Prevention of HBV and HCV 
in hemodialysis patients

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ESRD on chronic hemodialysis are at risk for:

- HBV and HCV infection

- HBV is the most efficiently transmitted blood-borne virus in the hemodialysis setting
HBV is transmitted by:

Percutaneous or permucosal exposure to infectious blood or to body fluids that contain blood.

With virus titers in blood this high, body fluids containing serum or blood also can contain high levels of HBV and are potentially infectious.

HBV at titers of 100-1000 virions/mL can be present on environmental surfaces in the absence of any visible blood and still result in transmission.
Hepatitis B Vaccine

Hepatitis B vaccine has been recommended for both hemodialysis patients and staff

Recombivax HB™ contains 10–40μg of HBsAg protein per mL

Engerix-B® contains 20 μg/mL.
Primary vaccination

Three intramuscular doses of vaccine, with the second and third doses given 1 and 6 months, respectively, after the first.

An alternative schedule of four doses given at 0, 1, 2, and 6 months to hemodialysis patients has been approved for Engerix-B®.
Compared with adults with normal immune status

The proportion of hemodialysis patients who develop a protective antibody response after vaccination (with higher dosages) is lower.

For those who receive the three-dose schedule, the median is 64% (range: 34%–88%)

For those who receive the four dose schedule, the median is 86% (range: 40%–98%)
Trials for Improvement of Vaccine-induced Seroconversion Rate

Changing the injection mode (the intradermal route vs. the intramuscular route or the combined use of the intradermal and intramuscular routes)

- No data exist on long-term protection from this route of Id. Data are insufficient to evaluate alternative routes (e.g., intradermal) for vaccination among hemodialysis patients.
The use of adjuvants

- Levamizole p.o.
- Thymopentin s.c.
- GmCSF
- IL-2
- Soluble CD40 supplementation with zinc aspartate

The immune response to HB vaccine continues to be unsatisfactory despite adjuvantation.
The new Hepatitis B recombinant DNA vaccine adjuvanted by AS04C containing 3-0-desacyl-4’-monophosphoryl lipid A adsorbed on aluminium phosphate (Fendrix) was reported be more effective in HD patients than the older recombinant vaccine (Engerix)

Pre-S/S vaccines should provide faster and more augmented sero-conversions rates compared to recombinant vaccines.
Some studies have demonstrated higher antibody response rates could be achieved before they become dialysis dependent, particularly patients with mild or moderate renal failure.

After vaccination protective antibody response:

- 86% with serum creatinine levels <4.0 mg/dl (mean: 2.0 mg/dl)
- 37% of those with serum creatinine levels >4.0 mg/dl (mean: 9.5 mg/dl)
- only 12% of whom were predialysis patients
Efficacy of HBV vaccination in HD 53%–78% after preexposure immunization

Furthermore, since the hepatitis B vaccine became available, no HBV infections have been reported among vaccinated hemodialysis patients who maintained protective levels of anti-HBs.

This observation has been particularly striking during HBV infection outbreaks in this setting.
Antibody Persistence

Among adults on hemodialysis who responded to the primary vaccination series:

Antibody remained detectable for 6 months in 80%–100% (median: 100%) of persons and

For 12 months in 58%–100% (median: 70%)
Duration of Vaccine-Induced Immunity

Among persons with normal immune status who respond to the primary series of hepatitis B vaccine, protection against hepatitis B persists even when antibody titers become undetectable.

However, among hemodialysis patients who respond to the vaccine, protection against hepatitis B is not maintained when antibody titers fall below protective levels. (10 mu/ml)
HBV is relatively stable in the environment and remains viable for at least 7 days on environmental surfaces at room temperature.
HBsAg has been detected in dialysis centers on:
clamps, scissors, dialysis machine control knobs, and doorknobs.
Blood-contaminated surfaces that are not routinely cleaned and disinfected represent a reservoir for HBV transmission.

Dialysis staff members can transfer virus to patients from contaminated surfaces by their hands or gloves or through use of contaminated equipment and supplies.
Most HBV infection outbreaks among hemodialysis patients were caused by cross contamination to patients via:

a) Environmental surfaces, supplies (e.g., emostats, clamps), or equipment that were not routinely disinfected after each use

b) Multiple dose medication vials and intravenous solutions that were not used exclusively for one patient;
c) Medications for injection that were prepared in areas adjacent to areas where blood samples were handled; and

d) Staff members who simultaneously cared for both HBV-infected and susceptible patients
Recommend:

a) Serologic surveillance of patients (and staff members) for HBV infection, including monthly testing of all susceptible patients for HBsAg.

b) Isolation of HBsAg-positive patients in a separate Room

c) Assignment of staff members to HBsAg-positive patients and not to HBV susceptible patients during the same shift
d) Assignment of dialysis equipment to HBsAg-positive patients that is not shared by HBV-susceptible patients

e) Assignment of a supply tray to each patient (regardless of serologic status)

f) Cleaning and disinfection of nondisposable items (e.g., clamps, scissors) before use on another patient
g) Glove use whenever any patient or hemodialysis equipment is touched and glove changes between each patient (and station)

h) Routine cleaning and disinfection of equipment and environmental surfaces.
Among hemodialysis patients

The segregation of HBsAg-positive patients and their equipment from HBV susceptible patients resulted in 70%–80% reductions in incidence of HBV infection
National surveillance data have demonstrated that independent risk factors among HD

Presence of >1 HBV-infected patient in the hemodialysis center who is not isolated,
As well as a <50% hepatitis B vaccination rate among patients.
Risk factors associated with HCV infection among hemodialysis patients:

- History of blood transfusions
- The volume of blood transfused and
- Years on dialysis

As the time patients spent on dialysis increased, their prevalence of HCV infection increased from an average of 12% for patients receiving dialysis <5 years to an average of 37% for receiving dialysis >5 years.
Hepatitis C Virus Infection

As well as investigations of dialysis-associated outbreaks of hepatitis C, indicate that HCV transmission most likely occurs because of inadequate infection control practices.
Cross-contamination among patients were observed, including:

a) Equipment and supplies that were not disinfected between patient use

b) Use of common medication carts to prepare and distribute medications at patients’ stations

c) Sharing of multiple dose medication vials, which were placed at patients’ stations on top of hemodialysis machines
d) Contaminated priming buckets that were not routinely changed or cleaned and disinfected between patients

e) Machine surfaces that were not routinely cleaned and disinfected between patients; and

f) Blood spills that were not cleaned up promptly
In particular

Supply carts were moved from one station to another contained both clean supplies and blood-contaminated items

Small biohazard containers

Sharps disposal boxes

Used vacutainers containing patients’ blood.
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Thanks for your attention