Infectious risk for healthcare workers: evaluation and prevention

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Abstract

Exposure to pathogenic agents is a major occupational risk factor in healthcare facilities. The most common pathogenic agents are human immunodeficiency virus, hepatitis B and C viruses, and Mycobacterium tuberculosis. In Italy, about 70-80% of all cases of exposure to biological agents result from injuries caused by needles or other sharp instruments used during healthcare procedures. These accidents place a high economic burden on healthcare facilities. Indeed, each event is estimated to cost around €375. Various studies have shown that the adoption of needlestick-prevention devices reduces occupational exposure to biological risk. At regulatory level, Italian Legislative Decrees 81/08 and 19/14 provide for measures to protect healthcare professionals from biological exposure to pathogenic agents.

Healthcare-associated infections (HAIs) are infections acquired during care procedures administered in hospital and in other healthcare facilities (residential care facilities, dialysis services, day-hospitals and day-surgeries) as well as in the home. They usually affect patients, although healthcare professionals, students, and volunteer assistants are also at risk. Studies of HAIs in terms of patient safety and related public health problems underscored the need for systematic prevention and control strategies (1, 2). Exposure to biological agents is the main occupational risk factor in healthcare facilities. Healthcare workers (HCWs) are more frequently exposed to subjects affected by diseases caused by transmissible pathogens and to potentially contaminated materials than is the general population (3).

The pathogenic agents most frequently implicated in cases of occupationally acquired infection are the human immunodeficiency virus (HIV), hepatitis C (HCV) and hepatitis B (HBV) viruses, and Mycobacterium tuberculosis (4, 5). The latter is a re-emergence risk and the World Health Organization (WHO) declared it a serious public health problem and a worldwide concern already in 1993. Notably, the incidence and prevalence of latent tuberculosis infection and overt tuberculosis infection are increasing in HCWs (6).

In Italy, Legislative Decree 81/08, supplemented and modified by Legislative Decree 106/09, regulates the use of biological agents in the workplace, including teaching and research environments, and has established work protocols and safety

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measures. In addition, the new Title X bis ("Protection against cuts and puncture wounds in the hospital and the healthcare sector") of the Legislative Decree 19/2014 sets out the measures for preventing and protecting workers involved in healthcare activities. The Decree requires Employers to carry out a specific risk assessment and to take specific preventive measures. The Decree also foresees severe penalties in the event of non-compliance with these obligations. The aim of the Decree is to eliminate, or at least reduce, the risk of injury from sharp medical devices and the resulting risk of infection by implementing preventive measures and specific staff training (7-9).

The WHO estimates that every year more than 3 million HCWs are wounded by needles/sharp objects contaminated with at least one of the afore-mentioned viruses. In Italy, about 70-80% of all accidents related to exposure to biological agents are due to punctures or wounds caused by needles or sharp instruments used during healthcare procedures (10).

According to the Italian Occupational Risk Study on HIV (SIROH) (11), the two most common routes of exposure are mucocutaneous (25% of total exposures) and percutaneous (75% of total exposures). Notably, the average rate of percutaneous and mucocutaneous exposure is 5-13 exposures/100 beds per year, and 63% of percutaneous exposures is due to accidental punctures with a needle, 33% to puncture/injury with other needle/sharp devices (lancets, scalpels, suture needles, razors, scissors, etc), and 4% to other objects/devices. Lastly, the study found that the most hazardous medical practices are injections (25%) and placement of needle cannulas. These accidents place a significant burden on healthcare facilities. Indeed, lengthy medical procedures must be performed after each accident to determine whether a serious illness has been contracted and, in the positive case, the patient may have to undergo long-term, or even life-long, treatments.

Irrespective of the type of accidental injury, the direct costs (which amount to ~375 €/event) are mainly related to the following factors:

- determination of serological status of the patient source
- determination of serological status of the exposed worker
- post-exposure prophylaxis for HBV-positive source
- post-exposure prophylaxis for HIV-positive source
- therapeutic monitoring for prophylaxis
- postoperative serological monitoring of the worker (up to 12 months) (12).

Several studies have shown that accidental wounds in HCWs can be prevented by adopting Needlestick-Prevention Devices (NPDs). Indeed, the adoption of NPDs reduced the consequences of occupational exposure to biological risk by between 63% and 100% (3). Moreover, according to the SIROH study, the introduction of NPDs in Italy reduced specific exposure rates by about 75% (11).

Italian Legislative Decree 19/14 (art. 286 sexies) lists specific measures to prevent cutting and puncture injuries, and recommends the adoption of NPDs. It also recommends staff training in the correct use of cutting medical devices, which, moreover, should be equipped with protection and security mechanisms; in the procedures to be implemented for the notification of injuries and for post-exposure monitoring; and in the type of prophylaxis in case of injury or bruising, based on the assessment of the infection potential of the source (9).

Consequent to Italian Legislative Decree 19/14, the University Hospital “Federico II” of Naples has set up a program to control the risk of infection that is based on collaboration between
the Health Directorate and occupational physicians (namely, the doctors responsible for Health and Safety at the workplace) of the Departments of Hygiene and Infectious Diseases to identify the causes of each injury and appropriate preventive and corrective measures. This program is based on specific training and on procedures of self-control to ensure the correct application of the procedures as well as on active epidemiological surveillance measured through rates of incidence.

**Riassunto**

**Rischio infettivo per gli operatori della Sanità: valutazione e prevenzione**

In ambiente sanitario l’esposizione ad agenti biologici rappresenta, di fatto, uno dei principali fattori di rischio occupazionale presente e gli agenti patogeni maggiormente implicati sono i virus dell’immunodeficienza umana, dell’epatite B e C ed il *Mycobacterium tuberculosis*. In Italia si stima che il 70-80% di tutti gli infortuni da esposizioni a rischio biologico sia riferibile a punture o ferite con aghi o altri taglienti utilizzati nel corso di procedure assistenziali. Tali infortuni comportano, per le strutture sanitarie, un rilevante onere economico, stimato intorno ai 375 €/evento. Diversi studi hanno dimostrato che l’adozione dei Dispositivi di Prevenzione per gli Aghi è estremamente efficace nel ridurre l’esposizione occupazionale al rischio biologico. A livello normativo, il D.Lgs. 81/08 e successive modifiche ed il D.Lgs. 19/14, prevedono specifiche misure di prevenzione e protezione per i lavoratori che, a qualsiasi titolo, prestano servizio in ambito sanitario e ospedaliero.

**References**


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