Prevention of Bacterial & Viral Cross-Infection in Dialysis Unit

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Area Clinical Manager, Cardiovascular Stream
Co-Director, Liverpool Renal Research Centre
Sydney South West Area Health Service

School of Nursing
The University of Sydney

School of Nursing
The University of Tasmania
Happy New Year
From Sydney
Area: 7,682,300 sq km
Population: 21 million
Dialysis population: 10,062 patients
Sydney South West Area Health Service

The new area will include the following public hospitals and health facilities:

- Balmain Hospital
- Bankstown/Lidcombe Hospital
- Bowral Hospital
- Braeside Hospital
- Camden Hospital
- Campbelltown Hospital
- Canterbury Hospital
- Carrington Centennial Hospital
- Concord Repatriation General Hospital
- Fairfield Hospital
- Karitane Mothercraft
- Liverpool Hospital
- Queen Victoria Memorial Home
- Royal Prince Alfred Hospital
- Rozelle Hospital
- Sydney Dental Hospital
- Thomas Walker Hospital (Rivendell)
- Tresillian
Objectives

• To outline the common bacterial & viral infection amongst the haemodialysis population

• To convey a basic understanding of the common infectious disease processes (i.e. mode of transmission, treatment, etc.)

• Discuss the management on common bacterial & viral infection

• To identify strategies for preventing cross-infection
Common Bacteria and Viruses in Dialysis

• Blood-Borne Viruses (BBV)
  – Hepatitis B
  – Hepatitis C
  – Human Immunodeficiency Virus

• Multi Resistant Organism (MRO)
  – Methycillin resistant staphylococcus
  – Vancomycin resistant enterococcus
Hepatitis B Virus (HBV)

- Non-cytopathic virus Transmission
- Perinatal transmission (most cases)
- High prevalence amongst endemic countries — China, South East Asia, Pacific nations
- Adults transmission via sexual contact & IV drug use
- Australia HBV carrier (160,000 – 200,000)
- Needle stick injury - Risk of percutaneous exposure, 30% (DNA +ve); 3% (non-DNA +ve)
# SIMPLIFIED VACCINATION SCHEMA

<table>
<thead>
<tr>
<th>PATIENT SEROLOGY</th>
<th>Action</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEPB sAg +ve</td>
<td>HEPB sAb&lt;10</td>
<td>No vaccination</td>
</tr>
<tr>
<td></td>
<td>HEPB sAb&gt;10</td>
<td>No vaccination</td>
</tr>
<tr>
<td>HEPB sAg -ve</td>
<td>HEPB sAb&lt;10</td>
<td>NEEDS VACCINATION or BOOSTER</td>
</tr>
<tr>
<td></td>
<td>HEPB sAb&gt;10</td>
<td>No vaccination</td>
</tr>
</tbody>
</table>
Hep B sAb <10, Hep B sAg –ve

Vaccination x 4 (0, 1, 2, 6 months)

Repeat serology @ end of the course.

Hep B sAb >10

Repeat serology after 6 months

Hep B sAb <10

Give booster vaccinations x 4 over 6 months, second course (0, 1, 2, 6)

Hep B sAb >10

Repeat serology in 6 months.

Hep B sAb <10, Pt. does not seroconvert, no more vaccination

Repeat serology every 6 months

Hep B vaccination flow chart

Liverpool Hospital
## Summary of Policies (HBV)

<table>
<thead>
<tr>
<th>Policy</th>
<th>Latest Version</th>
<th>Screening</th>
<th>Frequency of screening</th>
<th>Vaccination for Patient</th>
<th>Vaccination for Staff</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Health Infection Control Policy</td>
<td>2007</td>
<td>Yes</td>
<td>Not mention</td>
<td>Yes</td>
<td>Yes</td>
<td>Separation of patients by room or area and use of a dedicated machine is recommended</td>
</tr>
<tr>
<td>Victoria Health Infection Prevention Program</td>
<td>2006</td>
<td>Yes</td>
<td>Not mention</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Australia &amp; New Zealand Society of Nephrology, DNT&quot; Sub-Committee &quot;Consensus Statement&quot;</td>
<td>2001</td>
<td>Yes</td>
<td>3-6 monthly</td>
<td>yes</td>
<td>Not mention</td>
<td>Use of separate rooms and dedicated machines is recommended</td>
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<tr>
<td>Sydney South West Area Health Service (Western Zone)</td>
<td>2007</td>
<td>Yes</td>
<td>6 monthly</td>
<td>yes</td>
<td>Yes</td>
<td>Use of single room and dedicated machine</td>
</tr>
</tbody>
</table>
Hepatitis C (HCV)

- **Virus** — flavivirus family
- **Discovered** — infected serum injected to chimpanzees — (non-A, non-B hepatitis) — antibody test
- **Transmission**
  - Predominantly parenteral (drug use) — 80%
  - Immigrant population - poor infection control practices during procedures (vaccination, European & Asian acquired); chemoprophylaxis program (for schistosomiasis, Egyptian acquired)
  - Sexual transmission — (controversial) very low level (higher: if HIV +ve & high HCV viral load; presence of blood in genital tract - menstruation)
  - Perinatal transmission — 5% of deliveries (higher if HIV +ve)
## Summary of Policies (HCV)

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<td>2001</td>
<td>Yes</td>
<td>3-6 monthly</td>
<td>Vaccine not available</td>
<td>Vaccine not available</td>
<td>Isolation should be considered</td>
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<tr>
<td>Sydney South West Area Health Service (Western Zone)</td>
<td>2007</td>
<td>Yes</td>
<td>6 monthly</td>
<td>Vaccine not available</td>
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Human Immunodeficiency Virus (HIV)

- Retrovirus
- First manifestation – early 1980s
- Human infection – early 20th Century (transmitted zoonotically to humans from primates in Africa)

Mode of transmission:
- Sexual contact
- Blood to blood contact (blood transfusion, needle stick injury (0.3%))
- Mother to child (20-45%)
# Summary of Policies (HIV)

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<td>Yes</td>
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<td>Vaccine not available</td>
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"The Code, not even the Supreme, can crack!"
Hepatitis Registry

- A central database for all ESRD patients
- To keep track of the serology & Hep B immunization status
- To prevent cross-infection amongst dialysis patients
- Registry created by Renal Dialysis CNC in December 2005
- Started collecting data from March 2005 to present
The Registry...

- Each unit to update the registry as needed, i.e. new patients, serology/vaccination updates
- CNC to collate all data entered every 6 months
- CNC to maintain the registry & alert units of patients requiring follow-up (i.e. vaccination, serology, etc.)
- CNC to submit quarterly report to Director of Dialysis
- This initiative was awarded
Performance Indicators

1. Performance Indicator: *Number of patients with unknown serology at time of dialysis*

   Numerator: Number of patients with unknown serology
   Denominator: Total number of acute dialysis (including late referral i.e. <3 months)

2. Performance Indicator: *Number of patients being vaccinated*

   Numerator: All patients having received even a single Hep B vaccination
   Denominator: All patients (HD+PD) on maintenance dialysis with Hep BsAb <10 that require vaccination (excluding non-seroconvert patients)
Multi-Resistant Organism (MRO)
Methycillin Resistant Staphylococcus Aureus (MRSA)

- Gram positive coccus
- Found in wounds, intravascular lines
  - Humans are the agreed reservoir – MRSA can colonise any favourable area on the body (nose, armpits, etc.)
- Transmission
  - Poor aseptic technique
  - Poor hand-washing technique
  - Spread primarily by close & direct contact
  - Sharing & multi-use of equipment without appropriate disinfection/sterilisation
  - Misuse of antibiotics
## Summary of Policies (MRSA)

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<th>Frequency of screening</th>
<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Health Infection Control Policy</td>
<td>2007</td>
<td>No</td>
<td>N/A</td>
<td>Separation area for infected and colonised patients</td>
</tr>
<tr>
<td>Victoria Health Infection Prevention Program</td>
<td>2006</td>
<td>Routine screening not recommend</td>
<td>N/A</td>
<td>Dialyse in an area separate or segregated from other patients</td>
</tr>
<tr>
<td>Australia &amp; New Zealand Society of Nephrology, DNT&quot; Sub-Committee &quot;Consesus Statement&quot;</td>
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Vancomycin Resistant Enterococcus (VRE)

- Enterococci
- Susceptible people: immuno-compromised patients; patients with IV lines
- Clinical infection requires treatment
- VRE – first described in the UK in 1980s
  - Multi-drug resistant
  - Colonized patients (majority)
  - Clinical infection – expensive and difficult to obtain antibiotics may have to be administered
## Summary of Policies (VRE)

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<th>Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW Health Infection</td>
<td>2007</td>
<td>VRE screening may be a requirement prior to transfer between dialysis units</td>
<td>Prior to transfer</td>
<td>Separation of patients by room or area and use of a dedicated machine is recommended</td>
</tr>
<tr>
<td>Control Policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victoria Health Infection Prevention Program</td>
<td>2006</td>
<td>Suggest for in-centre dialysis patient only</td>
<td>Not mention</td>
<td>Dialyse in an area separate or segregated from other patients</td>
</tr>
<tr>
<td>Western Australia</td>
<td>2006</td>
<td>No</td>
<td>N/A</td>
<td>No</td>
</tr>
<tr>
<td>Guidelines</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3-6 monthly</td>
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<tr>
<td>Sydney South West Area Health Service (Western Zone)</td>
<td>2007</td>
<td>Yes until Mid 2009</td>
<td>3-6 monthly</td>
<td>Dedicated Isolation Dialysis Unit since 2002</td>
</tr>
</tbody>
</table>
The Art of Isolation
MRO - Transmission

• Environment (colonised)

• Hands of health care workers

• Spread from patient to patient
WHY ARE RENAL PATIENTS SUSCEPTIBLE to MRO?

• Lots of Vascaths, CAPD peritonitis, access cannulations
• Lots of infections -> lots of antibiotics
• Lots of comorbidities
  – age and diabetes
• Dialyse in close proximity
• Majority hospital based treatments
• All use the same toilet
• Interhospital transfers/ holiday patients
Dialyser Membrane
What is the risk of environmental contamination by VRE-colonised patients who attend for Outpatient appointments, radiological procedures & hemodialysis?
Melbourne VRE Study

- 15 mth surveillance program (April 1998 - July 1999)
- Three large university teaching hospitals
  - ARMC, MMC, Alfred Hospital
  - Strict infection control/isolation of colonised patients
- Units:
  - ICU (General, Road trauma, Cardiothoracic)
  - Renal
  - Haematology/Oncology
  - Transplant (Liver, Lung)
- 3458 patients; 4215 admissions; 8953 swabs
The Inanimate Environment Can Facilitate Transmission

~ Contaminated surfaces increase cross-transmission ~

Contaminated sites during Outpatient, radiology and H/D procedures

- Chair arms 3/26 (12%)
- Chair seat 13/26 (50%)
- Couch/trolley 8/20 (40%)
- Tap handles 1/36 (3%)
- Door handles 1/36 (3%)
- Stethoscope 1/36 (3%)
- BP cuff/bulb 3/36 (8%)
- Hemodialysis machine 1/16 (6%)
- HCW gloved hands 3/26 (12%)
- HCW unglove hand 1/36 (3%)
- HCW gown 7/36 (19%)

Prof. M. Lindsay Grayson, Infectious Diseases Department
Austin & Repatriation Medical Centre
Department of Medicine, University of Melbourne
The Caring for Australian Renal Impairment (CARI)
Improving Patient Outcomes: Vascular Access Implementation

Project 2008 - 2009

Implementation of CARI Guidelines on Timing and Type of Vascular Access Formation in Australasian CKD Patients

K. Polkinghorne, www.cari.org.au
Acute vascular access catheters for haemodialysis: Complications limiting technique survival

Table 4 Screening for infection

<table>
<thead>
<tr>
<th></th>
<th>Patient no. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AVAC routine Tip culture results</strong></td>
<td></td>
</tr>
<tr>
<td>Coagulase negative Staphylococci (CNS)</td>
<td>89 (46)</td>
</tr>
<tr>
<td>Negative culture</td>
<td>65 (33)</td>
</tr>
<tr>
<td>Multi-resistant Staphylococcus aureus (MRSA)</td>
<td>17 (9)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>17 (9)</td>
</tr>
<tr>
<td>Corynebacteria</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Candida</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Chryseomonas</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Gram negative rods (GNR)</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>2 (1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>195</td>
</tr>
<tr>
<td><strong>Blood cultures</strong></td>
<td></td>
</tr>
<tr>
<td>Negative culture</td>
<td>17 (40)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>12 (29)</td>
</tr>
<tr>
<td>MRSA</td>
<td>8 (19)</td>
</tr>
<tr>
<td>Coagulase negative Staphylococci (CNS)</td>
<td>3 (7)</td>
</tr>
<tr>
<td>E. coli</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Serratia</td>
<td>1 (2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>42</td>
</tr>
</tbody>
</table>

JEFFERYS, A.; CHOW, J; SURANYI, M. Nephrology 2003

55%
SUCCESSFUL CONTROL OF VRE COLONISATION

• Publications attest to effectiveness of intervention including:
  – Active surveillance
  – Contact isolation
  – Cohorting
  – As well as altered antibiotic policies

• PREVENTION BETTER THAN TO HAVE TO DEAL WITH ACUTE EPIDEMIC CRISIS
Cumulative VRE Data for In-Centre and Isolation Haemodialysis – March 2003 to June 2009

Liverpool Hospital
Isolation Rooms in the In-Centre Haemodialysis Unit
The VRE Isolation
Haemodialysis Unit
in Liverpool Hospital
A way forward for VRE

WORKING PARTY REPORT

Guidelines for the control of glycopeptide-resistant enterococci in hospitals

B.D. Cookson\(^a\), M.B. Macrae\(^b\*,\), S.P. Barrett\(^d\), D.F.J. Brown\(^d\), C. Chadwick\(^e\), G.L. French\(^f\), P. Hateley\(^g\), I.K. Hosein\(^h\), J.J. Wade\(^j\)

\(^a\)Laboratory of Healthcare Associated Infection, Specialist and Reference Microbiology Division, Health Protection Agency, London, UK
\(^b\)Department of Clinical Microbiology, University College London Hospitals NHS Trust, London, UK
\(^c\)Department of Medical Microbiology, Charing Cross Hospital, London, UK
\(^d\)Clinical Microbiology and Public Health Laboratory, Addenbrooke’s Hospital, Cambridge, UK
\(^e\)Infection Control, Christie Hospital NHS Trust, Manchester, UK
\(^f\)Department of Infection, Guy’s, King’s and St Thomas’ School of Medicine, St Thomas’ Hospital, London, UK
\(^g\)Pathology and Patient Services, St Bartholomew’s Hospital, London, UK
\(^h\)Department of Infection Prevention and Control, Cardiff and Vale NHS Trust, Wales and Public Health Service, UK
\(^i\)Health Protection Agency London, King’s College Hospital, London, UK
Recommendations- HPA in London (Health Protection Agency)

- **Screening**
  - Outbreaks (≥2 cases related time/place)
  - Selective media
  - Not necessarily enrichment

- **Management**
  - Only treat if infected
  - Check if sensitive to routine antibiotics
  - Role of linezolid & quinupristin/dalfopristin

- **Patients & staff**
  - Carriage persists months to years
  - Clearance treatment not recommended
  - Don’t screen staff

*Cookson, et.al. 2006, Journal of Hospital Infection*
• **Risk assessment VRE outbreak**
  • **Patient by patient**
    – Extent of VRE
    – Incontinent [or Diarrhoea, colostomy]
    – Resistant to linezolid, etc.
• **Hand hygiene**
  – Soap fails, either antiseptic hand wash or alcoholic hand rub
• **Isolation**
  – Ideally, single rooms
  – Capacity exceeded, cohort
• **Cleaning**
  – Heavy contamination
  – No evidence any particular regimen superior
  – Hypochlorite or phenolic
  – Special attention dust-prone surfaces
  – Especially at termination of incident
• **Inter-hospital transfer**
  – Must notify recipient of VRE status
  – Not a risk for normal people in community
• **Antibiotic stewardship**
  – Fewer *Glycopeptides & Cephalosporins*
  – Vital to measure and feedback to prescribers
  – Sheet cost to budgets of prescribers
Strategy in 2009 - Liverpool Infection Prevention Unit and the Renal Unit

Implement 7 Pillars of MRO control

- Administrative support
- Education
- Judicious use of antibiotics
- MRO surveillance
- Infection control precautions
- Environmental measures
- Decolonisation

Cookson, et.al., 2006
Administrative support

- Health Department
- Area Health Services
- General Managers
- Heads of Department
- Expensive
- Swabs
- Gowns
- Labour
- Key communication to stakeholders
- Ownership of the problem
- KPIs
Education

• All types of healthcare workers
• All levels of seniority
• Undergraduate programmes
• Postgraduate programmes
• Continuous
• Mandatory
• Feeding back KPIs
Preventing haemodialysis catheter infections

What is a haemodialysis catheter?
A haemodialysis catheter is a fine tube made from a synthetic material that is used as an alternative to a fistula or graft. Catheters are most commonly used if you need to dialyse immediately and you don’t have time to wait for a graft or fistula to be formed. Some people need a catheter permanently.

Most haemodialysis catheters are inserted by tunnelling it under the skin of the chest and then into a large vein in your chest. This is a tunneled catheter.

As these catheters are made from a synthetic material, your body regards it as a foreign body and there is a higher risk of infection at either the entry site of the blood stream. Infection can happen even when there is a good blood flow through the catheter.

The risk of infection is higher in people who dialyse through a catheter.

How do I know if I have an infection?
Your doctor can diagnose infection based on your symptoms and from the results of a microbiological examination of tissue or fluid from the infection site. In severe blood stream infection a blood test is required. These microbiological tests can take 2 or more days to be confirmed.

If you have any of the following you may have an infection:
- Fever
- Chills
- Drainage from the catheter site
- Redness or tenderness around the catheter site
- Generally feeling unwell and weak.

How are infections treated?
Most infections are easily treated with antibiotic tablets. In serious blood stream infections it may be necessary for the catheter to be removed so that the infection can be treated effectively. Recovery is usually rapid, and most people recover fully. If the infection is more severe you may need some weeks in hospital for antibiotic treatment through a drip.

How can I prevent infections?
Good care of your catheter can help prevent problems like infection. You need to:
- Keep the catheter dressing clean and dry
- Always wash your hands before handling your catheter or dressing
- Make sure your care givers either wash their hands or use an antiseptic hand rub before handling your catheter
- Keep the caps and clamps of your catheter tightly closed when not being used for dialysis. Only your care team should use the catheter for taking blood samples or to give medications
- Call the dialysis team if the skin around your catheter feels sore or looks red, or if the dressing has come loose.

For more information about preventing infection in maintenance haemodialysis, go to the dialysis website.

Department of Human Services

A Victorian Government initiative
10 Tips for preventing infection in haemodialysis

Be aware
Haemodialysis is a risk business infection-wise. It is important that you understand the infection risks to you, and what risk you might pose to others. The following simple strategies will help you minimise these risks and keep you healthy.

Wash your hands
Good hand hygiene, including hand washing with soap and water or the use of an alcohol based hand rub, is the most important thing you can do to prevent an infection. Keep your hands clean and always wash your hands before handling your access site.

Insist on the best
It isn’t just you that needs to keep your hands clean! Good hand hygiene is essential for all of your carers and dialysis team. Feel free to ask your dialysis team and carers to wash their hands.

Keep it clean
Your access site is important, but it can be the site for a serious infection. You can help prevent these infections by washing your fistula site with an antiseptic hand wash before dialysis. Your carers and dialysis team will use an “aseptic” (free from bacteria) technique to make sure that you aren’t put at risk.

Get to the point
Hepatitis B vaccination will protect against hepatitis B infection. Unfortunately the vaccine doesn’t work as well in people with kidney disease. You haven’t partial protection from the vaccination combined with a high standard of cleanliness in the dialysis unit will protect you. Vaccines research is improving the standards of immunisation; your dialysis team will keep you updated.

And stick to it
As you know – getting stuck with a needle is no fun – it’s even worse when it is someone else’s used needle. Make sure you and your caregivers dispose of sharps into a safe sharps container immediately after use.

Dress for success
Your blood can be an infection risk to your carers and dialysis team. If there is a chance of a blood splash from your lines, or during needleing, your carers should be wearing eye/face protection, gloves and protection for their clothing.

Spot the difference
Good cleaning practices help prevent bacteria being passed from one person to another. Your dialysis team will clean your chair and equipment after every use – every time.

Be alert
Know the signs and symptoms of infection and tell your carers or dialysis team immediately if you notice any of the following:

- Fever
- Chills
- If you have a catheter or are generally feeling unwell/weak
- Drainage from the catheter site
- Redness or tenderness around the catheter site.

Be a squeaky wheel
If you are worried about infection prevention speak with your carers or dialysis team. Everyone is responsible for preventing infections and working together will give you the best results.

For more information about preventing infection in maintenance haemodialysis, go to the dialysis website www.health.vic.gov.au/renal dialysis
Judicious use of antibiotics

• Selection of VRE increased by Vancomycin related to need to Rx MRSA
• Antibiotic policies
• Restriction of certain antibiotics
• Measurement of antibiotic use and feeding this back to prescribers
• Support by administration
MRO surveillance

- Role of screening
- Must think through dealing with positives
- Large numbers of colonised patients often found
- Intensive screening programme with sensitive method can find hundreds of carriers per infection
- Industrial concerns
- Screen patients with high risk situations, e.g. ICU, haematology
- Need research
Infection control precautions

- Isolate/cohort patients
- Need to know who’s got the MROs
- Flagging
- Attention to hand hygiene
- Gloves and Gowns
- Physical barriers
- Dealing with non-compliant HCWs
Environmental measures

• Need to physically clean
• Use disinfectants that will kill enterococci
• Phenolics
• Hypochlorite
• ALL fomites
• Toilets
• Everything in rooms
Decolonisation

- Difficult but “do-able” with MRSA
- Healthcare workers
- Patients
- Impossible with VRE and other superbug
- Approx 30% may clear over time
  - some excrete intermittently
  - some remain colonised for years
  - even low level colonisation is an infection
- Control risk if exposed to antibiotics
- When colonisation recurs usually same strain, *i.e.*, not truly cleared
VRE Clearance in Liverpool Hospital

- Commenced late 2009
- The preconditions for clearing:
  - Undergoes Renal Dialysis
  - Is stable medically
  - Has no catheters other than a dialysis catheter
  - Has not have received antibiotics in the 3 months prior to clearance
  - Does not have an acute wound, ulcer or tracheotomy
- Three neg. swabs to be taken one week apart
- Dialyse out of the Isolation Unit
Infection Control Issues and Controversies

• VRE control measures don’t eradicate VRE

• Outbreak “control” usually means reduction of VRE to a lower level

• Unsuccessful control of outbreaks unlikely to be published

• Cost of control immense Royal Perth Hospital $AUD 2.7m
Swine Flu (H1N1) vaccination

The Australian Government is making Panvax® H1N1 vaccine available
The priority groups for vaccination

• Front line health care and community care workers who have direct contact with patients
• People with underlying chronic medical conditions such as asthma, cancers, HIV, heart disease, diabetes and CKD
• People who are obese with a BMI over 35
• Indigenous people and remote and isolated communities with indigenous people
• Children in special schools, initially only 10 years and over until child safety data is available
• Pregnant woman
• Parents and guardians of children aged 0-6 months
Conclusion

• No conclusive evidence of dialysis related transmission in index patient
• Isolation: does it make a difference?
• Hepatitis registry: usefulness?
• Implement 7 Pillars of MRO control
  – Administrative support
  – Education
  – Judicious use of antibiotics
  – MRO surveillance
  – Infection control precautions
  – Environmental measures
  – Decolonisation
• Importance of Continuous auditing
• Resource implications
## Preventing infections in satellite haemodialysis units

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Transmission based precautions</th>
<th>Airborne</th>
<th>Droplet</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gowns</td>
<td>Worn to protect the hands when there is a risk of contact with blood or body substances.</td>
<td>As per standard precautions.</td>
<td>As per standard precautions.</td>
<td>For all manual contact with patient, associated devices and immediate environmental surfaces.</td>
</tr>
<tr>
<td>Impermeable apron/gown</td>
<td>Worn to protect clothing when there is a risk of splashing or contamination with blood or body substances.</td>
<td>As per standard precautions.</td>
<td>As per standard precautions.</td>
<td>When health care workers clothing is in substantial contact with the patient. Items in contact with the patient, and their immediate environment.</td>
</tr>
</tbody>
</table>
| Respirator or mask                               | Refer to AS 4381:1990 for additional information.  
Worn to protect mouth when there is a risk of splashing or contamination with blood or body substances. | P2/N95 particulate respirator for tuberculosis only.  
A cotton face mask with the purpose such as a mask that filters > 0.1 micron and has a splash resistant shield. | Yes - mask*.  
Protect face if splash likely. |
| Goggles/face-shields                             | Worn to protect eyes and face when there is a risk of splashing or contamination with blood or body substances. | Protect face if splash likely. | Protect face if splash likely. | |
| Special handling of equipment                   | Chains, haemodialysis machines and other direct patient contact equipment is cleaned after the patient is discharged using a neutral disinfectant and warm water solution.  
Haemodialysis machines should be cleaned and disinfected according to manufacturer's instructions. | Single use or reprocess before reuse on next patient (includes all equipment in contact with patient).  
*check with local infection control regarding disinfectant use. | Single use or reprocess before reuse on next patient (includes all equipment in contact with patient).  
*check with local infection control regarding disinfectant use. | |
| Single room                                      | No.                            | Dialyse in a single room or cohort patients with same infection.  
Door closed. | Dialyse in a single room or segregated area of the unit. (See also other requirements). | Dialyse in a single room or segregated area of the unit or cohort with patient with the same infection. |
| Single room with negative pressure air handling system | No.                            | Essential for pulmonary tilt. | No.                          | No.                                                                      |
| Transport or transfer of patients                | No.                            | Appropriate mask* for patient.  
Notify area receiving patient.  
Notify area receiving patient. | Appropriate mask* for patient.  
Notify area receiving patient.  
Notify area receiving patient. | Notify area receiving patient, prior to discharge.  
Remove gloves and gowns, and wash hands immediately on leaving patient. |
| Other requirements                               | Encourage patients to cover nose and mouth when coughing or sneezing and wash their hands after blowing nose. | Provide one metre of separation between patients in ward accommodation. | Provide one metre of separation between patients in ward accommodation. | |

* Refer to Australian Standards:  
AS 4381:1990 Single-use face masks for use in health care, for additional information  
AS/NZS 1716:2003 Selection, use and maintenance of respiratory protection devices  
AS/NZS 1716:2004 Respiratory protective devices Adapted from the Blue Book, Department of Human Services.
Glycopeptide Resistance in S. aureus