

An outbreak of multidrug resistant organisms in a neonatal intensive care unit in Malaysia.

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Introduction

Multi-drug resistant organisms (MDROs) often result in severe adverse complications and are increasingly challenging to manage in the neonatal intensive care unit (NICU). Between January–February 2017, an increase of MDROs, especially extreme drug resistant *Acinetobacter baumannii* (XDR-AB) were isolated from clinical and screening samples of infants in a 25-bed level III tertiary NICU. Based on daily MDROs surveillance, there were no MDROs isolated in the previous 6 months.

Objective

To investigate the source, mode of transmission and assess control measures for an MDROs outbreak affecting 9 preterms between January- February 2017

Methods

An outbreak investigation was performed with concurrent assessment of infection control measures. Intensive surveillance of clinical isolates, screening of contacts and the environment. Environment samples were obtained from high touch points in the infant care areas (eg. incubator, monitor, mini syringe pumps), the sink in the milk handling room, expressed breast milk (EBM), refrigerator and fingers of health care workers (HCWs). XDR-AB was defined as *Acinetobacter baumannii* resistant to all antibiotics except colistin. A review of protocols and direct observation of patient care practices was conducted and findings were communicated to the NICU staff.

Results

Nine preterm infants were colonised or infected with a total of 13 MDROs. The mean gestation age (GA), body weight (BW) and age at which MDROs were isolated was 30.7 ±SD 2.49 weeks, 1347±SD 403 gm and 16 ±SD 8.81 days respectively. All 9 neonates harboured XDR-AB. (Table 1)
One infected infant and all 5 colonisers were alive at 30 days. XDRAB was isolated from surveillance swabs (Table 2). The XDR-AB isolated from the neonates and surveillance swabs had similar sensitivity patterns. Patient care and adherence to infection control guidelines were not standardised. Non critical equipment (ie. syringe drives) were shared between patients and cleaning of equipment between patients was inadequate. Environment cleaning was poor and dilution of disinfectant (sodium hypochlorite) was incorrect.

Table 1: Summary of infants harbouring XDRAB January- February 2017

No	BW (gm)	GA (weeks)	Age during isolation of MDRO(days)	Invasive device or procedure	Site of isolation of MDRAB	Other MDRO	Infection/ colonised	Outcome (30 days)
1	845	27	10	Yes	TA	ESBL Kp	HAC	Alive
2	1305	30	13	Yes	NPS	-	HAC	Alive
3	570	27	6	Yes	Blood	-	HAI	Dead
4	1265	33	28	Yes	Swab omphalocoele	-	HAI	Dead
5	1515	31	14	Yes	Blood	-	HAI	Dead
				Yes	Throat swab	ESBL Kp, CR-Kp	HAC	Alive
6	1635	33	28	Yes	Rectal swab	-	HAC	Alive
7	1730	31	16	Yes	TA	ESBL Kp	HAI	Alive
8	1535	31	24	Yes	TA	ESBL Kp	HAI	Alive
9	1725	34	5	No	Eye swab	-	HAC	Alive

Kp= Klebsiella pneumoniae, CR= carbapenam resistant , ESBL=extended spectrum betalactamases, XDR-AB= extreme drug resistant *Acinetobacter baumannii*; TA=Tracheal aspirate; NPS= Nasopharyngeal secretion; HAC= Hospital acquired colonisation, HAI= Hospital acquired Infection, EBW= Express breast milk, HCW=Health care worker, SS= sensitive strain

Figure 1: MDRO NICU by Organisms January 2016-June 2017

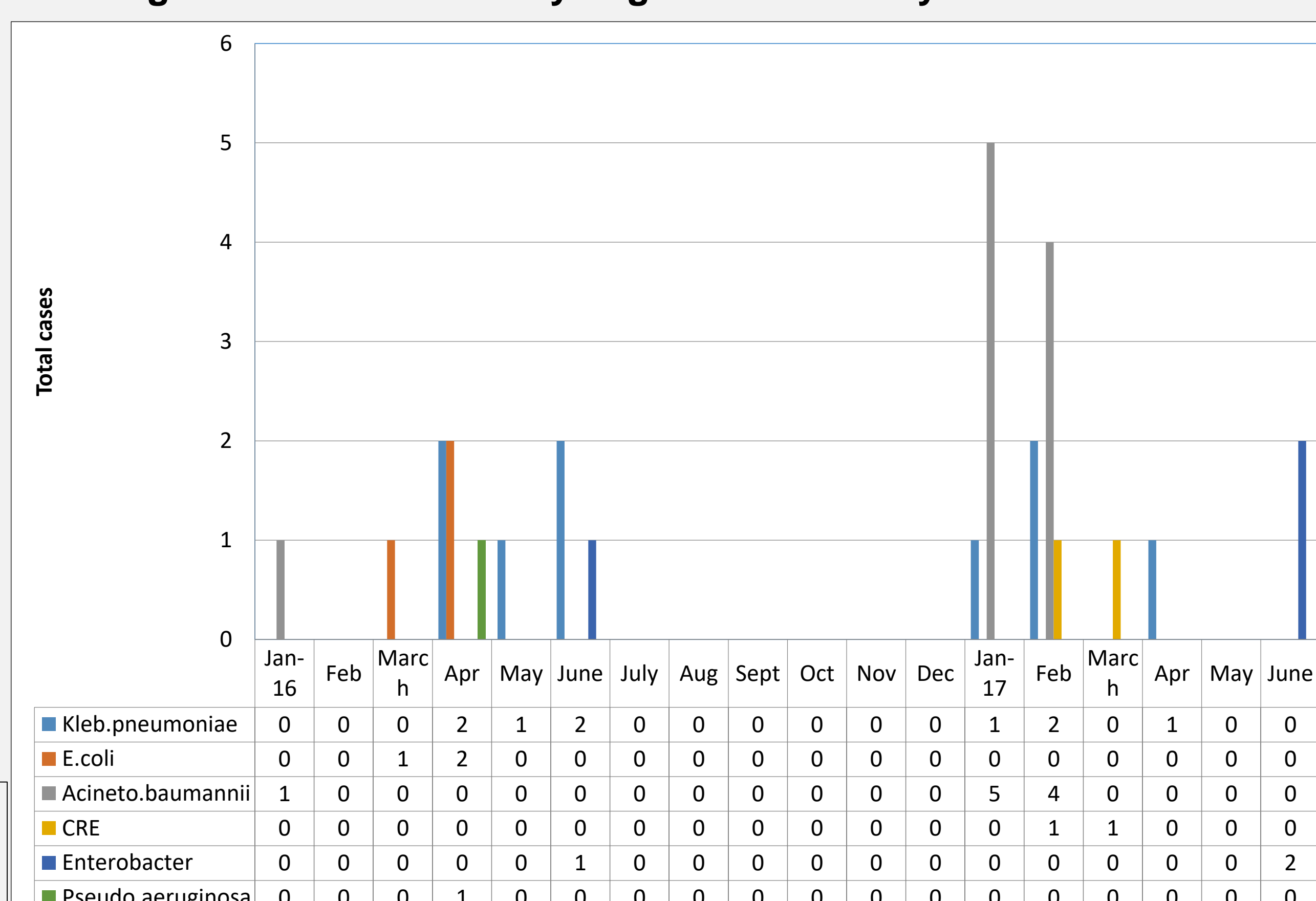


Table 2: Surveillance swabs January- February 2017

Surveillance swabs	Isolation of XDRAB	Other organisms isolated
26 Environment surfaces	2 (mini syringe driver & sink)	Touch screen monitor & Sink: <i>Pseudomonas aeruginosa</i> (SS)
EBM from 5 mothers	0	2 EBM: <i>Acinetobacter baumannii</i> , <i>Enterococcus fecalis</i> & Kp (all SS)
Finger print from 10 HCW	1	-
7 contacts screened	1	-

Intervention

Environmental cleaning & disinfection

- Retraining of cleaning staff: video and competence assessment
- Test strip to assess dilution of sodium hypochlorite solution
- Audit and feedback

Regular multidisciplinary meeting & leadership support

Equipment cleaning & dedicate to individual patient

Reviewing milk-handling practices

- Implement "Milk handling protocol"
- Education for mothers

Regular multidisciplinary meetings & Leadership/Management support:

NICU doctors, matrons, ward managers, infection control link nurses and cleaning staff

Reemphasize on compliance to infection prevention protocols to NICU staff, visiting doctors, medical students and visitors

HH, PPE, proper attire, cohorting, care bundles
Non critical equipment : dedicated to individual patient; proper cleaning & disinfection between patients.

INTERVENTIONS

Re-emphasize on patient care & safety

- Re-emphasizing hand hygiene compliance, PPE, cohorting & care bundles (VAP, CRBSI)

Re-emphasize on patient care & safety

- Moved to a suitable milk handling room

Reemphasize on compliance to infection prevention protocols to NICU staff, visiting doctors, medical students and visitors

HH, PPE, proper attire, cohorting, care bundles
Non critical equipment : dedicated to individual patient; proper cleaning & disinfection between patients.

Milk handling practices

Revised protocol and supervised practice, identified a suitable room
Educating mothers

Environment cleaning

Revised cleaning protocol , developed a cleaning video and checklist . Retrained cleaning supervisors , competence assessed and cleaning practices audited.

Infection control interventions & reinforcement of protocols resulted in reduction of MDROs and no further XDR-AB isolated. (Figure 1)

VAP= ventilator associated pneumonia, CRBSI= catheter related blood stream infection, HH=hand hygiene, PPE= personal protective equipment

Conclusion

Daily surveillance for MDROs is necessary to identify an outbreak promptly. A rapid and thorough investigation of the environment during an outbreak is essential to find the source of the infection. The spread of XDR-AB was suspected to have arisen from contaminated equipment and pathogen transmission via close contact. Revision of protocols and rigorous infection control enforcement by a multidisciplinary team, resulted in outbreak containment.

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