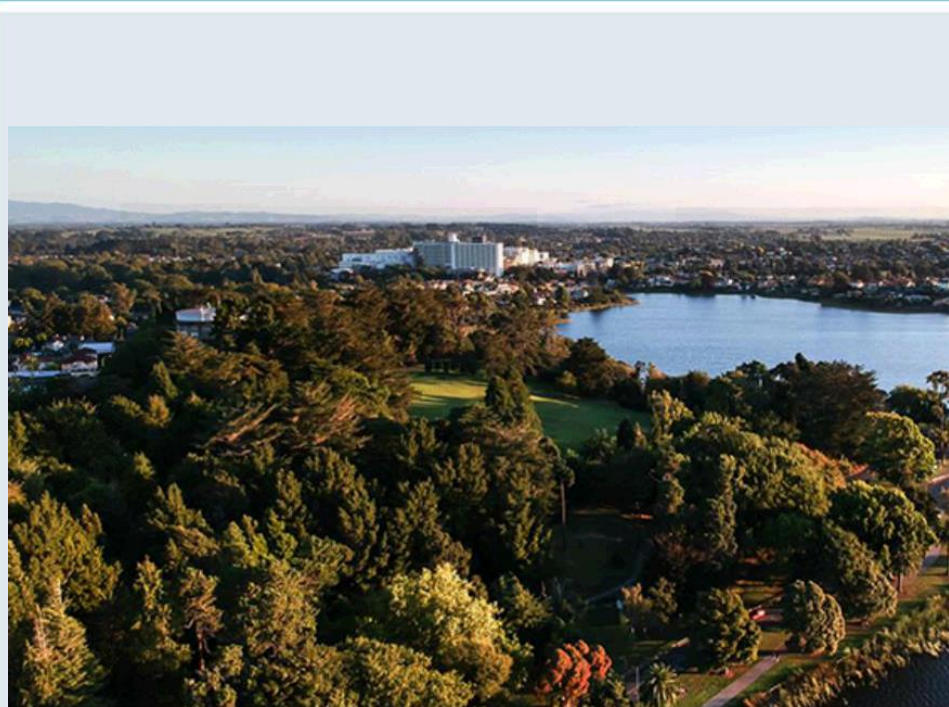




Sepsis Kills – You Can Count On It

Paul Huggan



This is a talk about sepsis epidemiology....

- *Are 1% of the adult population in New Zealand admitted to hospital with sepsis each year?*



Data doesn't define people



Background

Sepsis

Improving the prevention, diagnosis and clinical management of sepsis



Sepsis arises when the body's response to any infection injures its own tissues and organs. If not recognized early and managed promptly, it can lead to septic shock, multiple organ failure and death. It is a serious complication of infection in all countries and particularly in low- and middle-income countries. It represents a major cause of maternal and neonatal morbidity and mortality.

Although a precise estimate of the global epidemiological burden of sepsis is difficult to ascertain, some scientific publications reported that it affects more than 30 million people worldwide every year, potentially leading to 6 million deaths. The burden of sepsis is most likely highest in low- and middle-income countries.

Sepsis is frequently underdiagnosed at an early stage when it is still potentially reversible. In the community setting, it often presents as the clinical deterioration of common and preventable infections. Sepsis also frequently results from infections acquired in health care settings, which are one of, if not the most frequent adverse events during care delivery. As these infections are often resistant to antibiotics, they can rapidly lead to deteriorating clinical conditions.

Departments working on sepsis

- Antimicrobial resistance
- Classifications
- Emergencies preparedness, response
- Essential Medicines and Health Products
- Immunization, Vaccines and Biologicals
- Infection prevention and control
- Innovation Access and Use
- Maternal, newborn, child and adolescent health
- Sexual and reproductive health (maternal sepsis)
- Water, Sanitation and Hygiene (WASH)

Related links

- Improving the prevention, diagnosis and clinical management of sepsis
- WHA resolution on improving the prevention, diagnosis and clinical management of sepsis

About us

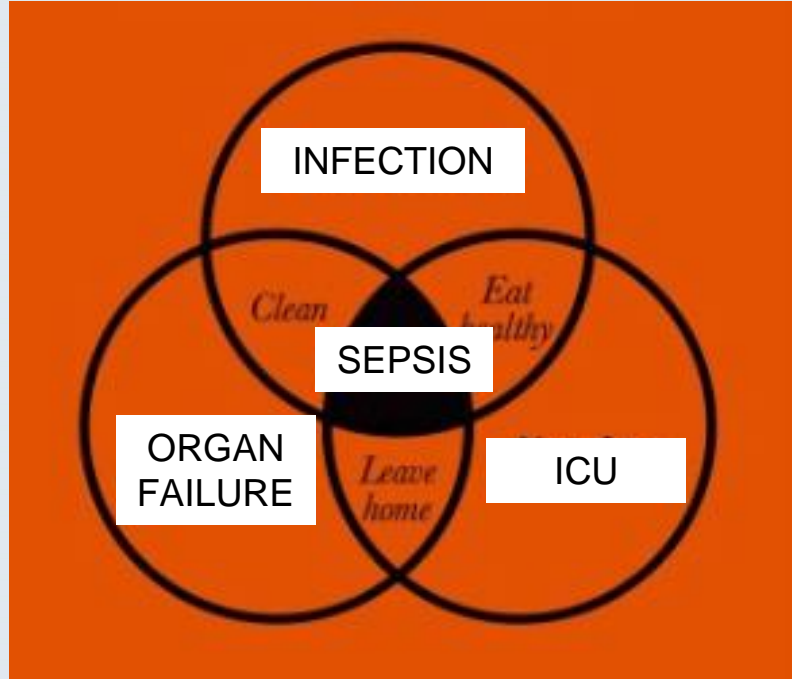
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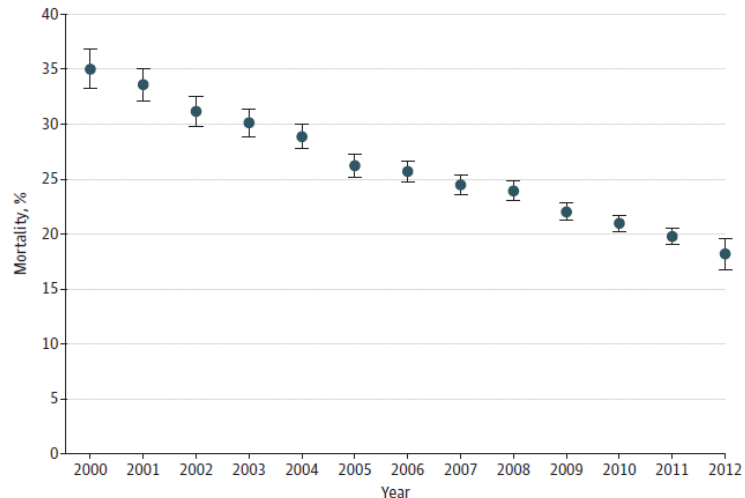




Mortality Related to Severe Sepsis and Septic Shock Among Critically Ill Patients in Australia and New Zealand, 2000-2012

Kirsi-Maija Kaukonen, MD, PhD, EDIC; Michael Bailey, PhD; Satoshi Suzuki, MD; David Pilcher, FCICM;
Rinaldo Bellomo, MD, PhD

Figure 1. Mean Annual Mortality in Patients With Severe Sepsis



No. of patients 2708 3783 4668 5221 6375 6987 7627 8529 8797 10277 11367 12213 12512

“Our study provides evidence that sepsis-related mortality has steadily decreased over time even after adjustments for illness severity, center effect, regional effects, hospital size, risk of being septic, and other key variables.”

Sepsis incidence and mortality are underestimated in Australian intensive care unit administrative data

Manon Heldens^{1,2}, Marinelle Schout^{2,3}, Naomi E Hammond^{2,4}, Frances Bass^{2,4}, Anthony Delaney^{2,5}, Simon R Finfer^{2,4}

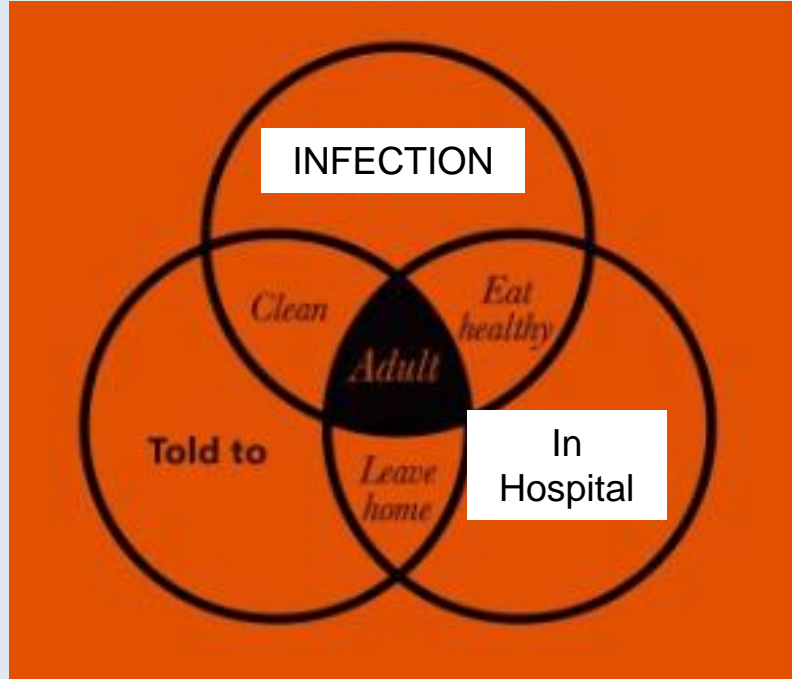


Clinical vs ANZICS CORE Definition

	Clinical	ANZICS CORE	P- value
ICU Prevalence	16.9%	11%	<0.001
Septic shock	5.7%	9.6%	<0.001
In-hospital death	27%	17%	0.12
In-hospital death (shock)	37%	16%	0.006

“Database criteria significantly underestimate incidence of sepsis and overestimate incidence of septic shock, resulting in lower estimated hospital mortality rates for each condition”





Infectious disease hospitalisation in New Zealand

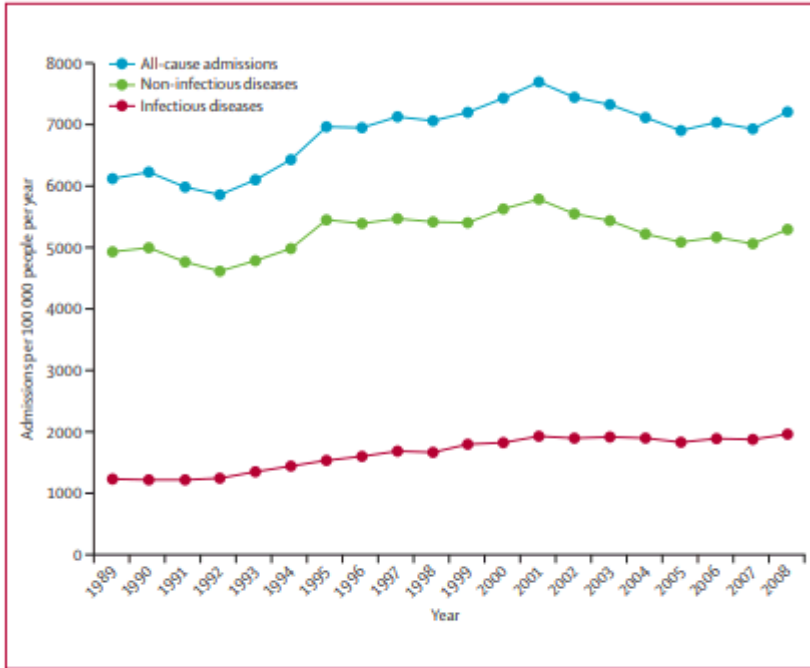
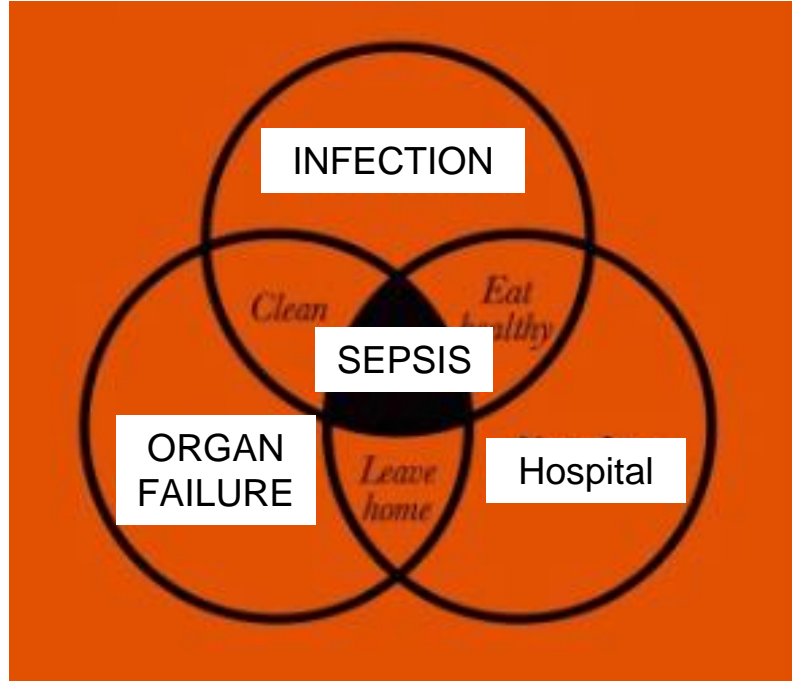


Figure 1: Annual rate of infectious and non-infectious diseases and all-cause hospital admissions in New Zealand (1989–2008)

Rates are age-standardised to the 2006 census. We estimated denominator populations for each year and age group by linear interpolation or extrapolation between census populations for the study period.

- Infections are the most common cause of hospitalisation in NZ
- Twice the rate of admission amongst Maaori and Pacific people compared with European/other
- Almost 3 times rate of admission amongst most deprived (NZDep 9-10) compared with the least



Defining Sepsis using ICD-10-AM

A: Infection (n=48)

Primary Codes (ICD10-AM-v8)-valid-2007-onwards¶

¶

A400 → Sepsis due to streptococcus, group A¶

A401 → Sepsis due to streptococcus, group B¶

A402 → Sepsis due to streptococcus, group D¶

A403 → Sepsis due to Streptococcus pneumoniae¶

A408 → Other streptococcal sepsis¶

A409 → Streptococcal sepsis, unspecified¶

A410 → Sepsis due to Staphylococcus aureus¶

A411 → Sepsis due to other specified staphylococcus¶

A412 → Sepsis due to unspecified staphylococcus¶

A413 → Sepsis due to Haemophilus influenzae¶

A414 → Sepsis due to anaerobes¶

A4150 → Sepsis due to unspecified Gram-negative organisms¶

A4151 → Sepsis due to Escherichia coli [E-Coli]¶

A4152 → Sepsis due to Pseudomonas¶

+

B: Organ Failure (n=69)

Secondary Codes (ICD10-AM-v6+8)-¶

¶

I950 → Idiopathic hypotension¶

I951 → Orthostatic hypotension¶

I959 → Hypotension, unspecified¶

R031 → Nonspecific low blood pressure reading¶

R572 → Septic shock¶

R570 → Cardiogenic shock¶

R571 → Hypovolaemic shock¶

R578 → Other shock¶

R579 → Shock, unspecified¶

D65 → Disseminated intravascular coagulation (defibrination syndrome)¶

D688 → Other specified coagulation defects¶

D689 → Coagulation defect, unspecified¶

D695 → Secondary thrombocytopenia¶

D696 → Thrombocytopenia, unspecified¶

K720 → Acute and subacute hepatic failure¶

E872 → Acidosis¶

Waikato DHB Sepsis

Per 100,000 population

- Total
 - 500
- Over 65
 - 2500
- Admitted to ICU
 - 17%
- Mortality
 - 18% *in hospital*
 - 37% *at one year*

Table 2. Five-Year Age Standardized Rates and Rate Ratios

Variable	ASR	95% CI	ASRR	95% CI
Gender				
Female	419.9	390.5–449.2	1.00	—
Male	586.2	547.3–625.2	1.40	1.23–1.59
NZ Dep Quintiles				
1	341.5	286.9–396.1	1.00	—
2	364.5	292.8–436.1	1.07	0.92–1.24
3	364.2	322.8–405.6	1.07	0.92–1.24
4	376.5	342.7–410.3	1.11	0.95–1.28
5	578.8	532.2–625.4	1.72	1.50–1.97
Ethnicity				
Non-Maori	341.5	322.3–361.5	1.00	—
Maori	1100.5	966.8–1244.2	3.22	2.85–3.65
Study Year				
2007–08	65.5	57.5–74.4	1.00	—
2008–09	71.8	63.4–80.9	1.09	0.77–1.55
2009–10	83.0	74.1–92.6	1.26	0.90–1.76
2010–11	98.3	88.7–108.7	1.48	1.08–2.06
2011–12	106.7	96.8–117.3	1.62	1.18–2.24

Abbreviations: ASR, age-standardized rate; ASRR, ASR ratio; CI, confidence interval; Dep, deprivation; NZ, New Zealand.

Yes, BUT...



“Isn’t coding rubbish?”

- New codes and coding strategies (*Gohil et al*)
 - Introduction of dedicated “sepsis” code (2002)
 - Introduction of DRG system (2007)
- Laboratory paradox
 - Increasing incidence of ICD9 sepsis, falling bacteremia and lactatemia rates (*Rhee et al*)



Objective evaluation vs medical records

RESEARCH | OPEN ACCESS

Validity of administrative data in recording sepsis: a systematic review

Rachel J Jolley, Keri Jo Sawka, Dean W Yergens, Hude Quan, Nathalie Jetté and Christopher J Doig

Critical Care 2015 19:139 | <https://doi.org/10.1186/s13054-015-0847-3> | © Jolley et al.; licensee BioMed Central. 2015

Received: 19 December 2014 | Accepted: 2 March 2015 | Published: 6 April 2015

$Sn - \geq 5.6\%$

$Sp - \geq 78\%$

RESEARCH | OPEN ACCESS

Discharge diagnoses versus medical record review in the identification of community-acquired sepsis

Henry E Wang, Dylan R Addis, John P Donnelly, Nathan I Shapiro, Russell L Griffin, Monika M Safford and John W Baddley

Critical Care 2015 19:42 | <https://doi.org/10.1186/s13054-015-0771-6> | © Wang et al.; licensee BioMed Central. 2015

Received: 31 October 2014 | Accepted: 23 January 2015 | Published: 16 February 2015

$Sn^* - \geq 42.6\%$

$Sp^* - \geq 86\%$

* Angus *et al* Crit Care Med 2001

Novel methods to estimate incidence



Other insights

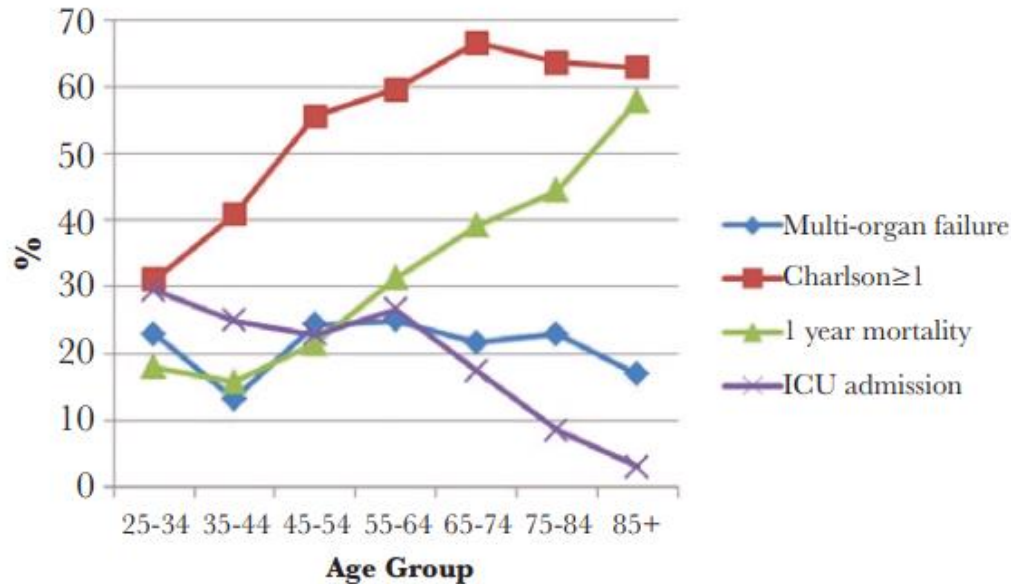
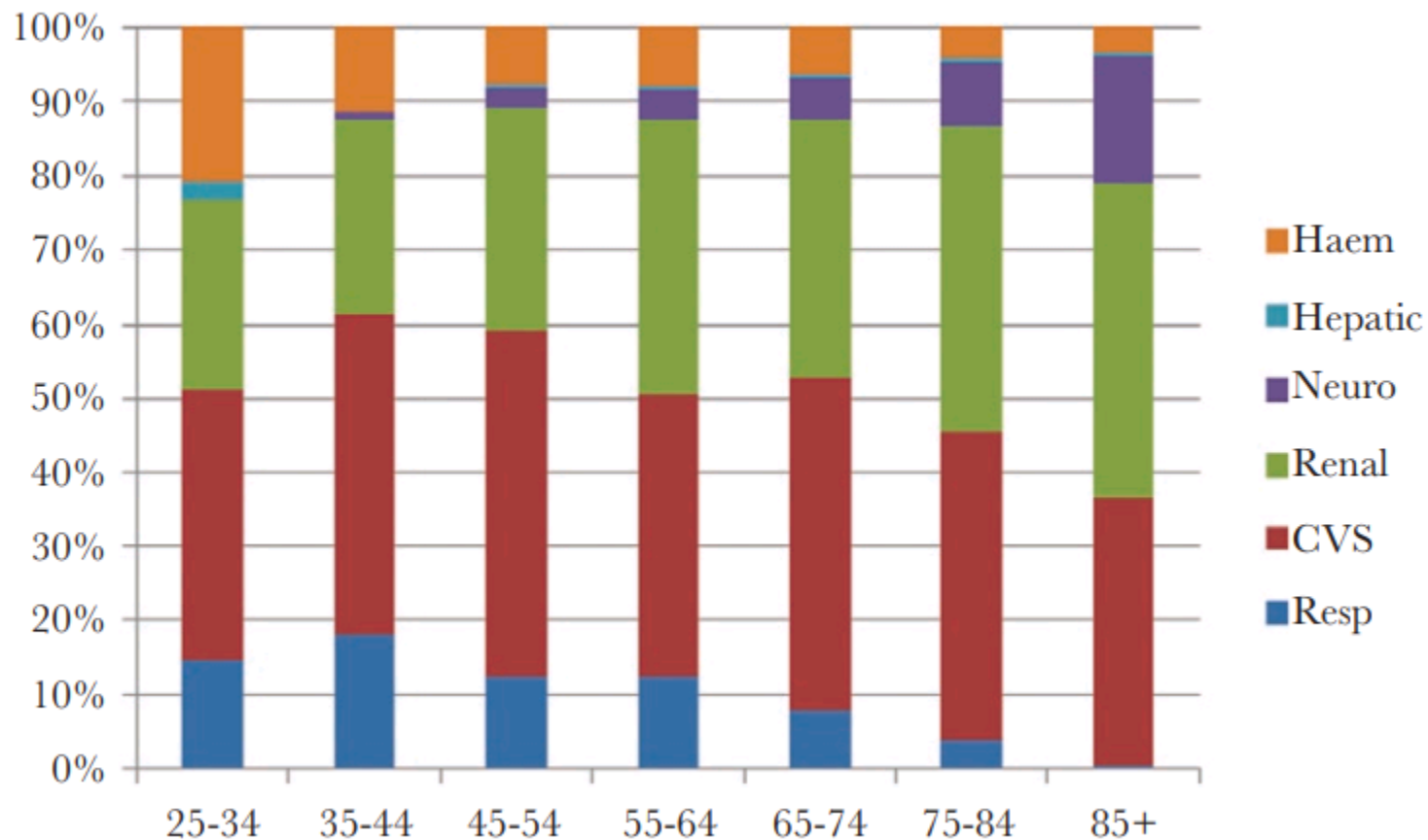


Figure 2. Proportions by age-group; multiorgan failure, comorbidity (Charlson score ≥ 1) 1-year mortality, and intensive care unit (ICU) admission.



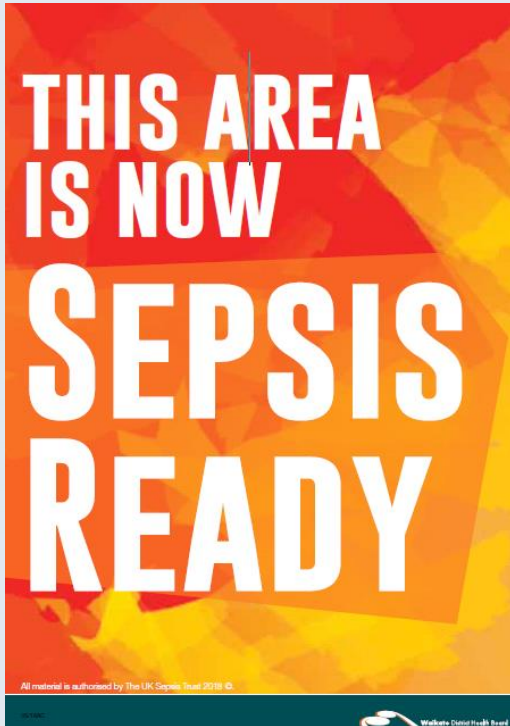


Sepsis Admissions, Waikato DHB

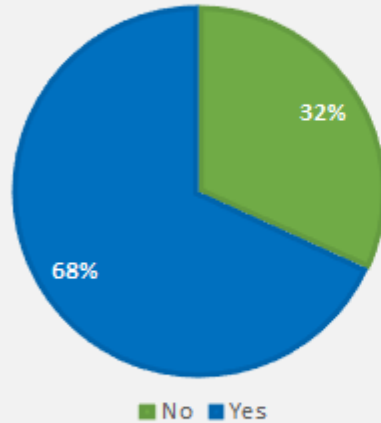
Sepsis (Acute admissions) by Year							
Fiscal Year	Unit	2012	2013	2014	2015	2016	2017
Infection	Number	762	765	765	853	811	1030
Sepsis	Number	420	368	408	449	470	581
Sepsis Mortality (< =28days of discharge)	Number	158	119	141	141	138	151
Sepsis Average Length of Stay	Days	17	16	14	15	12	14
Rates							
Total Admissions	Number	34030	36388	36796	37058	37140	39840
Sepsis rate	% of admissions	1.2	1.0	1.1	1.2	1.3	1.5
Sepsis Mortality rate	% of sepsis	38	32	35	31	29	26

With thanks to Sheena Moosa

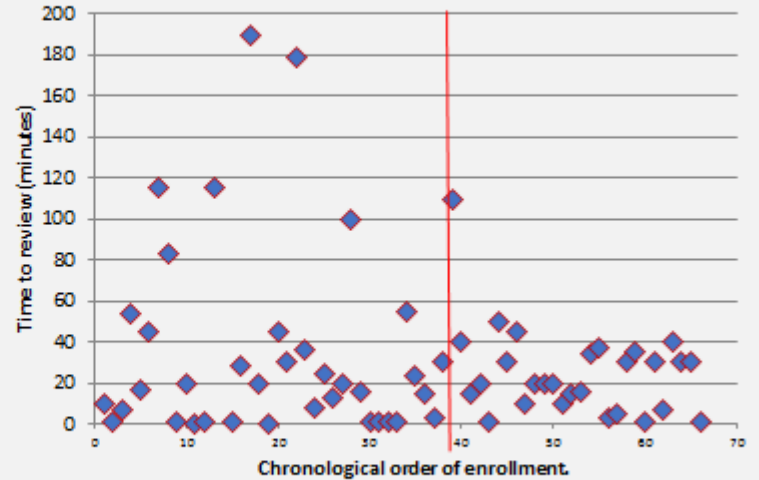
Impact of QI initiative – “Sepsis Ready”



Reviewed by a doctor within 30mins of TO



Time to first review (minutes)



Thank you



Sepsis: A National Approach

[Sepsis.org.nz](https://sepsis.org.nz)