Standard precautions in haemodialysis—the gap between theory and practice

Dolores Arenas Jiménez and José Sánchez-Payá

Servicio de Nefrología del Sanatorio Perpetuo Socorro (Alicante) and Unidad de Control de Infecciones y Epidemiología, Hospital de Alicante, Alicante, Spain

Del dicho al hecho hay gran trecho (prevention—easier said than done) Introduction

There is evidence that haemodialysis entails a high risk of exposure to blood-borne viruses. Until the mid 1970s, the most important hygienic problem in haemodialysis units was hepatitis B virus (HBV) [1]. After it had come under control, hepatitis C virus (HCV) became the most prevalent viral infection causing the well-known associated clinical sequelae [2,3]. The nosocomial mode of transmission has apparently become the most frequent mode of transmission on dialysis [4], since transmission of HCV via transfusion has been practically eliminated thanks to serological monitoring of blood donors and diminution of transfusion requirements after introduction of erythropoietin.

The magnitude of the risk of transmission by health care personnel in dialysis units is unknown, but should be small if standard precautions recommended by the Centre for Disease Control (CDC) are adhered to [5,6]. Hand washing and use of gloves are the most simple, but also the most important, methods—assuming that they are implemented. This raises the following question: are such measures actually adhered to in haemodialysis units? On which occasions are such precautionary measures necessary? Which measures are most frequently adhered to in clinical practice? Which measures are most frequently neglected?

Nosocomial transmission of HCV in haemodialysis units

Taking HCV as an example, several observations argue that nosocomial transmission is the principal mode of infection. On the one hand, some patients with HCV...
had never received a blood transfusion, and this is true for up to 40% of seropositive patients in some units [7]. The prevalence of HCV-positive patients on haemodialysis is higher than for patients maintained on other treatment modalities, e.g. home haemodialysis and peritoneal dialysis [8, 9]. Sampietro et al. [10] and other authors [11] studied HCV-positive patients dialysed in one haemodialysis unit and analysed the 5’-region of the viral genome which is highly conserved. In this population, one type of virus which was rare in the general population, was most frequent, suggesting nosocomial transmission. Isolation of HCV-positive patients effectively reduced the incidence of HCV infection in haemodialysis units [12, 13]. This observation is compatible with the notion that the haemodialysis technique itself provides a mode of viral transmission.

Transmission of HCV by haemodialysis is controversial, and the data on this point are contradictory. The dimensions of the virus particles and the dialysis membrane characteristics make this mode of transmission impossible on theoretical grounds, at least in the absence of membrane rupture. In a study performed in our unit, we found an association between certain dialysis machines and infection by HCV [3], but attempts to isolate HCV in the ultrafiltrate remained unsuccessful (unpublished data) as was also found in most other studies [14, 15]. Only some authors noted passage of viral particles into the ultrafiltrate when very high transmembrane pressures were applied and microleaks possibly occurred [16]. Probably the most important mode of transmission which, unfortunately, is the most difficult to document and control, is patient–patient transmission either directly or indirectly by contaminated surfaces.

**Standard precautions**

The recommendations concerning prevention and control of HCV and human immunodeficiency virus (HIV) infection have been laid down in specific protocols, which have been disseminated widely [5]. These recommendations are based on the systematic implementation of ‘universal precautions’ which currently are part and parcel of the concept of ‘standard precautions’ [6]. They have two goals, to avoid transmission of the microorganisms first from patient to health care personnel and second from health care personnel to patients.

The ‘standard precautions’ basically comprise four points. (i) washing of hands and cutaneous surfaces after contact with blood and other body fluids and after removal of gloves, (ii) utilization of gloves during contact with blood, body fluids, secretions, excretions and contaminated material, (iii) utilization of other barrier methods (masks, protective glasses and clothes, etc.) during patient care which can easily lead to splashes and aerosol formation; and (iv) adequate cleaning, disinfection and sterilization of all reutilized material.

**Activities in haemodialysis which necessitate precautions (hand washing and gloves)**

In all activities which lead to direct contact with blood products, it is necessary to wear gloves and to wash hands before and after said activities. Which recommendation should be made for the different dialysis-related activities? Hand washing is necessary when dialysis material is made ready for use; hand washing is also necessary whenever the patient is connected to and disconnected from the machine, particularly for dressing of the puncture site and, furthermore, whenever the patient requires attention in the course of the dialysis session and the blood line is manipulated.

It is not necessary to wash hands before used material is disposed of and before the room is cleaned, but gloves must be worn for these activities and hands must be washed after the activities are completed.

**Are standard precautions adhered to in haemodialysis units?**

It is necessary to stress that it is important that the staff handles adequately all material which is contaminated with blood of HCV-positive patients in order to avoid dissemination of the virus in dialysis units. It is obligatory to wear gloves and to wash hands before and after handling blood lines or potentially infectious material. Furthermore, it is necessary to clean bloodstains carefully and not to use leftover material that has been in contact with the patient. Although these rules are mandatory, unfortunately they are not always adhered to.

These proposals are apparently simple but when one monitors whether they are adhered to or not, a high degree of non-compliance by health care personnel is noted. This corresponds to what has been found in intensive care units by others too [17, 18].

**Isolation or meticulous application of standard precautions?**

Isolation of infectious patients in separate units interrupts potential chains of transmission and eliminates nosocomial infection, as documented in several studies [12, 13]. However, the issue remains whether such costly measures are obligatory or whether strict application of standard precautions is sufficient. Some authors, e.g. Gilli et al. [19], advocate no separation of infectious patients, but strict application of universal precautions, because a similar reduction in the incidence of hepatitis C is seen with and without isolation. Jadoul et al. [29] also advocate strict application of standard precautions as a way to control infection in the haemodialysis unit. Isolation is of proven efficacy for controlling infection. In certain circumstances, it may still be necessary to adopt this measure (units with very high prevalence or control of outbreaks of hepatitis C). This issue raises economic as well as
logistic problems. It is difficult to know on which criteria the separation of patients should be based: with the available methods, it is difficult to identify the highly infectious patient. Because of their immuno-suppressed state, some dialysed patients do not have increased transaminases; such patients have no antibodies but are PCR-positive; in some patients, PCR becomes negative after treatment with interferon, but one cannot exclude the possibility that they turn positive again some time after cessation of treatment.

Perspectives

It is necessary to consider why adherence to standard precautions by the health care personnel in dialysis units is so low. Although we do not have quantitative data, generally health care personnel are apparently more concerned about the possibility of infection by the patient. In contrast, they tend to disregard their role in transmitting HCV to the patient [21]. We believe this explains why the use of gloves was the measure which has been adhered to most frequently, followed by hand washing after (and less frequently before) manipulations [22]. Another factor which contributed to non-compliance is the time factor: staff have to work in a hurry because the shifts closely follow each other and because the timetable has to be strictly adhered to. The poor compliance of staff with standard precautions obliges us to give instructions on the mechanism of transmission of HCV in dialysis units and its potential prevention repeatedly on different occasions. Staff must be made conscious of the importance of systematic adherence to preventive measures. This simple measure could diminish the incidence of hepatitis C and would also have the advantage of being cheap. The impact of instructions given to health care personnel must be evaluated, i.e. adherence to recommendations before and after instruction and the impact of instruction on the incidence of HCV infection.

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References


Editor's note

Please see also the Clinical Observation article by Arenas Jiménez (pp. 1001–1003 in this issue).