The significant challenge - managing infections in critical care

Programme

Tuesday 23 March
Hall 11
International Convention Centre, Birmingham
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free papers

Why can’t he breathe? Botulism a 21st century challenge for intensive care
Ahmad NF, Cobby TF, Speirs GE, North Devon District Hospital, Barnstaple

The development of an antimicrobial catheter to protect against multi-resistant bacteria
Ashraf W, Bayston R, Stevenson O, Queens Medical Centre, Nottingham

Has the impact of methicillin resistance on outcome of Staphylococcus aureus bacteraemia reduced over the past 10 years?
University of Dundee & NHS Tayside

Improving the early detection and management of septic patients in general hospital wards
Marwick C, Guthrie B, Evans J, Davey P, University of Dundee & NHS Tayside

Epidemiology of Ventilator Associated Pneumonia in an Adult ICU
Kingston H, Sarge M, Rey V, Jepson A, Stotz M, Imperial College Healthcare NHS Trust, St Mary’s Campus, London

Diagnosing and monitoring ventilator-associated pneumonia
Lee M, Mathieu S, Allan C, Coakes J, Wyllie S, Williams M, Queen Alexandra Hospital, Portsmouth Hospitals NHS Trust

posters

Enabling Junior Doctors to Recognise Severe Sepsis: A strategy to decrease time to appropriate antimicrobial therapy and intensive care input
Brostoff JM, Potter EK, Kapila A, Royal Berkshire Hospital, London Road, Reading

A Fatal Case of Invasive Candidiasis in an Injecting Drug User
Burtonwood JR, Iyer S, Keating, L, Royal Berkshire Hospital, Reading

An audit of the quality of antibiotic prescribing in a large teaching hospital: less room for improvement than you might think.
Calton E, Goodfellow L, Qaiyoo S, Woodfield J, Hand K, Southampton University Hospitals NHS Trust

Survey of the Prevalence and Patterns of Infection in a UK Tertiary Hospital Intensive Care Unit
Chew K, Narayanan M, Royal Victoria Infirmary, Newcastle Upon Tyne

Recording the review date when prescribing antibiotics on the Intensive Care Unit (ICU)
Gupta A, Martin K, Graham–Clarke E, Sandwell General Hospital, West Midlands

A Case Report of Continuous Intravenous Infusion of Flucloxacillin via an Elastomeric Infusion Pump for the Treatment of Endocarditis
Hand K, Rivers G, Hayes P, Yue A, Yam T, Southampton University Hospitals NHS Trust

Comparison of microbial ecology and antibiotic resistance before and after routine cleaning in the intensive care unit environment
Kay G. L, Smith T. J, Stanley K. N, Mills, G, Edbrooke D, Townsend R, Green S, Sheffield Hallam University, Sheffield

An audit to determine timing of first dose antimicrobial administration and choice following diagnosis of sepsis at Darent Valley Hospital
Patel R, Williams A, Joy R, Gonzalez A, Darent Valley Hospital, Dartford & Gravesham NHS Trust, Kent

Improving appropriate meropenem and vancomycin prescribing in adult critical care
Pocock JM, Aliyu S, Sule O, Addenbrooke’s Hospital, Cambridge

Second peak of pandemic (H1N1) 2009 influenza: patient characteristics and intensive care management
Sharma V, Keating L, Royal Berkshire Hospital, Reading

Managing an MRSA Outbreak in a Neonatal Intensive Care Unit
Brown N, Pai S, Shef V, Acknowledgments- Murdoch E, Neonatal Intensive Care Unit, Addenbrookes Hospital, Cambridge University Hospitals

Diagnostic challenges in Critical Care: values of blood cultures taken over newly inserted central lines.
Stotz M, Manikon M, Musa I, Jepson A, Imperial College Healthcare NHS Trust, St. Mary’s Campus, London

notes
# Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>0900 - 0955</td>
<td><strong>Registration &amp; Coffee</strong></td>
</tr>
<tr>
<td>0955 - 1000</td>
<td><strong>Welcome address</strong></td>
</tr>
</tbody>
</table>
| 1000 - 1030 | **Infections in intensive care - questions we ought to be asking!**  
  **Professor Mervyn Singer, London** |
| 1030 - 1115 | **Free Papers**                              |
| 1030      | Epidemiology of ventilator associated pneumonia in an adult ICU  
  **Dr Hugh Kingston, London** |
| 1045      | Improving the early detection and management of septic patients in general hospital wards  
  **Professor Peter Davey, Dundee** |
| 1100      | Why can’t he breathe? Botulism a 21st century challenge for intensive care  
  **Dr Norfaizan Ahmad, Barnstable** |
| 1115 - 1145 | **Coffee & Poster Viewing**                   |
| 1145 - 1215 | **Diagnostic and prognostic markers for sepsis**  
  **Dr Jerome Pugin, Geneva** |
| 1215 - 1245 | **Annual General Meeting**                    |
| 1245 - 1345 | **Lunch & Poster Viewing**                    |
| 1345 - 1405 | **Antibiotic dosing in critical care**        |
| 1405 - 1450 | **Free Papers**                              |
| 1405      | Has the impact of methicillin resistance on outcome of *Staphylococcus aureus* bacteraemia, reduced over the past 10 years?  
  **Dr Karen Barnett, Dundee** |
| 1420      | The development of an antimicrobial catheter to protect against multi-resistant bacteria  
  **Mr Waheed Ashraf, Nottingham** |
| 1435      | Diagnosing and monitoring ventilator-associated pneumonia  
  **Dr Mihye Lee, Portsmouth** |
| 1450 - 1510 | **Preventing and treating MRSA infection in the ICU - what have we learnt?**  
  **Dr Jonathan Edgeworth, London** |
| 1510 - 1540 | **Surviving sepsis**                          |
| 1540 - 1545 | **Closing Remarks**                           |
**Why can’t he breathe? Botulism a 21st century challenge for intensive care**

Ahmad NF, Cobby TF, Speirs GE
North Devon District Hospital, Barnstaple

**Background:** Botulism is a rare but life threatening neuroparalytic syndrome.

**Report:** A 44 year-old man presented to the medical assessment unit with 24 hours history of blurred vision, bilateral ptosis, ataxia and dysphagia. The patient was an active heroin addict and the initial diagnosis of embolic stroke was made. 18 hours after admission the patient had a respiratory arrest which required 3 cycles of cardiac pulmonary resuscitation to which he responded and sustained good cardiac output. Initially he maintained good limb motor function but required intubation with mechanical ventilation due to lack respiratory effort. Investigations including computerised tomography of the head, transoesophageal doppler, tensilon test were all negative. By day 6, truncal and proximal muscle weakness continued to progress, he was still unable to breathe or open his eyes but was able to communicate by handwriting. Skin lesions were present from his subcutaneous heroin injection sites and these were reviewed by surgical team but debridement was not indicated. Diagnosis of botulism was reconsidered on day 9, serum was sent for botulinum neurotoxin and botulinum anti-toxin was administered. Botulinum neurotoxin assay was positive although the specimen was insufficient for typing. By day 128. His hospital stay has been complicated by nosocomial pneumonia and recurrent urinary tract infection.

**Conclusion:** This case of botulism highlights the need for education and awareness in drug abusing population. It is a rising problem and could occur in clusters especially from contamination of heroin products with each case requiring a potential 4 to 6 month intensive care stay.

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**The development of an antimicrobial catheter to protect against multi-resistant bacteria**

Ashraf W, Bayston R, Stevenson O
Queens Medical Centre, Nottingham

**Background:** External Ventricular Drainage (EVD) is used in the management of increased intracranial pressure following head injury, tumours and haemorrhage. The catheter placed in the cerebral ventricles drains excess cerebrospinal fluid (CSF) into a collecting system. Ventriculitis is a major problem in EVD (rates 5-15%), caused often by multi-resistant bacteria such as MRSA, MRSE, Acinetobacter sp and ESBL - producing enterobacteria, particularly in ICU. We have developed a broad spectrum antimicrobial catheter to protect against these multi-resistant "superbugs". The aim of this study was to determine the extent and duration of antimicrobial activity of this catheter against multi-resistant strains, using clinically predictive in vitro tests. Materials and Methods: Medical grade silicone catheter tubing was impregnated with triclosan, trimethoprim and rifampicin by a previously published method. Three methods were used to evaluate the catheters. The Serial Plate Transfer Test (SPTT) screens for the duration of antimicrobial activity and monitors resistance development. The tk100 assay determines the time taken to kill 100% of bacteria attached to catheter material. The in vitro model determines the ability of the catheters to resist successive bacterial challenges under constant flow conditions. Results: The SPTT showed duration of antimicrobial activity of >80 days. No resistance was seen. The tk100 showed that 100% of attached bacteria were killed in 24hr. The in vitro model showed that the EVD protected against bacterial colonization for >80 days. Conclusions: The impregnated catheter demonstrated a broad spectrum and a prolonged duration of activity against multi-resistant bacteria. The duration of activity in simulated in-use conditions is in excess of that required for EVD (~10-21 days) and might be useful in longterm vascular access catheters. In each case, the use of such a catheter should reduce infection as well as reducing antibiotic usage.

**References:**
Has the impact of methicillin resistance on outcome of Staphylococcus aureus bacteraemia reduced over the past 10 years?
University of Dundee & NHS Tayside

Background: MRSA has accounted for about 40% of Staph aureus bacteraemias (SAB) over the past five years but was much less common before that. Our hypothesis was that the impact of methicillin resistance would reduce with increasing prevalence because doctors would be more likely to select effective empirical treatment.

Methods: Cases were any patient in Tayside who had SAB from 1st July 1996 to 31st December 2006. Cases were divided into bacteraemia on arrival (SAB-OA) and Hospital Acquired (onset >48h after arrival, HA-SAB). Comparators for SAB-OA were selected from the population of Tayside matched for age and gender. Comparators for HA-SAB were all patients on the same ward as cases on the day that the blood culture was taken. Outcomes were death, length of index admission, readmission within two weeks and total hospital days in the year after onset, measured by record linkage. All outcomes were adjusted for co-morbidity and social deprivation and for HA-SAB for age and gender as well.

Results: There were 273 cases of SAB-OA (130 MRSA, 243 MSSA) with 1895 comparators and 477 cases of HA-SAB (260 MRSA, 217 MSSA) with 8779 comparators. There was only one MRSA case in 1996 and 4 in 1997. Survival curves for cases and comparators diverged for at least 100 days after onset, so we used one year mortality as the primary outcome measure. Adjusted odds ratio for mortality in cases vs comparators was 14.0 (CI 7.4-26.6) for MRSA-OA, 10.7 (CI 6.5-17.6) for MSSA-OA, 4.1 (CI 3.0-5.5) for HA-MRSA and 1.7 (CI 1.3-2.3) for HA-MSSA. There was no significant decrease in the risk difference between MRSA and MSSA over time. For HA-SAB the absolute risk difference between MRSA and MSSA was 17.4% (CI 9.3-25.9) for the whole cohort, 13.0% (CI 3.3-25.6) in 1996-9, 21.1% (CI 7.7 to 34.5) in 2000-03 and 11.5% (CI -2.5 to 25.5%) in 2004-6. HA-SAB with either MRSA or MSSA had a major but similar impact on length of stay and readmission throughout the cohort. The OR for readmission within two weeks was 70.6 (CI 28.1-177.8) for MRSA and 143.1 (58.5-350.1) for MSSA.

Conclusions: the impact of methicillin resistance has not diminished over time. However, our results support efforts to reduce all SAB, not just MRSA bacteraemia. Restricting follow up of SAB to the index admission will significantly under-estimate its impact on mortality and length of hospital stay.

Improving the early detection and management of septic patients in general hospital wards
Marwick C, Guthrie B, Evans J, Davey P
University of Dundee & NHS Tayside

Background/Objectives: Early intervention, including timely antibiotics, in patients with severe sepsis on admission to hospital improves survival and reduces admissions to the ICU. In our hospital a pilot study showed that about 50 inpatients per month developed sepsis on medical or surgical wards and <40% received timely antibiotic treatment. We have designed and implemented an intervention to improve care.

Methods: Patients developing sepsis were identified prospectively to provide baseline data. The primary measure for improvement is time to antibiotic therapy from onset of sepsis, with the target being within 4hrs. Potential barriers to good quality patient care were identified with a questionnaire survey of junior medical staff, followed by in-depth qualitative interviews with a purposive sample of questionnaire respondents.

A multifaceted intervention consisting of education, a care pathway, audit and feedback, was then developed and implemented.

Results: Data from 280 in-patients with sepsis, collected from Sept 08-Feb 09, showed the mean time to antibiotic administration was 11.36hrs (95%CI 9.4-13.3hrs), median 6hrs. Only 38.2% (95%CI 32.5-43.9%) of patients received antibiotics within 4hrs. The longest delays were between medical review and prescription of antibiotics. Only 34 patients (12%) had a lactate level measured.

Questionnaires were returned by 147 (35% response rate) junior doctors. Only 33% correctly identified the criterion for sepsis, but application of definitions to a case-scenario was better (89.5% correct). Potential barriers to improvement identified include lack of training and experience, decreased continuity of care/doctors' rotas, and busy workload.

Preliminary post-intervention clinical data (collected from Oct 2010) indicate some improvement with 48.6% (95%CI 40.4-56.8%) of 142 patients receiving antibiotics within 4hrs, with a step-wise month-to-month improvement.

Conclusion: The management of patients with sepsis in our hospital leaves room for improvement, with unacceptable delays in receipt of antibiotics from clinical onset of sepsis. Completion of evaluation of this intervention will indicate its potential to improve sepsis detection and management locally.
Epidemiology of Ventilator Associated Pneumonia in an Adult ICU

Kingston H, Sange M, Rey V, Jepson A, Stotz M
Imperial College Healthcare NHS Trust, St Mary’s Campus, London

Ventilator associated pneumonia (VAP) is a serious nosocomial infection with modifiable risk factors. The purpose of this study was to assess the epidemiology of this infection in St Mary’s adult ICU and calculate its cost in antimicrobials. This was facilitated by the introduction of computerised clinical records.

The clinical records of Patients present on the ICU over a six month period were reviewed retrospectively. Those without evidence of pre-existing chest infection ventilated for more than 48h were selected for further study. Their microbiology results were reviewed to see if bronchoalveolar lavage had grown at least 104/ml potentially pathogenic organisms. Subsequently their electronic notes were examined to see if they also met the clinical criteria for VAP. The cost of antimicrobials used to treat each episode of VAP was calculated.

Over the six month period, 209 patients were admitted to ICU without evidence of pre-existing chest infections. Of these, only 69 patients (33%) were ventilated for more than 48h. There were 29 occasions when patients met the microbiological criteria for VAP. In 8 patients this was confirmed clinically giving an incidence of VAP of 12% in patients ventilated for more than 48h. Lactose fermenting coliforms were responsible for 50% of the cases of VAP, none were due to S.aureus or Pseudomonas spp. The cost in antimicrobials was £261.90 per episode of confirmed VAP. Mean duration of treatment was 8 days. The antibiograms of the organisms isolated were also studied.

The incidence of VAP was comparable to reported figures. The spectrum of pathogens causing VAP was different from those frequently reported; this emphasises the importance of knowledge of local epidemiology. The cost of antimicrobials used for treatment of VAP can be used to make a business case for interventions to reduce its incidence.

<table>
<thead>
<tr>
<th>Number of episodes</th>
<th>Cost of antibiotics</th>
<th>Cost per episode</th>
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<tbody>
<tr>
<td>No clinical VAP but significant BAL</td>
<td>21</td>
<td>£3,974.78</td>
</tr>
<tr>
<td>Clinical VAP + significant BAL</td>
<td>8</td>
<td>£2,095.21</td>
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Diagnosing and monitoring ventilator-associated pneumonia

Lee M, Mathieu S, Allan C, Coakes J, Wylie S, Williams M
Queen Alexandra Hospital, Portsmouth Hospitals NHS Trust

Introduction: Monitoring ventilator-associated pneumonia (VAP) rate can be used to determine outcome measures, but it has also been, controversially, requested as a quality indicator by local commissioners. There is yet to be an agreed consensus definition for its diagnosis. VAP is an inflammatory process of the lung parenchyma occurring after 48 hours following tracheal intubation, due to organisms not present or incubating at the time mechanical ventilation was commenced. Its incidence is reported as 9-28% and is associated with prolonged hospitalisation and increased mortality. Following a 61 day pilot audit in 2009, a system using a modified clinical pulmonary infection score (CPIS) in conjunction with semi-quantitative microbiological assessment and a multidisciplinary team (MDT) review forum has been adopted in our trust to diagnose VAPs. We describe a repeat audit using this process following a change to the ventilator care bundle in introducing selective oral decontamination.

Methods: Over a 116 day period from 2009 to 2010, all patients on the critical care unit that were ventilated for more than 48 hours and had a clinical deterioration suspected to be caused by infection were screened using a locally developed pathway. Those with a modified CPIS score greater than 6 together with quantitative positive microbiology culture from respiratory specimens (cfu > 104) were included. All cases were subsequently discussed in a forum attended by microbiologists and intensivists to accurately determine diagnoses of VAP.

Results: 366 patients were admitted to the critical care unit over 116 days. Of these, 199 patients were ventilated and the total ventilated days was 759. Three patients were confirmed as having a VAP. One patient was also diagnosed as having “tube-associated pneumonia”. This compares to 6 patients diagnosed with VAP (118 patients ventilated; 483 ventilator days) during the pilot audit.

Conclusions: We have developed a robust method of diagnosing and continuously monitoring our VAP rates using the VAP pathway together with a MDT forum. The SCuD system has enabled us to monitor outcomes from stepwise changes to the ventilator care bundle that may lead to improvements in quality of care. Furthermore, our findings raise the issue of diagnosing and monitoring nosocomial pneumonia rates that do not fit the VAP diagnosis.
Enabling Junior Doctors to Recognise Severe Sepsis: A strategy to decrease time to appropriate antimicrobial therapy and intensive care input
Brostoff JM, Potter EK, Kapila A
Royal Berkshire Hospital, London Road, Reading

Background: Early recognition and treatment of sepsis is well recognised to reduce morbidity and mortality. Appropriate intervention with antibiotic agents and potential involvement of intensive care specialists are key management elements.

Aims: We set out to establish:
1. The level of knowledge among FY1 doctors of the criteria for diagnosing SIRS, sepsis and severe sepsis, as well as their knowledge of basic initial management for septic patients.
2. Whether a targeted brief intervention using an attachable laminated data card could improve their knowledge

Methodology: We used a standardised questionnaire on 26 FY1 doctors prior to one of their mandatory teaching sessions. The questions included: what the 4 parameters for SIRS are; what the abnormal values actually are; which other organ systems are involved in severe sepsis; how to investigate for a source of sepsis; and initial management steps of sepsis, including time to first antibiotic dose.

Outcomes: We had a 100% response rate. Prior to giving out the cards only 7/26 knew all 4 parameters for diagnosing SIRS, whereas after card issue 26/26 knew the 4 criteria. Notably 18/26 initially thought that blood pressure was a parameter for diagnosing SIRS.

In response to the question “What are 6 organs/systems whose dysfunction may indicate severe sepsis?” none could identify more than 4. After the cards had been given out, 24/26 recognised all 6 organ systems whose dysfunction would indicate severe sepsis.

Among other management questions, pre-card only 9/26 would have requested a lactate in a suspected septic patient, whereas following brief intervention 23/26 would have ordered one.

Conclusion: We demonstrate that the ability to recognise sepsis among FY1 doctors is poor, and there are significant gaps in their investigation and management of such patients. We show that use of a brief intervention card designed to remain with the doctor at all times increases their theoretical ability to recognise, investigate, and initiate suitable initial management for the septic patient. This includes early and appropriate use of targeted antimicrobial agents and involvement of senior support, including intensivists. As well as reducing ICU admissions, this should reduce morbidity and mortality from sepsis among hospital in-patients.

A Fatal Case of Invasive Candidiasis in an Injecting Drug User
Burtonwood JR, Iyer S, Keating, L
Royal Berkshire Hospital, Reading

Invasive candidiasis (IC) carries a high mortality and survival is directly impacted by the time taken to initiate therapy. Prompt treatment is limited, however, by the low sensitivity of current detection methods. Colonisation with Candida spp. in the ICU is common, occurs early and has a low positive predictive value for progression to candidaemia. IC is therefore hard to predict, problematic to detect and challenging to treat. Recent efforts have focussed on identifying risk factors for IC to enable targeted pre-emptive treatment. Our case study comprises both a novel presentation of IC and a discussion of the issues surrounding pre-emptive use of anti-fungal agents in the critically ill.

A 33 year-old male injecting drug-user (IDU) with Hepatitis C infection presented with septic shock and received
empirical treatment with broad spectrum antibiotics for sepsis of unknown origin. He was found to have a groin abscess with septic thrombophlebitis of the common femoral vein and a cavitory lung lesion on chest x-ray. Blood cultures taken on admission grew Eggerthella lenta however repeat cultures were negative after starting antimicrobials. Four days of broad-spectrum antibacterial therapy initially resulted in a clinical improvement but he subsequently deteriorated and again developed sepsis. Despite treatment, he continued to worsen, developed catastrophic haemoptysis and died from ventilatory failure.

Samples obtained at post-mortem yielded a poly-microbial growth comprising of Bacteroides spp., E. faecium, S. mitis and C. tropicalis in embolic abscesses within the liver, lung, spleen. The focus of infection appeared to be the septic thrombophlebitis and groin abscess. Histopathological examination of the cavitory lung lesion revealed fungal hyphae, eroding into an adjacent major blood vessel.

Despite the widespread use of newer anti-fungal agents in the treatment of IC and their increasingly common use as prophylactic agents, mortality from IC remains high. In our case study, we feel the broad-spectrum antibiotic therapy, Hepatitis C infection, septic shock and skin-barrier disruption allowed relentless progression of IC. Our case highlights both the difficulties managing IC and the arguments for pre-emptive anti-fungal treatment in selected groups of high risk, critically ill patients.
**Survey of the Prevalence and Patterns of Infection in a UK Tertiary Hospital Intensive Care Unit**

Chew K, Narayanan M  
*Royal Victoria Infirmary, Newcastle Upon Tyne*

**Background**  
The 2007 Extended Prevalence of Infection in Intensive Care (EPIC II) point prevalence study revealed infections are common in intensive care units (ICU) worldwide, and risk of infection increases with duration of stay in the unit.

**Objective**  
A prevalence survey was carried out in one of our tertiary hospital ICUs to establish the extent and patterns of infections locally.

**Design**  
The survey involved retrospective analysis of notes from patients who were in ICU between the 1st to the 30th of November 2009. Demographic, microbiological, therapeutic and outcome data were collected for 47 patients.

**Results**  
70% of the patients were at least 50 years old. Respiratory failure was the most frequent indication for admission (22 out of 47), of which 5 were due to swine influenza. Respiratory infection was the commonest source of infection whilst in ICU (60%). Pseudomonas aeroginosa was the most frequently isolated organism. Piperacillin / Tazobactam (PTZ) was the most heavily prescribed antimicrobial agent in the ICU, followed by Meropenem. 14% of Enterobacteriaceae were multiresistant and 33% of Pseudomonas aeroginosa were resistant to PTZ or Meropenem or both. There were 11 deaths in total, 5 of which infection was a contributory factor.

**Conclusions**  
Pneumonia was the commonest cause of infection and Pseudomonas aeroginosa was the most frequently isolated pathogen in our ICU. These results are consistent with the EPIC II findings. Regular surveillance of antimicrobial resistance should be carried out in view of the resistance data relating to PTZ and Meropenem, we aim to perform this biannually.

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**Recording the review date when prescribing antibiotics on the Intensive Care Unit (ICU)**

Gupta A, Martin K, Graham–Clarke E  
*Sandwell General Hospital, West Midlands*

**Background:**  
Previous studies have shown that the prolonged use of unnecessary antibiotics contributes to antibiotic resistance and increased morbidity in ICU. Review dates remind clinicians to re-evaluate antibiotic prescriptions and to stop or change treatment when necessary.

**Objective:**  
To evaluate compliance in ICU, both before and after an educational intervention, with current guidelines mandating that a review date for antibiotic prescriptions must be recorded on drug charts.

**Methods:**  
Information on the antibiotic, date prescribed and whether a review date was written, was collected daily from ICU drug charts between 3-11-08 and 12-11-08.

Interventions to educate staff about current guidelines on correct antibiotic prescribing techniques were initiated on 13-11-08. Interventions included sending an email to ICU clinicians, displaying posters around the unit and holding opportunistic discussions with staff.

Further data was collected between 8-12-08 and 17-12-08, using the same pre–intervention method, to see whether interventions had been successful in improving adherence to clinical practice guidelines.

**Results:**  
Prior to intervention, ICU clinicians recorded a review date in only 3 out of 25 antibiotic prescriptions (12%). Post intervention, ICU clinicians recorded a review date in a disappointing 1 out of 25 prescriptions (4%).

**Conclusion:**  
Initial audit results in November 2008 demonstrated that current guidelines on recording the review date for antibiotic prescriptions in ICU were not being satisfactorily complied with. After attempts to educate all prescribing clinicians about current guidelines, review dates were still not in widespread use. The reasons for this non compliance need to be investigated and addressed in an attempt to prevent a dangerous increase in antibiotic resistance.
A Case Report of Continuous Intravenous Infusion of Flucloxacillin via an Elastomeric Infusion Pump for the Treatment of Endocarditis
Hand K, Rivers G, Hayes P, Yue A, Yam T
Southampton University Hospitals NHS Trust

A 65-year-old male developed recurrent Staphylococcus epidermidis bacteraemia and endocarditis associated with an infected cardiac permanent pacemaker. The pacing system was extracted percutaneously and a fully-sensitive Staphylococcus epidermidis was isolated from pus from the pacing leads. The patient was treated with flucloxacillin and rifampicin.

A pacemaker was reimplanted one month later after negative blood cultures but follow-up blood cultures four weeks post-op again grew Staphylococcus epidermidis, with a similar antibiogram to previous isolates from this patient. The patient was readmitted to hospital and a trans-oesophageal echocardiogram (TOE) indicated vegetation on the tricuspid valve associated with a remnant of pacing wire from the original pacing system.

Pathogen MICs for oxacillin of 0.094mg/L, ceftriaxone 2.0mg/L, daptomycin 3.0mg/L, vancomycin 6.0mg/L and teicoplanin 16mg/L were determined. The patient was treated with intravenous flucloxacillin 2 grams 4-hourly, gentamicin and sodium fusidate. Gentamicin was discontinued after 14 days and the patient requested that options for outpatient therapy be considered. Treatment was continued with oral sodium fusidate and flucloxacillin administered by continuous intravenous infusion (12g/100mL normal saline over 24hours) from an elastomeric pump via a peripherally inserted central line.

The predicted steady-state serum concentration for flucloxacillin infused at 500mg/hour is 68mg/L, providing a sustained concentration of unbound drug of 2.72mg/L. In practice, the rate of delivery was slower than expected and the pump delivered 79% of the dose over a 24-hour period. The rate of infusion may have been slowed by the viscosity of the 12% drug solution. Nonetheless, serum levels were predicted to exceed the MIC of the organism by a factor of at least 16-fold for 100% of the dosing interval.

The patient was discharged home to complete a 6-week course of treatment. Repeat blood cultures and TOE two weeks post-treatment were negative and the patient remained symptom-free six weeks post-treatment.

Flucloxacillin, delivered by continuous infusion from an elastomeric pump device, offers an alternative approach to the treatment of endocarditis in an outpatient setting for haemodynamically stable patients with sensitive pathogens.

Comparison of microbial ecology and antibiotic resistance before and after routine cleaning in the intensive care unit environment
Sheffield Hallam University, Sheffield

The role of the hospital ward environment as a reservoir of hospital-acquired infections (HAIs) has been hotly debated and much research has been conducted during outbreak situations. In order to extend our knowledge of the role of the environment as a reservoir of microorganisms and resistance determinants, we have investigated the ward environment during normal operation of two intensive care units (ICUs), where the consequences of HAIs can be particularly severe. The sampling regime included frequently-touched surfaces (such as patient chairs), the floor and ward sink plugholes. Samples were taken before and after routine cleaning and analysed via PCR for the presence of bacterial 16S rRNA genes, antibiotic resistance determinants (including mecA) and beta-lactamase genes. Parallel cultural analysis was used to assess the presence of fungi. Routine cleaning was accompanied by a significant reduction in the frequency with which bacteria and fungi were detected on hard surfaces. There was a smaller parallel change in the rate of molecular detection of bacteria from sink plugholes. Denaturing gradient gel electrophoresis revealed that similar 16S rRNA genes representing Gram negative opportunistic species were retrieved from sink samples before and after cleaning. Cleaning was effective in removing culturable antibiotic-resistant bacteria, although antibiotic resistance genes could be amplified via PCR from environmental samples even after cleaning.
An audit to determine timing of first dose antimicrobial administration and choice following diagnosis of sepsis at Darent Valley Hospital
Patel R, Williams A, Joy R, Gonzalez A
Darent Valley Hospital, Dartford & Gravesham NHS Trust, Kent

Objectives:
1. To determine if first dose administration of antimicrobial therapy is within the recommended time frame of 1 hour as per the Surviving Sepsis Campaign (SSC) guidelines
2. To determine if the Trust is compliant with guidelines relating to choice of empirical antimicrobials
3. To characterise the clinical and laboratory variables of septic patients as per the SSC guidelines

Design – Retrospective audit

Subjects & Settings – A district general hospital with 460 beds

Methods – Patient data was collated from September 2009 until 49 patients identified with a diagnosis of sepsis. All adult patients included. A&E excluded.

Results – The mean time from diagnosis to initiation of empirical antimicrobial therapy was 4.82 hours. Only 9 (18%) of the patients received empirical antimicrobial therapy within the first hour after diagnosis. Appropriateness of empirical antimicrobial therapy was found in 42 (86%) of the patients. The most common clinical & laboratory variables were tachycardia (59%) and increased CRP (88%) respectively.

Patient Outcome – 12 patients deceased (24%), the remainder were discharged.

Limitations – Poor documentation on medical notes and drug charts. The times on the drug chart are fixed and this fundamental process is a constraint.

Conclusions – Mean time to administration of effective antimicrobial therapy for patients with sepsis was much longer than internationally recommended ($\leq$ 1 hour). A high index of suspicion is required to diagnose severe sepsis and the full blown septic syndrome is not apparent in our population.

Recommendations – Reasons for the delay need to be identified to improve current practice & achieve the target of $\leq$ 1 hour for first dose administration. We recommend that doctors prescribe stat doses including time of administration required for first dose. Communication on wards & documentation in medical notes & drug charts needs to be improved. A surviving sepsis awareness campaign will be initiated within the Trust.

References –

Improving appropriate meropenem and vancomycin prescribing in adult critical care
Pocock JM, Aliyu S, Sule O
Addenbrooke’s Hospital, Cambridge

Objectives: Appropriate antibiotic prescribing is crucial in preventing antimicrobial resistance and ensuring low rates of hospital-acquired superinfections. Antibiotics should be correctly selected, and prescriptions reviewed after identification by appropriate septic screen of an organism with sensitivities.

In view of the frequent use of the broad-spectrum antibiotics meropenem and vancomycin on adult critical care wards in this large teaching hospital, a point-prevalence audit was performed to ensure appropriate prescribing.

Methods: All patients in the Intensive Care and Neurocritical Care units receiving meropenem or vancomycin on the day of audit were included. Information was recorded including appropriateness of prescribing according to Trust antibiotic policy, septic screen performed, and possibility of de-escalation to narrow-spectrum antibiotics or cessation of therapy in view of sensitivities or clinical progress. Feedback was given to Unit Directors and the wards re-audited against the same criteria after 2 weeks to assess improvement.

Results: 28/68 patients met inclusion criteria, 11 on the initial visit and 17 on re-audit, receiving meropenem (n=8), vancomycin (n=9) or both (n=1). Prescriptions were appropriate in 75% before and 87% following feedback. De-escalation according to sensitivities was possible in 3/39 prescriptions, however in 9/28 patients an appropriate septic screen had not been taken. Cessation of meropenem was possible in 2/19 cases due to patient improvement, and of vancomycin in 8/20 cases, largely due to negative MRSA screens.

Conclusions: Improvement in appropriate prescribing was seen following feedback, with use of other first line antibiotics thus protecting the resistance profile for meropenem, and sparing of vancomycin use in the absence of MRSA risk. However in a substantial number of cases therapy could have been amended in the light of microbiological results, highlighting the importance of appropriate sampling and frequent review to ensure timely de-escalation and cessation of broad-spectrum therapy.
Second peak of pandemic (H1N1) 2009 influenza: patient characteristics and intensive care management.
Sharma V, Keating L
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Although the incidence of new cases of pandemic (H1N1) 2009 influenza have decreased to their lowest levels since the disease first appeared in the UK, WHO experts expect the 2009 virus to be a major feature of the 2010 influenza season. As of February 2010, there have been 423 deaths related to pandemic (H1N1) 2009 in the UK. We describe our experience of managing 6 cases with confirmed pandemic (H1N1) 2009 influenza in an attempt to share information that may maximize patient outcome should further outbreaks occur.

Methods: Prospective data was collected from all confirmed cases of pandemic (H1N1) 2009 admitted to ICU.

Results:

<table>
<thead>
<tr>
<th>Case</th>
<th>Age; yrs</th>
<th>Sex</th>
<th>Past medical history</th>
<th>APACHE II</th>
<th>Admission diagnosis</th>
<th>Respiratory</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31</td>
<td>F</td>
<td>None</td>
<td>35</td>
<td>Septic shock</td>
<td>-PaO2 / FiO2, kPa: 8</td>
<td>Dead</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>M</td>
<td>Yes</td>
<td>29</td>
<td>Septic shock</td>
<td>-a gradient, kPa: 77</td>
<td>Dead</td>
</tr>
<tr>
<td>3</td>
<td>47</td>
<td>F</td>
<td>Yes</td>
<td>29</td>
<td>Septic shock</td>
<td>Vasopressors: Yes</td>
<td>Dead</td>
</tr>
<tr>
<td>4</td>
<td>51</td>
<td>F</td>
<td>Yes</td>
<td>10</td>
<td>CAP*</td>
<td>Haemofiltration: Yes</td>
<td>Dead</td>
</tr>
<tr>
<td>5</td>
<td>55</td>
<td>F</td>
<td>Yes</td>
<td>15</td>
<td>CAP*</td>
<td>Lymphopaenia: Yes</td>
<td>Alive</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>M</td>
<td>Yes</td>
<td>19</td>
<td>CAP*</td>
<td>Bacterial cultures: Positive</td>
<td>Alive</td>
</tr>
</tbody>
</table>

Discussion: 6/42 confirmed pandemic (H1N1) 2009 influenza cases admitted to our hospital required ICU admission during second peak of the pandemic. Patient characteristics, symptoms and comorbidities were similar to those reported in literature. None of the patients received oseltamivir or vaccine prior to hospital admission. All 3 deaths occurred within 24 hours of hospital admission due to intractable problems including profound metabolic acidosis, renal failure, septic shock and acute cardiovascular collapse. Case 1 tested positive for pneumococcal antigen. Cases 5 and 6 acquired nosocomial infection with anaerobes. All patients had radiographic evidence of pneumonia and required invasive ventilation for a mean duration of 11 days. One patient who was transferred to a tertiary hospital for extracorporeal membrane oxygenation survived. All survivors had received oseltamivir during their stay in ICU. A high index of suspicion in unvaccinated patients, prompt H1N1 surveillance, early use of oseltamivir and appropriate infection control measures are paramount to help prepare for 2010.

Managing an MRSA Outbreak in a Neonatal Intensive Care Unit
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Acknowledgments- Murdoch E, Neonatal Intensive Care Unit
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Overcrowding and understaffing can increase the risk for methicillin-resistant Staphylococcus aureus (MRSA) transmission. Over the period, October 2009 to December 2009, a single strain outbreak of MRSA was identified and managed in a tertiary neonatal intensive care unit (NICU). The MRSA strain had a readily recognizable susceptibility profile, which included resistance to gentamicin and high level mupirocin resistance. By pulsed-field gel electrophoresis it was identified as EMRSA15 – new variant A. In total twelve babies, including the index case, were found on screening to be colonized with the strain during this period. This was unprecedented as spread of MRSA on the Unit had never been identified before. There were no infections as a result of the MRSA colonization during the outbreak period. The index case was a baby transferred to the NICU from an external hospital in September 2009. Transmission followed an unavoidable incident when there was an increase in the number of emergency admissions causing overcrowding and increased workload for the staff, which may have resulted in compromised infection control practices. An incident management team was established to investigate and control the transmission. This included placing the babies in cohorts with specific staff, anti-septic washes, regular screening of babies, staff screening to investigate the possibility of staff carriage and emphasizing the importance of personal protective equipment and good hand washing technique. During the outbreak the unit was closed to outside admissions for a period of nine days. During this time the NICU underwent a deep clean and hydrogen peroxide vapour fumigation. The outbreak ended after 57 days. It was declared as a serious untoward incident (SUI) with the key learning points being capacity management and the facilities for isolation of babies with transmissible organisms. Since the incident, there have been improvements in the provisions and practices for infection control, highlighting its importance in patient safety.
Diagnostic challenges in Critical Care: values of blood cultures taken over newly inserted central lines.
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Imperial College Healthcare NHS Trust, St. Mary’s Campus, London

Introduction
The diagnosis of bacteraemia in critically ill patients can be complicated by contamination of samples, potentially leading to the use of inappropriate antibiotics and unnecessary use of hospital resources. It is clinical practice to take blood cultures (BC) in critically ill patients from freshly inserted central venous catheters (CVC’s). We conducted this prospective audit to assess the diagnostic accuracy of this commonly used approach.

Patients and Methods
We prospectively included 30 consecutive patients with sepsis due to suspected catheter related blood stream infection who were planned to undergo a change of CVC and to have BC taken. Only 4-lumen antimicrobial impregnated CVC were used and insertion was standardised. Blood samples were withdrawn separately through 2 predefined lumina and each sample inoculated for anaerobic and aerobic growth. These were compared against simultaneously taken peripheral BC’s. BC bottles were incubated for 5 days or until positivity and checked for growth daily. Positivity of peripheral BC’s were considered ‘gold standard’.

Results
One patient was lost to follow up. Patients’ mean ICU stay was 11.4 days (range 1-36) and 79.3% of patients were treated with at least 1 antimicrobial agent at the time of the CVC change. The internal jugular vein was the preferred site of insertion (66%). 4 patients had positive peripheral blood cultures. Sensitivity for CVC sampling was 66.7% and specificity 87% with a positive predictive value (PPV) of 57.1% and negative predictive value (NPV) of 90.9%, no difference was found between sample sites.

Discussion
This prospective audit shows that the common clinical practice of taking BC from newly inserted CVC’s does not have sufficient diagnostic accuracy. Our data suggest that this practice should best be avoided to save hospital resources.
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