centers which are incapable of handling properly this influx of ill-fated human beings.

CONFLICT OF INTERESTS

None.

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