

Report of the INDEPENDENT REVIEW OF CARDIFF AND VALE UNIVERSITY HEALTH
BOARD'S MANAGEMENT AND RESPONSE TO THE ACINETOBACTER BAUMANNII
OUTBREAKS IN AUGUST AND NOVEMBER 2015

Mark Turner

Martin Kiernan

Bharat Patel

April 2017

Table of Contents

Contributors and Acknowledgements.....	iii
Glossary	iv
Executive Summary	1
Chapter 1 Introduction	6
Chapter 2 Background	8
Description of the unit and its activities before the outbreak.....	8
Infections before the current outbreak.....	9
The clinical problem: neonatal infection and bacteria that can be resistant to multiple drugs	9
The UK context	10
The South Wales context.....	10
Chapter 3 What happened?	12
Overview of Chronology.....	12
Outbreak detection.....	12
Linkage and Outbreak identification	12
Steps taken to control the outbreak	15
Impact of the outbreak.....	16
Key points	18
Chapter 4 Review Questions	20
Question 1 Were the August 2015 and November 2015 AB outbreaks effectively managed?	20
Question 2A. Was the closure of the NNU in August and November 2015 reasonable?	24
Question 2B. Was the closure done in a timely manner?.....	24
Question 2C. Was the decision to reopen the NNU on both occasions reasonable?	25
Question 3. Has the UHB demonstrated learning and put in place robust arrangements?	25
Question 4. Are the proposed new NNU plans fit for purpose in mitigating future risks of IP&C outbreaks?.....	25
Compliance with national guidance and standards (before, during and after)..	26
Workforce and environmental influencing factors;.....	26
Governance and accountabilities.....	26
The working relationship with the Neonatal Network	26
Chapter 5 Other observations	28
Chapter 6 Recommendations	31
Appendix 1 Terms of Reference	33
Appendix 2 Timetable of the Review Team’s visit to Cardiff.	Error! Bookmark not defined.

Acknowledgements

The Review Team is grateful for the hospitality and logistic support provided by:

Carole Evans

Alexandra Scott

Julie Evans

April 19th 2017

Glossary

Term	Explanation
<i>Acinetobacter baumannii</i>	A species of bacteria that can cause serious infection in newborn babies and adults.. Also known as A. baumannii, this bacteria can survive inside hospitals for many weeks and can be very difficult to remove (or eradicate) from hospitals.
Alliance	In this setting, an alliance is the form of organization that has been proposed to deliver health care services for children in South Wales. Health Boards will work together with alliances.
Antibiotic	A medicine that treats infections caused by bacteria
Bacteria	One type of germ that can survive outside the cells of the body and spread between people.
Catastrophic risk	A risk that could cause a major impact on health care, or could cause a hospital to close
Clinical Board	Within Cardiff and Vale University Health Board clinical services are organized so that they work together well. The combinations of clinical services are managed by Boards of health care professionals and administrators in Clinical Boards.
Closure of the neonatal unit	<p>A neonatal unit is closed when it is not able to admit as many babies as usual.</p> <p>Closure can be partial or complete.</p> <p>Partial closure occurs when some babies that would be admitted under normal circumstances cannot be admitted. Partial closure can be managed by looking after babies in another part of the hospital, or by moving babies to other hospitals. The best way to transfer babies to other</p>

April 19th 2017

Term	Explanation
	<p>hospitals is to move a pregnant woman before she gives birth.</p> <p>Full closure occurs when absolutely no babies are admitted to the neonatal unit. Some babies are very sick when they are born and can be too sick to move. This means that full closure can only be done if no babies are born in a hospital.</p> <p>It is impossible to prevent admissions to a neonatal unit without stopping babies from being born in a hospital, or reducing the number of babies being born by a large amount.</p>
Collaborative	The South Wales Project led to the proposal that neonatal services provided across Health Boards should be managed through a collaborative process
Colonisation	Colonisation occurs when a germ (usually a bacteria) is found on the skin or in other parts of the body, without causing an infection. We are all colonized with many bacteria.
Effectively managed	An outbreak of infection is effectively managed if the number of new infections declines rapidly and all reasonable steps to treat the outbreak are taken as soon as possible.
Health Board	The organization that has responsibility for the health of people in a defined part of South Wales
Independent review	A look at events by a qualified group of people who do not work at the hospital being reviewed
Infection	An infection occurs when a germ causes problems for a patient or makes her / him feel unwell
Infection Prevention and Control (IP&C)	IP&C aims to protect people receiving health care from harm by stopping infections from starting and by ensuring

April 19th 2017

Term	Explanation
	that infections do not spread.
Isolate	<p>An isolate is a bacteria that is found in a sample taken from a patient or the environment. Samples may be taken from skin, blood or other parts of the body. Samples can also be taken from cots, walls, floors etc.</p> <p>An isolate from a sample from a patient can indicate colonization or infection depending on what happens to the patient.</p>
Mitigating risks	Reducing the impact of something if a risk becomes a problem.
Neonatal unit	A hospital ward that looks after newborn babies
Neonate	A newborn baby. In this report a neonate is a baby who has not been discharged from hospital after birth.
Outbreak	An outbreak occurs when the same germ is found, or causes illness, in more than one baby at the same time.
PFGE	A way to work out whether two bacteria are the same. PFGE = pulsed field gel electrophoresis
Reasonable management	One or more patients are treated in a way that can be justified and that would have been done by a respectable group of doctors and nurses
Resistant	A resistant bacterium is one that does not does not respond to an antibiotic. A bacterium that does not respond to several different antibiotics has “multiple resistance”
Risk	If there is a chance that something bad will happen, the risk of the bad thing is a summary of how likely the bad thing is and how bad it can be.
Risk register	A collection of all the important risks in a

April 19th 2017

Term	Explanation
	hospital.
Risk score	A number that summarizes a risk. A score of 0 means that there is no risk. The maximum score is 25 which means that the bad thing is very likely and would have a catastrophic impact if it does happen.
Serious incident	In the English NHS, a serious incident is an “adverse event, where the consequences to patients, families and carers, staff or organisations are so significant or the potential for learning is so great, that a heightened level of response is justified”
South Wales Project (SWP)	A consultation between 2013 and 2014 about the best way to deliver health services to children in South Wales
Typing	Tests that allow the laboratory to determine whether bugs are the same. One of the methods used to do this is pulse field gel electrophoresis (PFGE).
Welsh Health Specialised Services Committee (WHSSC)	<p>The Welsh Health Specialised Services Committee (WHSSC) is responsible for the joint planning of Specialised and Tertiary Services on behalf of Local Health Boards in Wales.</p> <p>WHSSC was established in 2010 by the seven Local Health Boards in Wales to ensure that the population of Wales has fair and equitable access to the full range of specialised services.</p>

April 19th 2017

Executive Summary

An outbreak of colonization and infection with a bacterium called *Acinetobacter baumannii* on the Neonatal Unit was declared by Cardiff and Vale University Health Board on August 25th 2015. This independent review was commissioned by the Board to investigate the management of the outbreak.

Prior to the outbreak under investigation, several smaller outbreaks involving a number of different organisms occurred on the neonatal unit between 2011-2015. The condition of the neonatal unit (size, cot spacing and staffing) had been recognized as a catastrophic risk and documented as such on the Health Board risk register since 2012.

A. baumannii is commonly found in the environment. It can withstand drying and remain in the environment for weeks or months and is difficult to eradicate. It is a particular concern because it is usually resistant to antibiotics that are commonly used to treat infection. In this instance the organism was relatively sensitive. The risk of an outbreak may increase when infection prevention and control measures break down or when neonatal units (and other care settings) lack space .

This report summarizes the events during the recognition, management and closure of the outbreak.

The external review was asked to consider four questions:

Question 1. Were the August 2015 and November 2015 AB outbreaks effectively managed?

The review noted that effective management involves several components that are outlined in the document “Managing and preventing outbreaks of Gram-negative infections in UK neonatal units” (Anthony et al.)¹ . Using one standard for management the review found that 6 of 8 recommendations were met completely and 2 of 8 recommendations were met partially.

Of particular note were the many elements of good practice. These included:

- Once the outbreak had been identified there was a rapid development and implementation of interim estates solution. This was very impressive.
- There was also impressive devotion to the care of the babies by a wide variety of staff – clinical and non-clinical

¹ Anthony M, Bedford-Russell A, Cooper T, et al. Managing and preventing outbreaks of Gram-negative infections in UK neonatal units. Arch Dis Child Fetal Neonatal Ed 2013;98: F549–F553.

April 19th 2017

- There was honest and transparent communications with parents, with staff and with the broader community
- The maternity and neonatal made changes in clinical practice
- There was outstanding leadership of IP&C by one doctor and the neonatal unit IPC nurse, but not a resilient system. The team needs to be strengthened and a system-based approach developed so that if specific individuals are absent the system still works

Of concern were the elements of poor practice. These were:

- There are opportunities for improvement of surveillance and early detection and early implementation of interventions
- Optimal surveillance might have identified the outbreak earlier
- The review team felt that on the balance of probabilities the outbreak resulted from a perfect storm of unit issues and other issues.
 - The unit issues were space and staffing. Since these issues were subject to decisions by the Welsh Government the unit issues were, at least in part, beyond the control of the Health Board.
 - A number of factors that were under the control of the Health Board contributed to the causation and impact of the outbreak. These avoidable factors were: infection prevention and control systems that lacked resilience and were critically vulnerable to the absence of key individuals. These vulnerabilities related to cleaning and the identification and control of infections.

The review team felt that if the neonatal unit was in its current setting and if adequate IPC measures in place the outbreak would have been significantly less likely and any outbreaks would have much less impact.

The continuation of weak IPC systems leaves the Health Board open to the continued risk of outbreaks in other clinical areas.

Question 2

Taking all relevant factors into account

2A. Was the closure of the NNU in August and November 2015 reasonable?

Yes.

The minutes of the early meetings relating to the August 2015 outbreak report many difficulties in implementing control measures and logistic difficulties. Separation of infected and uninfected babies could not be achieved. In addition, with the ongoing level of occupancy and continued maternity unit activity service could not be maintained at a safe level.

In November 2015 further risks could not be taken when there was a recurrence of the organism in the new interim facility and further transmission events were thought to have occurred.

April 19th 2017

2B. Was the closure done in a timely manner?

Yes.

Once the outbreak was recognized and the difficulties in implementing control measures were identified the August closure was done in a timely manner. However, as discussed in the report, the outbreak could have been identified sooner.

2C. Was the decision to reopen the NNU on both occasions reasonable?

Yes

Continued, prolonged closures would have compounded risks in other areas.

3. Has the UHB demonstrated learning and put in place robust arrangements?

Arrangements have changed since the outbreak but further developments are still needed in:

- Value of IP&C at the team level and at Clinical Boards and corporate level
- Value of communication between staff
- Value of clear laboratory processes and leading onto information for action
- Value of having sufficient staff on the neonatal unit

4. Are the proposed new NNU plans fit for purpose in mitigating future risks of IP&C outbreaks?

The environmental plans for the NNU are fit for purpose with respect to mitigating the risks of similar neonatal outbreaks.

The weak links in the plans are obtaining revenue to maintain adequate staffing and maintaining capital to complete the plans.

The review team were impressed by the speed with which new plans were prepared and executed.

Reflection

Low birth weight neonates are known to be prone to infections and can die from infections that would not be fatal in other age groups. *Acinetobacter baumannii* infections in intensive care can lead to mortality. The fact that infections in this unit did not lead to deaths associated with *Acinetobacter* may have been related to the nature of this particular bacterium. In particular, it did not cause infections in all the babies who were colonized (it had low virulence) and it was susceptible to antibiotics that are used commonly. The outcomes could have been a lot worse. In similar outbreaks there has been significant number of deaths. This was a lucky escape for the babies and the hospital.

April 19th 2017

The review team noted in passing that many stakeholders in the neonatal services in South Wales had been extremely frustrated between 2012 and the end of 2015. The circumstances that led to the outbreak (overcrowding and inadequate staffing on the neonatal unit) were widely recognized but no adequate actions were taken despite exhaustive discussions.

Recommendations

Eighteen recommendations were made in total.

The most important of these are shown in bold:

A. Recommendations specific to the neonatal unit

1. **Secure revenue for staffing**
 - a. **If this is not done then the full benefits of capital investment for infection control and prevention (and other benefits) to date will not be realised**
2. Secure capital for the remaining beds in the current plan
3. Share experiences with the Neonatal Network and the broader health economy
 - a. The health economy did not benefit properly from the learning arising from the Singleton ESBL *E.coli* deaths
 - b. The neonatal network would benefit from closer working arrangements with the maternity network and the commissioners
 - c. The 12 hours dedicated neonatal transport service should be extended to 24 hours. If another serious outbreak were to arise, additional transport services may need to be commissioned short term

B. Recommendations that are relevant across the Health Board

4. **Increase engagement of medical staff in IPC at all levels of the organization**
 - a. **During clinical work all doctors need to follow IPC measures at all times including effective hand hygiene and bare below the elbow.**
5. **Improve methods for linking isolates and identifying outbreaks.**
 - a. **Implement electronic methods for linking isolates, for example IC Net.**
 - b. **Implement a system that is not reliant on one person**
 - c. **The IPC Team should have access to information about isolates so they can look it up for themselves**
6. Document meetings, risk assessments and completed actions more effectively
7. Maintain multiple ways for staff to raise concerns
8. Review cleaning practices
 - a. Training and competence assessment
 - b. Methods
 - c. Review of methods (is Actichlor being used effectively)
9. Consider quantitative assays of cleaning effectiveness
10. Maintain close monitoring of infections at all levels of the organization
11. Ensure robust ways for the Health Board to become aware of troublesome isolates
 - a. Review arrangements with PHW about information flow from the labs to health care facilities in the Health Board
12. **Assure capacity and capability of IPC team**

April 19th 2017

- a. The IPC team is too small, banding of staff is extremely low for a major teaching hospital and lacks a middle tier between DIPC and operational staff. It should be recognised that the DIPC role is not full-time and that the postholder has additional external responsibilities.**

- 13. Improve hand hygiene audits
- 14. Improve hand hygiene practice and personal ownership
- 15. Review whether the risk register is useful: the Neonatal Unit was rated as 25 out of 25 for 4 years. What is the point of the risk register if an intolerable risk can be carried for so long?
- 16. Develop ways for nurses to be reassessed in cleaning skills
- 17. Recognize tremendous work by cleaners, nurses, DIPC team and neonatal doctors, particularly Dr. J. Calvert
- 18. Highlight exceptional work done by Dr. E. Davies and recognize the value of that work by strengthening the IPC team

April 19th 2017

Chapter 1 Introduction

There were two outbreaks of *Acinetobacter baumannii* on the neonatal unit (NNU) at University Hospital of Wales (UHW) in Cardiff during 2015.

The outbreaks were managed by the Health Board responsible for the hospital: Cardiff and Vale University Health Board (CVUHB). Once the outbreak had been completed CVHB commissioned an external review: this is the report of the review. The review's terms of Reference are included as Appendix 1.

The Independent review was asked to answer four questions:

Question 1

Were the August 2015 and November 2015 AB outbreaks effectively managed?

Question 2

Taking all relevant factors into account:

- A. Was closure of the NNU in August and in November 2015 reasonable?
- B. If so was it done in a timely manner?
- C. Was the decision to re-open the NNU on both occasions reasonable?

Question 3

Has the CVUHB demonstrated learning and put in place robust arrangements?

Question 4

Are the proposed new NNU plans fit for purpose in mitigating future risks of IP&C outbreaks?

The review was asked to consider:

- Compliance with national guidance and standards (before, during and after);
- Workforce and environmental influencing factors;
- Governance and accountabilities;
- Working relationship with the Neonatal Network.

The review team included:

A Neonatologist with an interest in infection and antibiotics (MT)

An Infection Prevention and Control (IP&C) specialist (MK)

A Medical Microbiologist with experience of managing and investigating outbreaks (BP).

April 19th 2017

None of the review team had worked in Cardiff, or in Wales.

The review team described their previous associations with South Wales as:

MT: one research collaboration with Prof. S. Kotecha at UHW that involved planning a clinical trial of an antibiotic

MK: No relevant disclosures

BP: Between 2008-2014 member of review teams for Healthcare Inspectorate Wales for outbreak reviews (including ESBL E coli cross infection in a maternity/neonatal unit) and peer review visits. Similar work for Abertawe Bro Morgannwg University Health Board on a hepatitis B transmission between two patients.²

The review was conducted between September 5th 2016 and October 31st 2016.

The review started with a three-day visit to Cardiff between September 5th and September 7th 2016.

The timetable for the three-day visit is shown in Appendix 2.

The review team met with the Cardiff team (Director of Nursing, DIPC, Lead Neonatologist) to share their initial review on September 7th.

A draft report was prepared by MT and revised by the review team.

The draft report was reviewed by relevant members of UHB between November 27th 2016 and March 16th 2017.

² 2008 HIW SPECIAL REVIEW OF THE OUTBREAK OF CLOSTRIDIUM DIFFICILE AT THE FORMER NORTH GLAMORGAN NHS TRUST IN MARCH/APRIL 2008

2009 Healthcare Inspectorate Wales – “All Wales” review of the management of patients with diarrhoea and vomiting

Jan 2012 Abertawe Bro Morgannwg University Health Board, NHS Wales – Expert External Report on the transmission of hepatitis B between two patients who underwent cardiac surgery at Morriston Hospital in Swansea in March 2011

2014 Healthcare Inspectorate Wales - A Review Of Abertawe Bro Morgannwg University Health Board's (AMBU) Response to the ESBL E.coli Cross Infection in the Maternity/Neonatal Unit at Singleton Hospital in November 2011

April 19th 2017

Chapter 2 Background

Description of the unit and its activities before the outbreak

The Unit

The WHSSC Commissioned neonatal ICU and HDU services. The historic and recognised commissioned cot capacity during the period for ICU/HDU was 17+1 (split 10 HDU, 8 ICU).

Unit activities included all types of ventilation (including high flow oscillatory ventilation and inhaled nitric oxide), surgery and family support.

The current estate opened in 1971.

Neonatal activity from the nearby Llandough Hospital was transferred to UHW in 2005 without an increase in the footprint of the unit. There have been significant changes in neonatal practice since 2005 and significantly more equipment is used now compared to a decade ago.

In England, current recommendations for the design of existing neonatal units are that each intensive care cot is allocated a minimum 16m². Current recommendations for new units are 20m² per cot, not including staff areas. It should be noted that the specifications for neonatal units have changed over the past decade, with increasing understanding of how infections spread within units.

One of the intensive care areas on the Unit that was operational prior to the first outbreak in 2015 had floor space of 60m². This space accommodated seven intensive care cots so that the allocated space was 8.6 m² per cot.

The first detailed documentation of the problems with the size of the neonatal unit was prepared by the Lead Neonatologist in 2009 and presented to the Clinical Board.

The Unit was widely recognized as being too small and a significant risk of infection was identified in 2011 and escalated to a catastrophic risk on the corporate risk register in 2012.

A plan and justification for investment (a business case) for redevelopment of the Neonatal Unit was developed in 2013 and submitted to the Welsh Government. A decision was delayed because of the South Wales Project. The South Wales project was a collaborative approach to reviewing the provision for neonatal services in South Wales. The review took place between 2013 and 2014. During this time no decisions were made about the Neonatal Unit at UHW. Following this process a business case for expansion of the neonatal unit at UHW was sent to WG in March 2016

April 19th 2017

Infections before the current outbreak

Before 2015 the background rate of infection on the neonatal unit at UHW was similar to the rate of infection at other units. The Unit is part of the Vermont Oxford Network (VON). VON is the leading method for comparing neonatal units globally and membership of VON reflects a commitment to quality improvement. During 2014 VON included data about whether or not 53,423 babies with a birthweight < 1500g had an infection 4 or more days after birth (late infections), and these were compared to 57 babies admitted to UHW. There was no evidence that UHW had more late infections than other units with similar activity. The Neonatal team had undertaken several quality improvement initiatives to address late infections: these initiatives were similar to actions taken by similar units in the rest of the UK.

However, the number of outbreaks was higher than the review panel expected.

Previous outbreaks included:

November 2011 *Pseudomonas aeruginosa* – a bacterium that can be difficult to treat

April 2015 Methicillin Resistant *Staphylococcus aureus* (MRSA) – another bacterium that can be difficult to treat

July 2015 Influenza – a virus that can make premature babies very sick

The number of outbreaks was significantly higher than expected particularly during 2015 and it is evident that the frequency of outbreaks was increasing.

The clinical problem: neonatal infection and bacteria that can be resistant to multiple drugs

Neonates are more prone to infection than other people. This is partly because they handle infections differently and partly because they are exposed to a large number of invasive procedures that are needed as part of their care.

Infections make people feel unwell, prolong hospital stay and therefore need other resources for successful treatment. Neonates suffer from infection as well. In addition, neonates can suffer long-term consequences of infections. The infection, and the body's response to it, can disrupt the development of the brain. This means that babies with infections are more likely to have brain damage than babies who do not get infections. This is a unique feature of neonatal infection that needs to be accounted for in risk analysis.

Given that most neonates who are discharged from hospital have a long lifespan, the proper horizon for benefit-risk assessments of neonatal treatments is 70 years. Disability Adjusted Life Years (DALYs) or similar measures need to be calculated on this

April 19th 2017

basis. Health care systems need to base services around high quality care thereby averting many decades of ill-health.

There is increasing recognition that bacteria are becoming more resistant to antibiotics. Multidrug resistance is a particular problem in neonates because many antibiotics have not been studied in neonates and so we don't know which doses work and how to minimize side effects.

A. baumannii is commonly found in the environment. It can withstand drying and remain in the environment for weeks or months. This persistence makes it extremely difficult to eradicate. It is a particular concern because it is usually resistant to antibiotics that are commonly used to treat infection.

The UK context

With the increasing recognition of antimicrobial resistance (AMR) and its particular impact on babies there has been increased scrutiny of neonatal infections. A number of recent events have been reviewed and reports have been issued.

Infection Events

Northern Ireland *Pseudomonas aeruginosa* outbreak. This outbreak was related to water-borne infections but the enquiry identified a number of general issues including the need to share information about infections between units and to develop effective networks to manage infection across a population.

Singleton Hospital ESBL *E. coli* outbreak. The report concluded that a lack of space made infection more likely; the report included a specific recommendation effort was made to ensure that no other units in Wales had the same problems.

Reports

Under the auspices of the Neonatal Infection Sub-Group of the ARHAI (Antimicrobial Resistance and Healthcare Associated Infection) Committee of DH England, a group developed some guidelines entitled "Managing and preventing outbreaks of Gram-negative infections in UK neonatal units" (Anthony 2013).

In England, DH issues a building note for neonatal units in 2013 (80% of 20m² should be enough for existing units)

The South Wales context

The best way to organize neonatal services in South Wales has been under discussion for some time.

All interviewees reported considerable frustration about the delay in decision-making about neonatal services in South Wales

The Singleton report prompted review of infection across South Welsh neonatal units. This included reviews by CVUHB and the Neonatal Network followed by action plans.

April 19th 2017

CVUHB were aware of the issues and tried to follow the recommendations in the report about the Singleton hospital. Staff from CVUHB told the review panel that external factors prevented them from following all the recommendation of the report about Singleton hospital.

April 19th 2017

Chapter 3 What happened?

Overview of Chronology

Outbreak detection

The first isolate related to the outbreak was from an eye swab in May 2015. The neonatal unit were informed. That isolate was not retained. This was in line with standard practice for isolates from skin or eyes so that this isolate was not available for comparison with bacteria that were isolated later in the year (i.e. subsequent typing).

The second isolate was from two sites in the same patient in June 2015: secretions from an endotracheal tube (ETT) and a positive blood culture. The neonatal unit were informed about these findings and infection control measures were reinforced. Crucially, the link between the first isolate and the second isolate was not made.

The third isolate occurred at the end of July 2015 when the neonatal Infection Control Nurse was on annual leave. When she returned from holiday she manually searched back through the isolates that had previously occurred and identified the first and second isolates. This led to a discussion with other senior members of the IP&C team. It would have been possible to identify a potential connection, “linkage”, between the isolates at this time if the isolates had identical antibiotic resistance profiles, even if advanced methods such as typing were not used.

The fourth isolate occurred in August 2015 just before the DIPC and Senior Infection Control Nurse went on Annual Leave. All the available isolates were sent for typing in case there was an outbreak, however the antibiograms of all of the isolates was identical.

The fifth isolate occurred later in August 2015 just before the DIPC and Senior Infection Control Nurse returned from Annual Leave. The DIPC organized an outbreak meeting and screening of all the babies on the neonatal unit was undertaken. At this stage an outbreak was declared.

Linkage and Outbreak identification

It is important to find out whether isolates are the same bacterium that has spread between patients, to find out whether isolates are linked. Linkage between isolates is central to the identification and control of outbreaks. However this does not preclude the implementation of control measures at an early stage prior to these results becoming available. An outbreak is when the same bacterium is found in more than one baby – if an outbreak is not recognized it will not be controlled and avoidable infections will not be prevented.

When the second isolate occurred the neonatal Infection Control Nurse was on sick leave. Although the isolate was noted by one of her colleagues, and the neonatal unit was notified, there was no attempt to search for a previous isolate that might be linked to the second isolate. This meant that an opportunity to identify the outbreak was missed. The

April 19th 2017

clinical team would have discussed the possibility of an outbreak and might have changed their plan.

At the time of the first opportunity, linkage between isolates was identified by the Infection Control Nurse attached to the Neonatal Unit. The Infection Control Nurse received an e-mail each day with all the positive isolates from the hospital. Each day the Infection Control Nurse had to transfer the contents of the e-mail to a spreadsheet for that day and then identify the isolates that were relevant to her/his clinical areas. If the Infection Control Nurse identified an isolate that might be associated with an outbreak she/he had to review all the previous spreadsheets in which a similar outbreak might be found. This depended on the memory of specific nurses and the ability of the nurse to search through previous spreadsheets looking for an isolate that might be similar to one she had just come across. We note that the system of outbreak detection based on personal recollection informed by e-mails and spreadsheets is inadequate and is significantly below best practice. The Infection Control Team did not have access to the laboratory system operated by Public Health Wales, despite requesting this. We note that other Boards in Wales do have access to this system. Computerised systems are available to automate the process and ensure that multiple people can access the data relating to a clinical area. The systems can be set up to raise triggers when similar isolates are identified in the laboratory, providing automated alerts about possible outbreaks.

A Public Health Wales Microbiologist suggested to us that the IPC team may not have the authority to request screening and typing in the absence of the DIPC: this was apparent when the SICN and DIPC were on leave at the same time. This is possibly due to perceived status, since the team is extremely small for the level of activity and the bandings of team members are considerably below what would normally be found in a major teaching hospital in a capital city. Also, there was a lack of clarity about how the responsibilities were shared between the Health Board and Public Health Wales.

The chronology of this outbreak is summarized in Figure 1 which illustrates the cumulative number of *A. baumannii* isolates by time annotated with significant events.

April 19th 2017

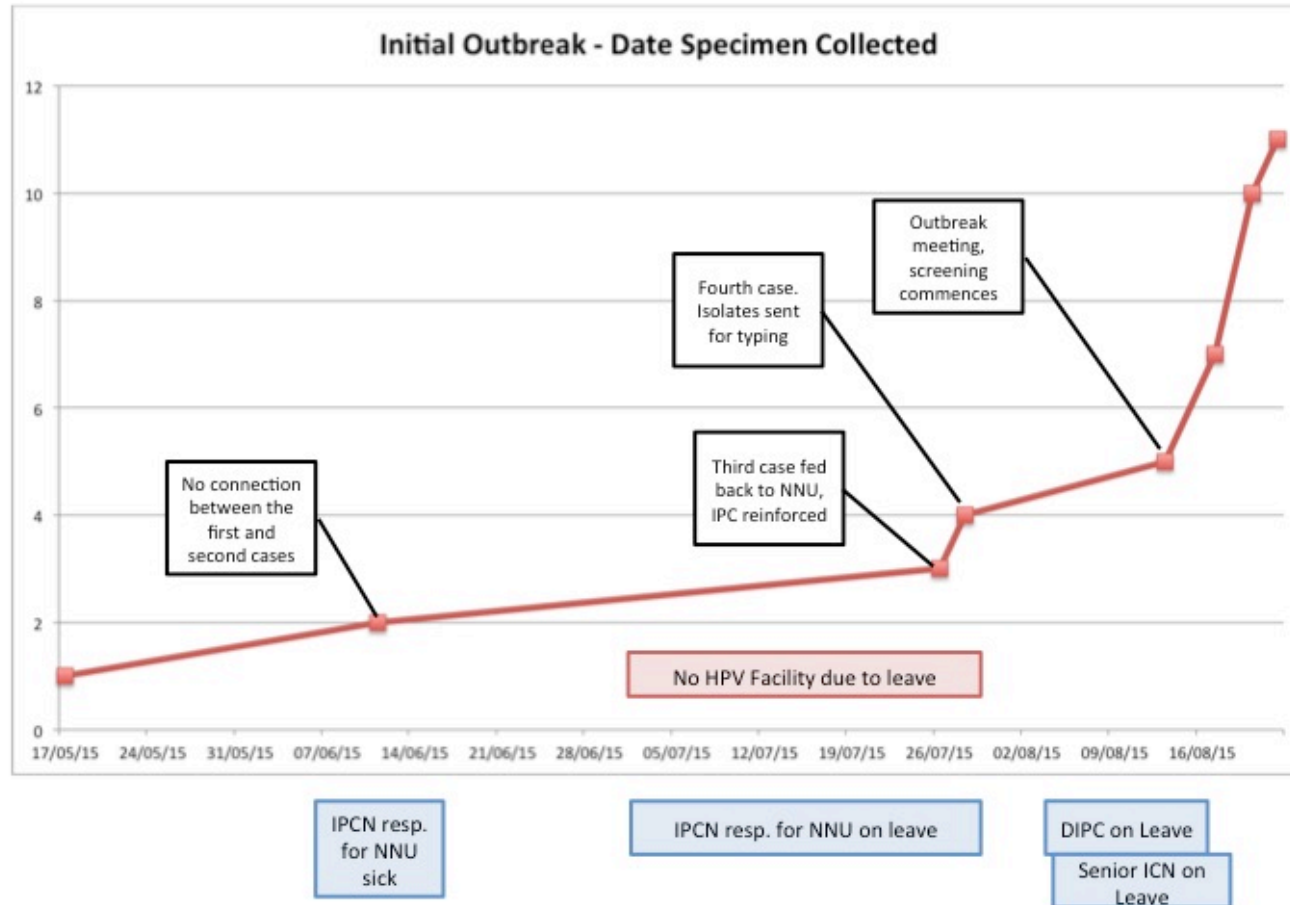


Figure 1. Time and event curve for the outbreak

April 19th 2017

The review team felt that there were two occasions early in the first outbreak where interventions could have been implemented earlier.

1. The Review team felt that best practice would have been to order screening of all babies on the neonatal unit and to call an outbreak at an earlier stage, possibly after the third and probably after the fourth isolate.
2. The delay between fourth and fifth isolates was associated with a delay in instituting measures to halt the outbreak. This could have reduced the total number of babies affected by the outbreak and the burden to the babies, families, staff, population of South Wales and Hospital Board.

Other factors contributed to the outbreak.

One was a shortage of staff on the unit. This included insufficient nursing staff and medical staff. This was due to a combination of sickness, pregnancy and recruitment difficulties.

In the case of medical staff in training grades, the staff shortages were longstanding and reflected, in part, negotiations with the authorities with oversight of doctors in training about the number of doctors in training and the nature of their training.

Another factor was the effect of the environment. The unit did not meet the standards for bed spacing recommended for NNUs at the time and this had been repeatedly documented. Coupled with an air handling system that did not meet the recommended number of air changes, this increased the risk from environmental contamination. At this time, no environmental specimens were taken and this would have been good practice.

A further factor was that the practice for cleaning equipment (particularly incubators) was to clean them on the unit with a chlorine-based solution and then to fumigate them with Hydrogen peroxide vapour (HPV). This system was inoperative for most of August 2015, as the only worker that could operate the HPV system was on leave. In practice it is difficult to maintain the 5 minutes contact time with the chlorine-based disinfectant necessary for disinfection to take place and it is likely that this contributed to the outbreak, since no risk mitigation measures were implemented whilst the staff member was on leave.

Steps taken to control the outbreak

Once the outbreak was called there was a comprehensive reaction including:

- An outbreak team was convened. The minutes from the first few incident meetings show that the team were struggling to make progress implementing various control measures. There were a number of pressures on the team and it was not until around the time of the first Serious incident meeting that the minutes reflect some progress towards control.
- High-level Serious Incident (SI) meetings two or three times a week during the initial phases of the outbreak with appropriate changes in the frequency of the meetings as the outbreak was resolved and when it returned.
- Meetings of the Infection Prevention and Control team
- Identification of alternative estate

April 19th 2017

- This was done with admirable speed and efficiency. A number of options was rapidly identified. The options were appraised, taking account of the needs of the neonatal service and other services – work which should be specially commended.
- It was decided to develop an interim unit. Plans for the interim unit were developed rapidly.
- A business case for the interim unit and part of a definitive solution was prepared.
- New estate was developed with unheard of speed.
- Transfer of the babies and staff from the old to the interim unit were made expeditiously and with due account of the need to cohort the babies colonized with *A. baumannii*.
- In parallel to these actions the number of babies admitted to the unit was reduced in order to reduce the likelihood of further cases. This proved to be difficult because the number of births in the hospital was not reduced markedly. Where possible mothers who were expected to give birth to babies with problems requiring neonatal intensive care were transferred out of UHW. This was not possible in all cases. On occasions babies had to be transferred out of Wales to Bristol and beyond.
- Communications with staff, families and with the broader community. Clearly very effective and well-received by staff, families and the media. It is striking that there were no formal complaints
- Care pathways for babies who required neonatal care but not admission to the neonatal unit were modified. This included increasing the capacity for babies to receive intravenous antibiotics on the postnatal wards.
- Senior management and Hospital Board engagement had a clear impact and expedited decision-making.

Impact of the outbreak

1. Disruption to families and staff

A large number of families experienced new conditions for neonatal care and was subject to uncertainty about the care their baby would receive. Families were distressed by segregation / cohorting of babies.

The staff found the outbreaks very stressful. The contributors to staff stress included: extreme uncertainty about source and duration of the outbreak; frustration that the outbreak could have been prevented by changes they had been arguing for since 2009; limited changing areas and coffee room in interim area

2. Transfers out

Between 1st August 2015 and 27th September 2015 a total of 57 mothers were transferred out of South Wales antenatally because of reduced capacity for neonatal care at UHW. This included one to Oxford (for expected neonatal surgery), one to Taunton, two to Gloucester (including one mother carrying twins), one to London (Chelsea and Westminster), one to Southampton

April 19th 2017

Between 1st August 2015 and 27th September 2015 a total of 26 babies were transferred out of South Wales antenatally because of reduced capacity for neonatal care at UHW. This included one each to Birmingham and London (St. George's) and two to Oxford,

3. Neonatal surgery

This was reported to be a major source of stress for staff and families across South Wales.

Cardiff is the only site that can provide neonatal surgery in South Wales.

The alternative is to transfer babies to England. The first choice would be Bristol. However, Bristol was often full and so babies had to move to other parts of England, including Southampton and Birmingham.

The obvious solution would have been to place surgical babies on the PICU in Cardiff. This is widely done in many other centres. This solution had been discussed by the relevant medical staff extensively in the years before the outbreak. We were told that the skills mix among PICU Consultants was not suitable for the care of babies with neonatal surgical conditions, that there was insufficient capacity on the PICU and that there was not sufficient capacity among the NICU Consultants to provide shared care for babies on the PICU.

This situation is very disappointing and contributed to the preventable harm arising from the outbreak.

It may be worth reconsidering the components of this problem, namely skills mix among PICU Consultants, PICU capacity and capacity among NICU Consultants.

More generally, the surgical issues highlight the value of contingency plans. The Board should develop contingency plans for the placement of neonatal cots should another threat to the service arise. Threats to the neonatal unit are not limited to outbreaks of life-threatening infection. Contingency plans should be developed proactively in collaboration with internal and external stakeholders. There is a need for network-wide contingency plans for when any part of the South Wales neonatal service is threatened.

4. Neonates with antibiotics on the postnatal wards

A large number of relatively healthy babies receive antibiotics after birth because of maternal or neonatal risk factors. Prior to the outbreak there had been extensive discussions over several years about avoiding unnecessary admissions to the neonatal unit by administering antibiotics on the postnatal wards (this is done in many maternity hospitals). This process was expedited during the outbreaks. This was a considerable burden for the neonatal nurses as they were already stretched dealing with the outbreak.

5. Clinical Impact

We did not review the clinical records of the babies who were colonized or infected but internal assessments by the clinical teams were conducted and found that no significant clinical harm arose from the outbreak

April 19th 2017

One baby who had been colonized died subsequently. We were told that this baby had multiple conditions some associated with prematurity and some associated with underlying conditions. The combination of conditions was sufficient to cause mortality. The baby was not infected with AB before death and there is no reason to link the death to AB colonization.

Key points

There were some aspects of excellent practice.

There are opportunities for improvement of surveillance and early detection and early implementation of interventions

Optimal surveillance might have identified the outbreak earlier

Once the outbreak had been identified there was a rapid development and implementation of interim estates solution. This was very impressive.

There was also impressive devotion to the care of the babies by a wide variety of staff – clinical and non-clinical

There was honest and transparent communications with parents, with staff and with the broader community

The maternity and neonatal made changes in clinical practice

There was outstanding leadership of IP&C by one individual and one IPC nurse but a resilient system was absent. The team needs to be strengthened and a system-based approach developed so that if specific individuals are absent the system still works

The review team felt that on the balance of probabilities the outbreak resulted from a perfect storm of unit issues and other issues.

The unit issues were space and staffing. Since these issues were subject to decisions that were part of a long-term planning process for neonatal services supported by the Welsh Government, the unit issues were, at least in part, beyond the control of the Health Board as long as the Health Board contributed to the long-term planning process.

A number of factors that were under the control of the Health Board contributed to the causation and impact of the outbreak. These avoidable factors were: systems that lacked resilience and were critically vulnerable to the absence of key individuals. These vulnerabilities related to cleaning and the identification and control of infections.

The review team felt that if the neonatal unit was in its current setting and if adequate IPC measures in place the outbreak would have been significantly less likely and any outbreaks would have much less impact.

On the other hand, the continuation of weak IPC systems leaves the Health Board open to the continued risk of outbreaks in other clinical areas.

April 19th 2017

Low birth weight neonates are known to be prone to infections and can die from infections that would not be fatal in other age groups. *Acinetobacter baumannii* infections in intensive care can lead to mortality. The fact that infections in this unit did not lead to deaths associated with *Acinetobacter* may have been related to the nature of this particular bacterium. In particular, it did not cause infections in all the babies who were colonized (it had low virulence) and it was susceptible to antibiotics that are used commonly. The outcomes could have been a lot worse. In similar outbreaks there has been significant number of deaths. This was a lucky escape for the babies and the hospital.

April 19th 2017

Chapter 4 Review Questions

Question 1 Were the August 2015 and November 2015 AB outbreaks effectively managed?

The review team adopted the standard for management of Gram Negative outbreaks provided by Anthony et al. (Anthony 2013) This was also described as the standard adopted by the Health Board.

Table 1 shows the recommendations provided by Anthony et al. and the reviewers' opinions of compliance with each recommendation.

The Health Board met all 8 recommendations related to the management of the outbreak. Six recommendations were met in full and two recommendations were partly met. The Health Board's response to two recommendations was hampered by external factors.

On balance, the August 2015 and November 2015 AB outbreaks were effectively managed once the outbreaks were recognized. That is, the management of the outbreak can be justified. A respectable body of professional opinion would have handled the outbreak in a similar way.

But:

- Documentation of risk assessment and action plans was weak, in particular the recording of completed actions
- Cleaning should have been assessed more rigorously than a simple visual check
- Cleaning was not resilient because of dependence on a limited number of staff
- The outbreak broke through existing measures – there was suboptimal implementation of chlorine based cleaning and HPV
- Systems that enable early detection and allow early implementation of intervention were lacking
- Hand hygiene was, and remains, inadequate.

Issues with cleaning had not been resolved at the time of the visit by the review team.

At the time of the visit by the review team the instructions for cleaning were ambiguous. The use of Actichlor was suboptimal. It should be left to dry and needs to be in place for at least 5 minutes. Senior members of the UHW staff were under the impression that housekeeping staff left Actichlor in place for 5 minutes. However, observation of unit practice suggested that Actichlor was often wiped off after a minute or so to prevent smearing.

April 19th 2017

Hand hygiene remained inadequate at the time of the review. The review team noted good practice among many staff. However, the review team noted poor practice. For example members of the surgical team did not remove their watches before examining a baby.

In summary, the outbreak was effectively managed with some room for improvement.

April 19th 2017

Table 1

Recommendations from the paper by Anthony et al. 2013 and the review team's assessment of compliance with each recommendation.

Recommendation	Compliance	Comment
<i>Management of outbreaks</i>		
Activate an organisational response and establish a control team when an outbreak is suspected	Yes, in part	Apparent delay due to staff absence. The systems were not robust, and continue to lack resilience
Screen for the specific organism only during an outbreak	Yes	
Undertake multidisciplinary reviews of cleaning routines, hand hygiene and Gram-negative bacteria transmission risks	Yes, in part	There were, and continue to be, gaps in the review. For example, IPC staff finding dust on the radiators despite internal cleaning audits demonstrating high compliance. The review team found unauthorized cleaning materials on the neonatal unit The cleaning instructions were ambiguous and at the time of the review were implemented in a way that undermines their effectiveness Effectiveness of cleaning was only assessed in a subjective manner Opportunities to perform environmental sampling were missed
Consider deep-cleaning	Yes, in part	At the time of the first outbreak it was not possible to undertake HPV fumigation due to the layout of the unit
Cohort colonised and infected babies preferably but not necessarily in isolation cubicles	Yes	
Consider reducing beds or closing a unit to new admissions as a way of improving spacing and staff:patient ratios until the outbreak is under control.	Yes	The Health Board acted appropriately once the outbreak was identified. The Health Board was hampered by issues with neonatal services across South Wales.
Establish mechanisms to communicate effectively across the network	Yes	The Health Board acted appropriately once the outbreak was identified. The Network acted appropriately but was hampered by its

April 19th 2017

Recommendation	Compliance	Comment
		narrow remit, lack of power and very limited resources
Inform parents of the outbreak as early as possible, and providing prewritten 'infection outbreak' information sheets	Yes	This was done well.
<i>Prevention of outbreaks</i>		
Meet national staffing and cot-spacing requirements	No	Standards set by the Network, and relevant standards operational in England, were not met for a considerable period of time
Follow a Water Action Plan	Yes	
Use infection reduction care bundles	Yes	The Neonatal Unit conducted these but other parts of the organization appeared not to recognize this
Benchmark	Yes	The Neonatal Unit conducted these but other parts of the organization appeared not to recognize this
Introduce breast milk early	Yes	http://www.nhs.uk/conditions/pregnancy-and-baby/pages/breastfeeding-first-days.aspx
Limit antibiotic use	No	Hampered by lack of 36 hour reporting. The delay in implementing 36 hour reporting was beyond the Hospital Board's control

April 19th 2017

Question 2A. Was the closure of the NNU in August and November 2015 reasonable?

The Review team considered a standard for “reasonable” and adopted “a defensible practice that would have been followed by a respectable body of professional opinion”.

In this light, the closure of the NNU was reasonable on both occasions.

In fact, the closure was not just reasonable but essential.

Any criticism of the closure would be unreasonable.

The minutes of the early meetings relating to the August 2015 outbreak report many difficulties in implementing control measures and logistic difficulties. Separation of infected and uninfected babies could not be achieved. In addition, with the ongoing level of occupancy and continued maternity unit activity service could not be maintained at a safe level. In this situation closure of the unit was required.

In November 2015 further risks could not be taken when there was a recurrence of the organism in the new interim facility and further transmission events were thought to have occurred.

Question 2B. Was the closure done in a timely manner?

Yes.

Once the pattern of colonization had been recognized the unit was closed and the SI called. However the review team felt that that the August outbreak have been recognised a month earlier if robust surveillance systems had been in place.

The recurrence of the outbreak in November 2015 was a very difficult time for all staff involved. They felt that they had taken every possible step to end the outbreak and prevent another outbreak. Once the outbreak was recognized then the unit was closed appropriately.

Again, the risk assessment for the second closure was not documented.

The risk assessment for the second reopening was documented in detail and illustrated a reasoned case and responsible decision-making.

April 19th 2017

Question 2C. Was the decision to reopen the NNU on both occasions reasonable?

Question 2C: Was the decision to re-open the NNU on both occasions reasonable?

Yes.

Continued, prolonged closures would have compounded risks in other areas.

However, documentation of risk assessment before the first re-opening could have been better

Question 3. Has the UHB demonstrated learning and put in place robust arrangements?

Yes. Learning has already started and is ongoing

Some initiatives have been implemented

- The Big Room

Arrangements have changed since the outbreak but further developments are still needed in:

- Value of IP&C at the team level and at Clinical Boards and corporate level
- Value of communication between staff
- Value of clear laboratory processes and leading onto information for action
- Value of having sufficient staff on the neonatal unit

Question 4. Are the proposed new NNU plans fit for purpose in mitigating future risks of IP&C outbreaks?

The review team were impressed by the design of the new NNU and the speed of construction. The Estates department and their contractors are to be congratulated on the work they have done for the NNU since the start of the outbreak.

The plans for the NNU were fit for purpose with respect to mitigating the risks of infection

The review team had concerns about:

- Revenue for staffing the new neonatal unit: this is yet to be obtained
- Capital to complete all the phases of the neonatal unit: this is yet to be obtained
- Staffing model: yet to be finalised

April 19th 2017

It should be noted that the risks of failure in training issues and other aspects of staffing issues, particularly doctors in training, are beyond the control of CVUH Board control

We did not receive effective assurances that these concerns would be addressed.

Relationship between CVHB and the broader health economy with respect to neonatal services remains unclear and this is a significant risk to the sustainability of the neonatal services at UHW.

Compliance with national guidance and standards (before, during and after)

See Question 1.

Workforce and environmental influencing factors;

Workforce: the issues are complex but there was a good response in the circumstances.

Nursing workforce planning is complex because of the high need for specialist staff. Any reduction in the numbers of nurses being trained in Wales will place further strain on the system.

Medical workforce planning is complex because of training issues that are the responsibility of Deanery and the review of the number of neonatal units needed in South Wales.

Environment: there was an excellent response to the challenges raised by outbreak

Governance and accountabilities

Governance and accountabilities were good within CVUHB.

Governance and accountability outside CVUHB were not clear to the staff who spoke to us: see Chapter 5.

In particular it is not clear who is accountable for the gaps in the neonatal service across South Wales

The working relationship with the Neonatal Network

April 19th 2017

The neonatal network is a subgroup of the Wales Health Specialist Services Committee (WHSSC). The Neonatal Network has an advisory role with no power. The Neonatal Networks identifies standards for neonatal care, informs units about those standards and convenes meetings to promote compliance with those standards. However, the Neonatal Network has no mandate, resources or capacity to enforce standards. Similarly, the Neonatal Network can identify how many neonatal cots are empty or are being used at any one time. The Neonatal Network can share information about cot availability and can convene discussions about how to handle cot shortages. However, the Neonatal network cannot solve cot shortages. The Neonatal Network has very limited resources and staff. Given the constraints on the Neonatal Network the arrangements made by the network appear to be appropriate. However, these now need to be formally agreed in the South Wales Network to ensure that should a future outbreak occur in any of the South Wales neonatal units capacity and service issues will be maintained.

We were told that at the clinical level, neighboring Health Boards collaborated well during the outbreak. Some informants told us that there is no way to coordinate neonatal units across South Wales. The neonatal transport team for South Wales was aware of bed status and could coordinate the movement of babies between units.

There appeared to be some confusion in the Health Board about the scope of the Neonatal Network. Senior staff in the Board appeared to attribute unrealistic capabilities to the Network while being unaware of the work done by the Network. Informal relationships between clinicians were mistaken for actions of the Network. The information we received from the network and the clinicians indicated that the informal relationships worked as well as could be expected during the outbreak. Any apparent shortcomings in joint working between neonatal units were not due to a lack of will to collaborate, or to any failings of the staff badged as Network staff. The lack of coordination between units results from structural and governance failings in the neonatal service across South Wales. The commissioning arrangements for neonatal services are very unclear with Health Boards and commissioners having some input, but no one taking clear responsibility for governance.

The Network was beyond our scope but the broader health economy may like to consider whether the Network needs to be strengthened. Public Health Wales is a unitary agency across Wales that is a good example of subsidiarity (some actions need to be taken across Wales while other actions should be taken locally). A combined approach to neonatal services in South and Mid Wales could also benefit from a formal, unitary approach.

April 19th 2017

Chapter 5 Other observations

It proved impossible to answer the review questions without examining the broader context of neonatal care in South Wales. Some observations beyond the scope of the review are offered to the CVHB, WHSSC and the Welsh government.

A) The South Wales context.

We were told several times that the governance of neonatal services is opaque, even to staff who have worked in South Wales for a decade.

Our understanding is that the Health Board has responsibility for the health of its population. This is done with a block grant from the Welsh Government (WG).

WHSSC commissions specialist services. It did not have a quality framework at the time of the outbreaks although we were told that one is under development.

The Neonatal Network has an advisory role. It has neither mandate nor funding to actively manage clinical care. The Network sets standards for WHSSC but we were told that when the standards are not met the Network has no way to influence clinical care.

The Neonatal Network provides reports to each Health Board and convenes regular meetings at which the Health Boards, represented by the Neonatal Units, compare practice in the light of the reports from the Network. The Network informally supports discussion between the clinicians about care and issues such as this outbreak.

We note that there are effective feedback loops within CVUHB that were used effectively to manage the outbreaks. In contrast, incomplete compliance with standards identified by the Neonatal Network has not appeared to influence the commissioning of neonatal services across South Wales

A root cause analysis of the outbreaks would implicate poor environment and staffing

The poor environment had been recognized in 2011 and escalated to the highest possible risk rating within CVUHB in 2012. We were repeatedly told about the frustration felt at all levels of the organization because of the delay in addressing that risk. We were told about factors beyond the control of CVUHB that contributed to the delay in remedying this risk but these external factors were outside our remit and scope.

The fundamental root cause of the outbreak is the failure to address the issues with poor environment and staffing. This means that some of the responsibility for the outbreak lies with organizations, other than CVUHB, that control the resources for specialist neonatal services in South Wales.

The South Wales health economy might like to consider whether the governance arrangements for neonatal care contributed to the delay in addressing the risk posed by the neonatal unit at UHW and whether different governance arrangements might lead to safer and higher quality services in future.

April 19th 2017

These issues are important because the opacity of governance arrangements with respect to neonatal services reported by staff at UHW may be relevant to other clinical services in South Wales.

Many facets of the outbreak impinge on external stakeholders. The findings and recommendations of this report have implications for stakeholders beyond CVUHB, including the neonatal units in Wales that all need to consider how to learn from this episode.

B) The Neonatal Unit and CVUHB

Historically, the Neonatal Unit appears not to have been given the recognition it deserves in the organization. We wonder which funding schemes received funding ahead of the NNU given the risk rating, previous reports such as Singleton Report and the number of outbreaks on the Unit.

We would like to pay tribute to the unceasing dedication of Jenny Calvert, Lead Neonatologist since 2009: others would have given up faced with such intransigent difficulties. Her energy and commitment have sustained the Unit through exceptional problems over many years. She has supported, and been supported, by a dedicated team.

The NNU worked under totally inappropriate and unacceptable conditions for many years and all staff deserve considerable praise and recognition.

Some interviewees hinted that the Neonatal team may have been the authors of their own misfortune to some extent. There was a perception that the Neonatal team continued to admit babies even when the Unit was closed and that such admissions were somehow unreasonable. If it existed such a judgment would be unfair. Admissions to the Neonatal Unit are by definition unpredictable and unavoidable. The only way to prevent admissions to the Neonatal Unit is to stop women giving birth in the hospital. The use of stabilization cots was a useful measure during the outbreak but would never be a sustainable way to manage admissions beyond the outbreak situation. The difficulties facing the neonatal unit were caused by inadequate space and staffing, exacerbated by the absence of a coherent system for managing neonatal services across South Wales. Some babies will come to harm if they are transferred within hours of birth but it is not immediately clear which babies these are. Neonatal stabilization is not the same as triage in the Emergency Department or stabilization of a child with meningococcal septicaemia in a District Hospital. During the interviews there were some suggestions that senior medical staff in the hospital did not understand the subtleties of neonatal stabilization. If such a lack of understanding informed policy during, or before, the outbreak it would have added to the difficulties faced by the Neonatal team.

C) Senior medical roles

When responding to questions about how IPC was led the CEO / MD referred to the IPC team. After a number of statements the review team concluded that leadership of

April 19th 2017

infection prevention and outbreaks through the various structures (IPC team and across Directorates) could be strengthened even further

April 19th 2017

Chapter 6 Recommendations

Eighteen recommendations were made in total.

The most important of these are shown in bold:

A. Recommendations specific to the neonatal unit

1. **Secure revenue for staffing**

- a. **If this is not done then the full benefits of capital investment for infection control and prevention (and other benefits) to date will not be realised**

2. Secure capital for the remaining beds in the current plan

3. Share experiences with the Neonatal Network and the broader health economy

- a. The health economy did not benefit properly from the learning arising from the Singleton ESBL *E.coli* deaths
- b. The neonatal network would benefit from closer working arrangements with the maternity network and the commissioners
- c. The 12 hours dedicated neonatal transport service should be extended to 24 hours. If another serious outbreak were to arise, additional transport services may need to be commissioned short term

B. Recommendations that are relevant across the Health Board

4. **Increase engagement of medical staff in IPC at all levels of the organization**

- a. **During clinical work all doctors need to follow IPC measures at all times including effective hand hygiene and bare below the elbow.**

5. **Improve methods for linking isolates and identifying outbreaks.**

- a. **Implement electronic methods for linking isolates, for example IC Net.**
- b. **Implement a system that is not reliant on one person**
- c. **The IPC Team should have access to information about isolates so they can look it up for themselves**

6. Document meetings, risk assessments and completed actions more effectively

7. Maintain multiple ways for staff to raise concerns

8. Review cleaning practices

- a. Training and competence assessment

April 19th 2017

b. Methods

c. Review of methods (is Actichlor being used effectively)

9. Consider quantitative assays of cleaning effectiveness

10. Maintain close monitoring of infections at all levels of the organization

11. Ensure robust ways for the Health Board to become aware of troublesome isolates

a. Review arrangements with PHW about information flow from the labs to health care facilities in the Health Board

12. Assure capacity and capability of IPC team

a. The IPC team is too small, banding of staff is extremely low for a major teaching hospital and lacks a middle tier between DIPC and operational staff. It should be recognised that the DIPC role is not full-time and that the postholder has additional external responsibilities.

13. Improve hand hygiene audits

14. Improve hand hygiene practice and personal ownership

15. Review whether the risk register is useful: the Neonatal Unit was rated as 25 out of 25 for 4 years. What is the point of the risk register if an intolerable risk can be carried for so long?

16. Develop ways for nurses to be reassessed in cleaning skills

17. Recognize tremendous work by cleaners, nurses, DIPC team and neonatal doctors, particularly Dr. J. Calvert

18. Highlight exceptional work done by Dr. E. Davies and recognize the value of that work by strengthening the IPC team

April 19th 2017

Appendix 1 Terms of Reference

TOR – external review NNU – v 6 (13 -05 - 16) FINAL

INDEPENDENT REVIEW OF CARDIFF AND VALE UNIVERSITY HEALTH BOARD'S MANAGEMENT AND RESPONSE TO THE ACINETOBACTER BAUMANII OUTBREAKS IN AUGUST AND NOVEMBER 2015

Terms of Reference and Scope of the review

The Medical Director and Chief Nurse/Executive Nurse Director of Cardiff and Vale University Health Board have commissioned an external independent review of the management of the infection prevention and control outbreaks in the Neonatal Unit at the University Hospital of Wales during 2015. This will cover the period from the first *Acinetobacter baumannii* outbreak in August 2015 to the re-opening of the Neonatal Unit on 18.12.15, following a second outbreak of *Acinetobacter baumannii*.

Terms of reference

The review will specifically consider:

Were the August 2015 and November 2015 AB outbreaks effectively managed?

Taking all relevant factors in to account:

- Was closure of the NNU in August and in November 2015 reasonable? If so was it done in a timely manner?
- Was the decision to re-open the NNU on both occasions reasonable?

In determining this, the review should consider:

- Compliance with national guidance and standards (before, during and after);
- Workforce and environmental influencing factors;
- Governance and accountabilities; and
- the working relationship with the Neonatal Network.

April 19th 2017

Has the UHB demonstrated learning and put in place robust arrangements?

Are the proposed new NNU plans fit for purpose in mitigating future risks of IP&C outbreaks?

Scope of Investigation

This will cover the period from the first *Acinetobacter baumannii* outbreak in August 2015 to the re-opening of the Neonatal Unit on 18.12.15, following a second outbreak of *Acinetobacter baumannii*.

Investigation process and methodology

April 19th 2017

The review will involve a review of key documentation, interviews with key staff and on-site visits to the neonatal Unit. The reviewer will have access to all relevant documentation and evidence.

Publication and Information Sharing

The final report will be presented to the public session of the UHB Quality, Safety and Experience committee.

The report will also be shared with Welsh Government, Welsh Health Specialised Services Committee and with the Neonatal Network

Governance

The draft report will be shared with named individuals who have participated in the review. A controlled distribution method will be used to ensure that the draft report is seen only by those who need to comment on factual accuracy of the contents.

The report, as previously stated will be presented at the UHB Quality, Safety and Experience Committee and noted at the following Board session. Progress reports, as appropriate, will be monitored through the QSE Committee.

Timescale of the review

The review should be concluded within 4 weeks of commencement with a final report to Cardiff and Vale UHB, within 12 weeks of commencement.