

ICD-10 based coding overestimates neonatal sepsis rates from a metropolitan NICU

Lee ZZ¹, Haeusler G², Tan K^{1,3}

¹Department of Paediatrics, Monash University; ²Infection and Immunity, ³Monash Newborn, Monash Children's Hospital; Melbourne, Australia

Monash Newborn

Handled with Care

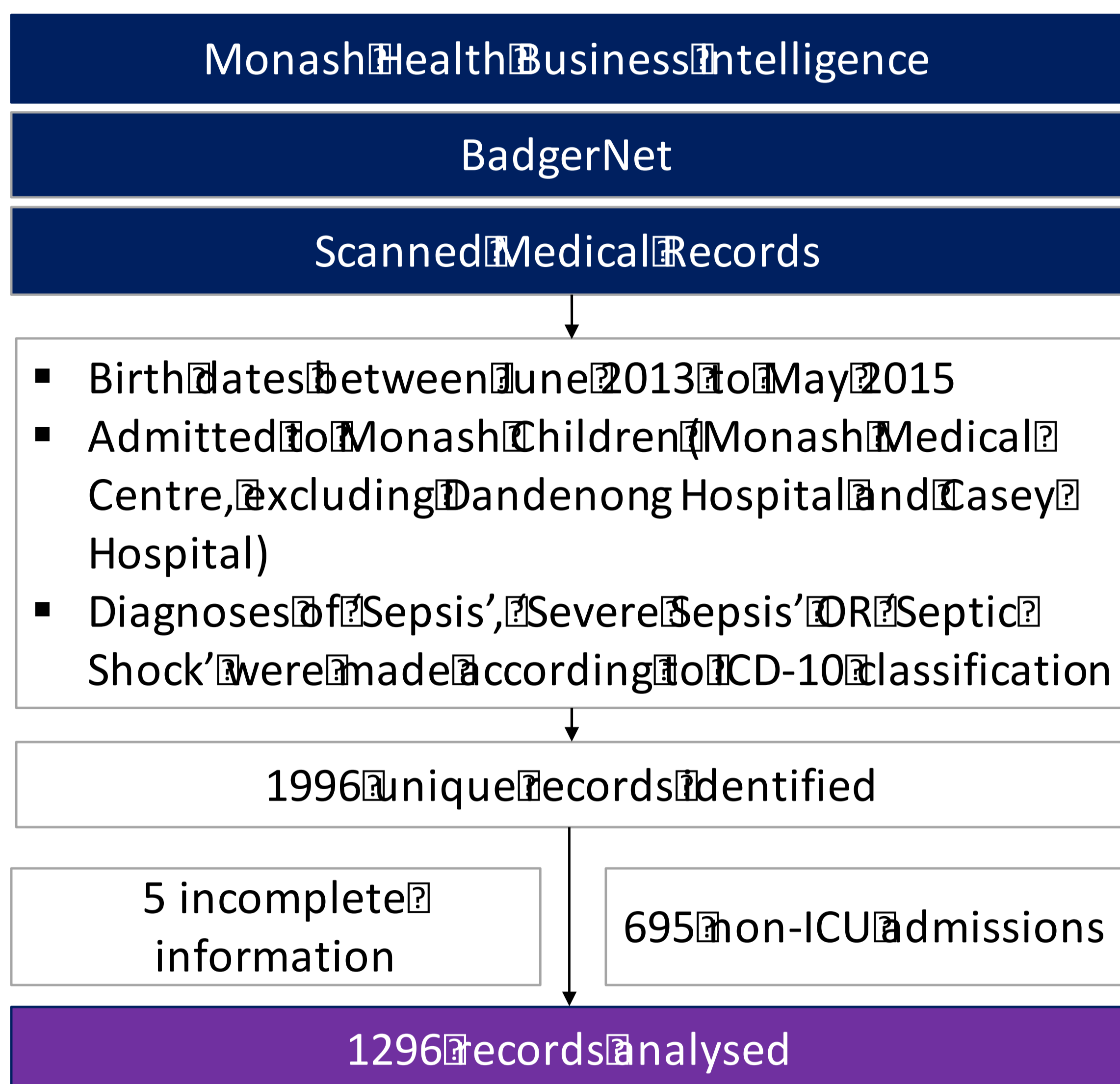
BACKGROUND

Our hospital developed an online dashboard for reporting departmental sepsis rate as part of an organizational initiative for reduction of sepsis, utilising data from the Victorian Acute Episode Dataset (VAED). Our NICU sepsis rate appeared disproportionately high: up to 25% of all admissions, including term infants.

OBJECTIVE

To investigate the validity and reliability of hospital reported sepsis by comparing against ANZNN criteria for culture positive sepsis¹ and CDC definitions of clinical sepsis²

METHOD



Cases were classified as true sepsis (BSI/CSEP) according the following criteria.

Blood Stream Infections (BSI)	Clinical sepsis (CSEP)
<ol style="list-style-type: none"> Definite pathogen in blood culture OR Growth of possible contaminant (eg. Coagulase-negative staphylococcus (CONS)) in blood culture <p>PLUS:</p> <ol style="list-style-type: none"> Treatment with antibiotics >/ 96 hours (OR death <96 hours) AND At least one of the following: <ul style="list-style-type: none"> Growth of the same organism on repeat culture OR Abnormalities in at least one laboratory markers (eg. C-reactive protein (CRP) >10mg/L; Immature: Total Neutrophil (IT) Ratio >0.2 etc.) OR Presence of clinical features consistent with systemic infection (eg. Lethargy, apnea, respiratory distress etc.) 	<ol style="list-style-type: none"> Presence of at least 1 of the following clinical signs or symptoms with no other recognizable cause: <ul style="list-style-type: none"> Fever (>38C rectal) Hypothermia (<37C rectal) Apnea Bradycardia <p>AND</p> <ul style="list-style-type: none"> Blood culture either not performed or NO organisms detected in culture AND No apparent infection at another site AND Physician institutes treatment for sepsis (We implemented a cutoff of ≥ 5 days of antibiotic usage)

All remaining cases were defined as either Contaminant or Culture Negative non-Sepsis (CNNS) according to blood culture results.

RESULTS

	Sepsis (N=1249)	Severe Sepsis/ Septic Shock (N=47)
Sex		
Male	735	28
Female	514	19
Gestational age (weeks)*	35.9 [23-42]	33.4 [24-42]
Birth weight (grams)*	2710.9 [536-5815]	2299.2 [596-5241]
Total bed days	19930	1919
Length of stay (days)*	16.0 [1-189]	40.8 [2-266]
Onset of sepsis		
Early Onset (EOS, < 48 hours of life)	1139	36
Late Onset (LOS, ≥ 48 hours of life)	103	10
>28 days of life	7*	2*

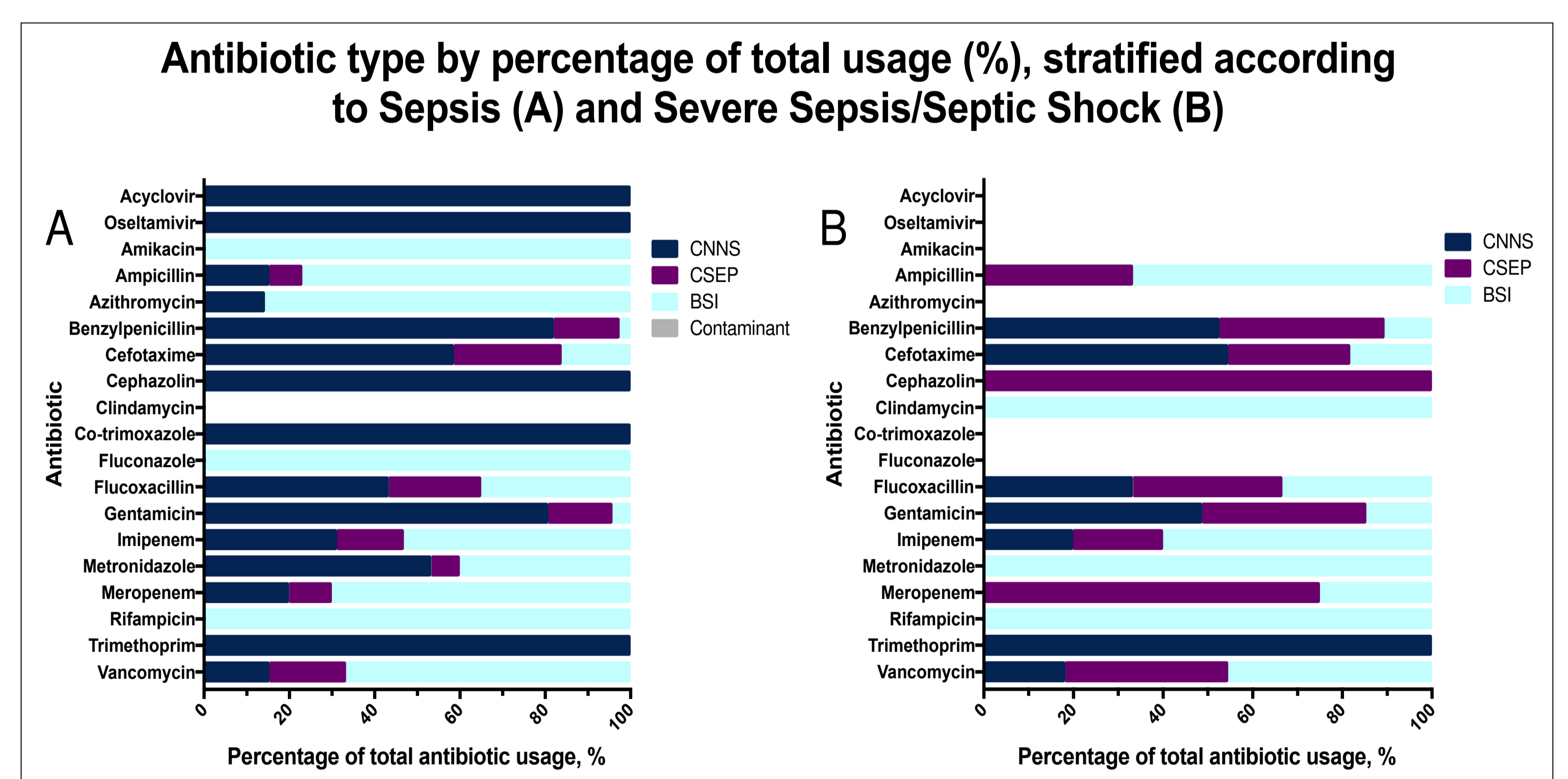
*These 9 cases were subsequently excluded from analysis.

	Blood Culture Positive		Blood Culture Negative	
	Contaminant	BSI	CSEP	CNNS
Sepsis	14	60	186	982
Severe Sepsis/ Septic Shock	0	8	16	21
Total	14	68	202	1003

True Sepsis
270/1287 (20.9%)

When the cases ANZNN and CDC criteria of sepsis are applied to the cases identified previously identified as such through Dr Foster, only 270 or 20.9% were clinically significant cases of sepsis of infants <28 days old.

All septic episodes were treated with at least one type of antibiotic or antiviral, with Benzylpenicillin (N=1192) and Gentamycin (N=1226) being the most frequent choices of treatment.



CONCLUSIONS

Rates of NICU neonatal sepsis is grossly overestimated if reporting is based solely on ICD-10 coding when compared to the ANZNN and CDC definitions of sepsis.

REFERENCES

- Bowen JR, Callander I, Richards R, et al. Decreasing infection in neonatal intensive care unit through quality improvement. *Arch Dis Child Fetal Neonatal Ed* 2017; 102:F51-F57.
- Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. *American Journal of Infection Control*. 2008; 36:309-32.