SEPSIS QI Ireland

A National Programme

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www.hse.ie/sepsis

Why is Sepsis QI important?

- 1 in 5 patients with sepsis die
- Presentation is variable
  - Mimics other conditions
  - Evolves over time
- All the data required to make the diagnosis is not available on presentation
    - **>80% arises outside the ICU**
  - Yet it is a time-dependent medical emergency!

There is a GAP, it's *Sepsis recognition!*

"Think SEPSIS" at Triage

Always exercise clinical judgement

Clinical suspicion of infection?

YES

Sepsis Screen Required

Identify which of the following 4 groups the patient belongs to and assign appropriate triage category.

1 **At risk of neutropenia**

2 **Any 1 sign of acute organ dysfunction**

3 **SIRS Response, i.e. ≥2 SIRS criteria**

+ ≥1 co-morbidity

4 **+ No co-morbidities**

Category 2

Category 3

START SEPSIS FORM

NEWS ≥ 4
(or ≥ 5 on O_2)
"Think SEPSIS"

(Exercising Clinical Judgment)

Clinical suspicion of infection?

YES

Sepsis Screen Required
Identify which of the following 4 groups the patient belongs to and escalate appropriately.

1 At risk of neutropenia

(bone marrow failure, autoimmune disorder, treatment including but not limited to chemo/radiotherapy).

*Follow the **'Febrile Neutropenia' pathway** if on chemo/radiotherapy.*

Note: these patients may present without fever

2 Any 1 of the following signs of acute organ dysfunction:

- Altered Mental State
- RR > 30
- O_2 sat < 90%
- SBP < 100
- HR > 130
- Mottled or ashen appearance
- Non-blanching rash
- Other organ dysfunction

3 ≥ 2 SIRS criteria

- RR ≥ 20
- HR > 90
- T > 38.3°C or < 36°C
- BSL > 7.7 mmol/l (in non-diabetic patient)

PLUS ≥ 1 co-morbidity

4 No co-morbidity

Medical review within minimum 30min (follow NEWS escalation protocol)

Follow usual NEWS escalation protocol

START SEPSIS FORM

Co-morbidities associated with increased mortality with Sepsis
Age ≥ 75 years | Frailty | Diabetes Mellitus | Cancer | COPD | Chronic kidney disease | Chronic liver disease
HIV/ AIDS infection | Immunosuppressed | Major trauma and surgery in the past 6 weeks

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If there is infection, "Think SEPSIS"

(Exercising Clinical Judgment)

Maternal Sepsis is a life-threatening condition defined as organ dysfunction resulting from infection during pregnancy, childbirth, post-abortion or postpartum period (WHO 2016).

RECOGNISE SEPSIS • ENHANCE SURVIVAL •

Clinical suspicion of infection?

YES

Sepsis Screen Required

Identify which of the following 4 groups the woman belongs to and escalate appropriately.
Always exercise clinical judgement.

1

IMEWS trigger for immediate review, i.e.
>2 YELLOWS
or
>1 PINK

2

Any 1 of the following signs of acute organ dysfunction:

- Altered Mental State
- RR > 30 rpm
- O_2 sat < 90%
- SBP < 90 mmHg
- HR ≥ 130 bpm
- Fetal heart rate >160 bpm
- Mottled or ashen appearance
- Non-blanching rash
- Other organ dysfunction

3

SIRS Response, i.e. ≥2 modified SIRS criteria listed below.

- Respiratory rate ≥ 20 bpm
- Heart rate ≥100 bpm
- Temperature <36°C or ≥38.3°C
- Bedside glucose > 7.7mmol/L (in the absence of diabetes mellitus)
- WCC < 4 or > 16.9 x 10^9/L

4

At risk of neutropenia
(bone marrow failure, autoimmune disorder or treatment including but not limited to, **chemotherapy and radiotherapy**)

Screen Positive
START SEPSIS FORM
and escalate to medical review

None apply

Screen Negative
Follow usual IMEWS escalation protocol

Have a lower index of suspicion for infection or sepsis in the unwell women with risk factors

Risk factors

Pregnancy Related

- Cerclage
- Pre-term/prolonged rupture of membranes
- Retained products
- History pelvic infection
- Group A Strep. infection in close contact
- Recent amniocentesis

Non Pregnancy Related

- Age > 35 years
- Minority ethnic group
- Vulnerable socio-economic background
- Obesity
- Diabetes, including gestational diabetes
- Recent surgery
- Symptoms of infection in the past week
- Immunocompromised e.g. Systemic Lupus
- Chronic renal failure
- Chronic liver failure
- Chronic heart failure

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Sepsis Form - Emergency Department Adult

ALWAYS USE CLINICAL JUDGEMENT

There are separate sepsis criteria for maternity patients and children

EMERGENCY MEDICINE

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Complete this form and apply if a patient presents to the Emergency Department with symptoms and/or signs of infection.

Section 1: Sepsis screen for Nursing Staff

Suspicion of infection ☐

AND

Patient presentation ☐ **1** ☐ **2 or** ☐ **3**

(see Section 3 and "Think Sepsis" poster).

If both identified, triage as Category 2/Orange and commence Sepsis Form

Date: Triage Time: Triage Category:

Signature: NMBI PIN:

Addressograph here

Section 2: Sepsis diagnosis for Medical Staff

Document site of suspected infection after medical review

☐ Respiratory Tract ☐ Intra-abdominal ☐ Urinary Tract

☐ Skin ☐ Catheter/Device Related ☐ Intra-articular/Bone

☐ Central Nervous System ☐ Unknown

☐ Other suspected site:

☐ **No clinical suspicion of INFECTION**: terminate form and sign at bottom.

Section 3:

Who needs to get the "Sepsis 6" – infection plus any one of the following:

1. ☐ Patients who present unwell who are on treatment that puts them at risk of neutropenia, e.g. on anti-cancer treatment.
2. ☐ Clinically apparent new onset organ failure, e.g. altered mental state, respiratory rate >30, hypoxia, heart rate ≥130, hypotension, oligo or anuria, non-blanching rash, pallor/mottling with prolonged capillary refill.
3. ☐ Patients with co-morbidities plus ≥2 SIRS criteria

Modified SIRS criteria: Note - physiological changes should be sustained ≥30mins.

☐ Respiratory rate ≥ 20 breaths/min ☐ WCC < 4 or > 12 x 10^9/L ☐ New onset confusion

☐ Heart rate > 90 beats/min ☐ Temperature <36 or >38.3°C ☐ Bedside glucose >7.7mmol/L *(in the absence of diabetes mellitus)*

Co-morbidities associated with increased mortality in sepsis.

☐ COPD ☐ DM ☐ Chronic liver disease ☐ Cancer ☐ Chronic kidney disease

☐ Immunosuppressant medications ☐ Age ≥75 years ☐ Frailty ☐ HIV/AIDS

Section 4

☐ **If YES** after medical review to Section 2 **PLUS** 1,2 or 3 in Section 3.

Start SEPSIS 6 (Section 6)

Time Zero:

Section 5

☐ **If NO** to infection with a high-risk presentation (1, 2 or 3), tick NO and sign off. If uncomplicated infection, continue usual infection treatment as appropriate and review diagnosis if patient deteriorates.

☐ **Infection**

Antimicrobial given:

Has a decision been made to apply a relevant treatment limitation plan.

☐ Do not proceed with Sepsis pathway. Document limitations in clinical notes.

Doctor's Name: **Doctor's Signature:**

MCRN: **Date:** **Time:**

Sepsis 3 Form ED - 18/08/2017

Continue overleaf

Give 3	Take 3
1.OXYGEN: Titrate O_2 to saturations of 94 -98% or 88-92% in chronic lung disease.	**1. CULTURES:** Take blood cultures *before giving antimicrobials* (if no significant delay i.e. >45 minutes) and consider source control.
2. FLUIDS: Start IV fluid resuscitation if evidence of hypovolaemia. 500ml bolus of isotonic crystalloid over 15mins & give up to 30ml/kg, reassessing for signs of hypovolaemia, euvolaemia, or fluid overload.	**2.BLOODS:** Check point of care lactate, FBC, U&E, LFTS, +/- Coag. Other tests and investigations as per history and examination.
3. ANTIMICROBIALS: Give IV antimicrobials according to local antimicrobial guidelines.	**3. URINE OUTPUT:** Assess urine output and consider urinary catheterisation for accurate measurement in patients with severe sepsis/septic shock.

Fluid resuscitation algorithm for adults

NATIONAL CLINICAL EFFECTIVENESS COMMITTEE

RECOGNISE SEPSIS • ENHANCE SURVIVAL

SBP <90mmHg or MAP <65mmHg, Lactate >2mmol/l

Give bolus 500mls isotonic crystalloid over 15 minutes and reassess.
(Repeat lactate after 2 litres and if shock is persistent consider CRITICAL CARE)

Hypovolaemia,
Altered mentation,
Oliguria,
Cold/mottled skin,
Hypotension,
Raised lactate
15 Minutes Observations

Fluid overloaded,
Increasing respiratory rate,
Decreasing O_2 saturations,
JVP distension,
Crepitations

Euvolaemia* or no longer fluid responsive

SBP >90 mmHg and/or MAP >65mmHG, Lactate <2mmol/L

- ⇒ Stop all IVT
- ⇒ Consider diuretic
- ⇒ Consider NIV of intubation
- ⇒ Continuous monitoring

SBP <90 mmHg and/or MAP <65mmHG, Lactate >2mmol/L

- ⇒ Stop all IVT
- ⇒ Vasopressors
- ⇒ Consider NIV of intubation
- ⇒ **Not** for diuretic
- ⇒ Continuous monitoring
- ⇒ **Call Critical Care**

SBP <90 mmHg and/or MAP <65mmHG, Lactate >2mmol/L Despite adequate fluid Resuscitation

- ⇒ Vasopressors
- ⇒ IV maintenance
- ⇒ Continuous monitoring
- ⇒ **Call Critical Care**

SBP >90 mmHg and/or MAP >65mmHG, Lactate <2mmol/L

- ⇒ Maintenance fluids
- ⇒ 1/2 hourly observations
- ⇒ Reassess hypovolaemia

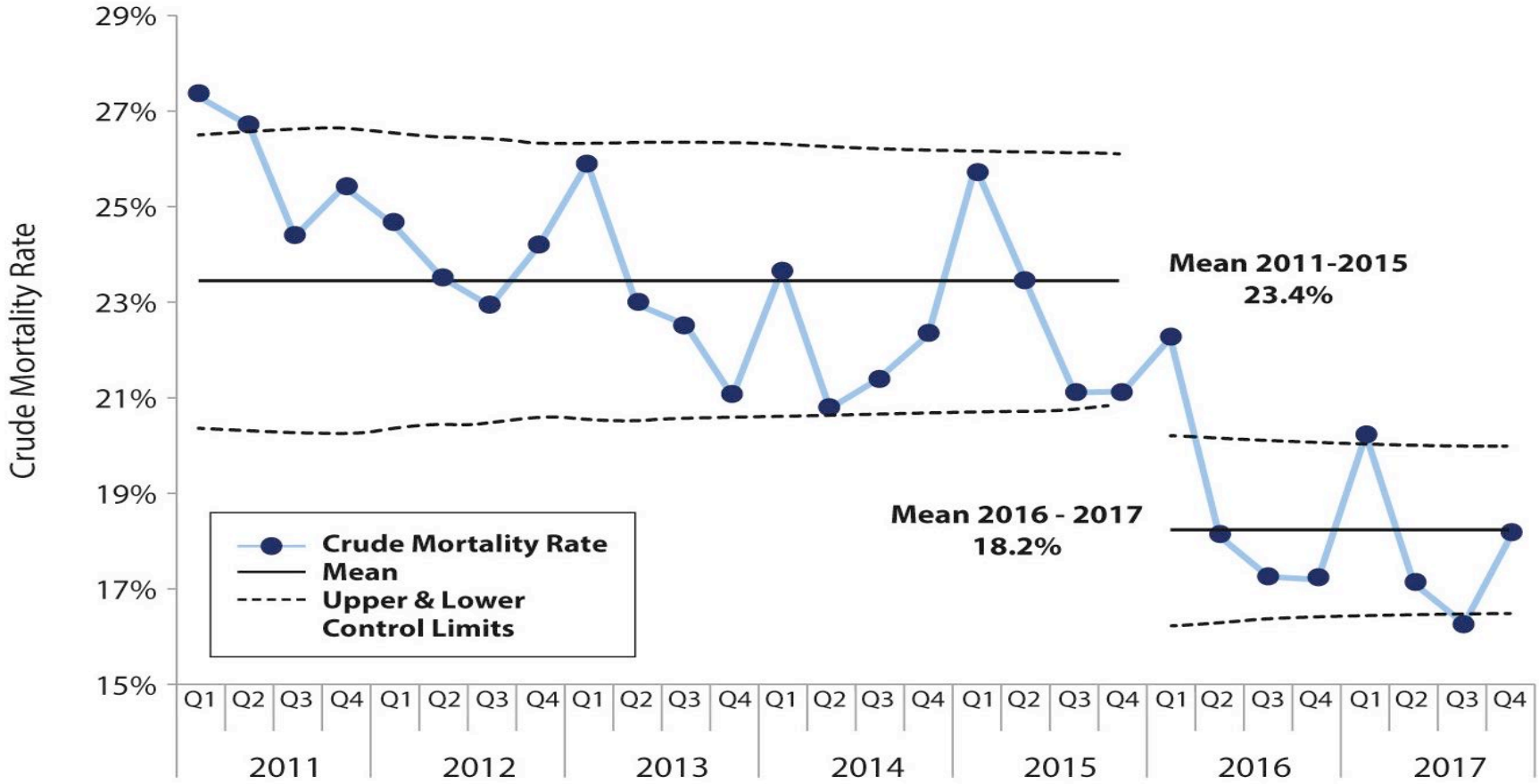
MAP: *Mean Arterial Pressure,* ***SBP:*** *Systolic Blood Pressure*

* Euvolaemia can be difficult to assess in patients with distributive shock, the patients in the ProCESS and ARISE trials received, on average between 4 and 5 litres of isotonic crystalloid fluid in the first 6 hours after diagnosis of septic shock, of this 30mls/kg and 34mls/kg of IVT was administered in the first hour respectively.

For more information go to on National Clinical Guideline No 6. Management of Sepsis go to: www.health.gov.ie/patient-safety/ncec

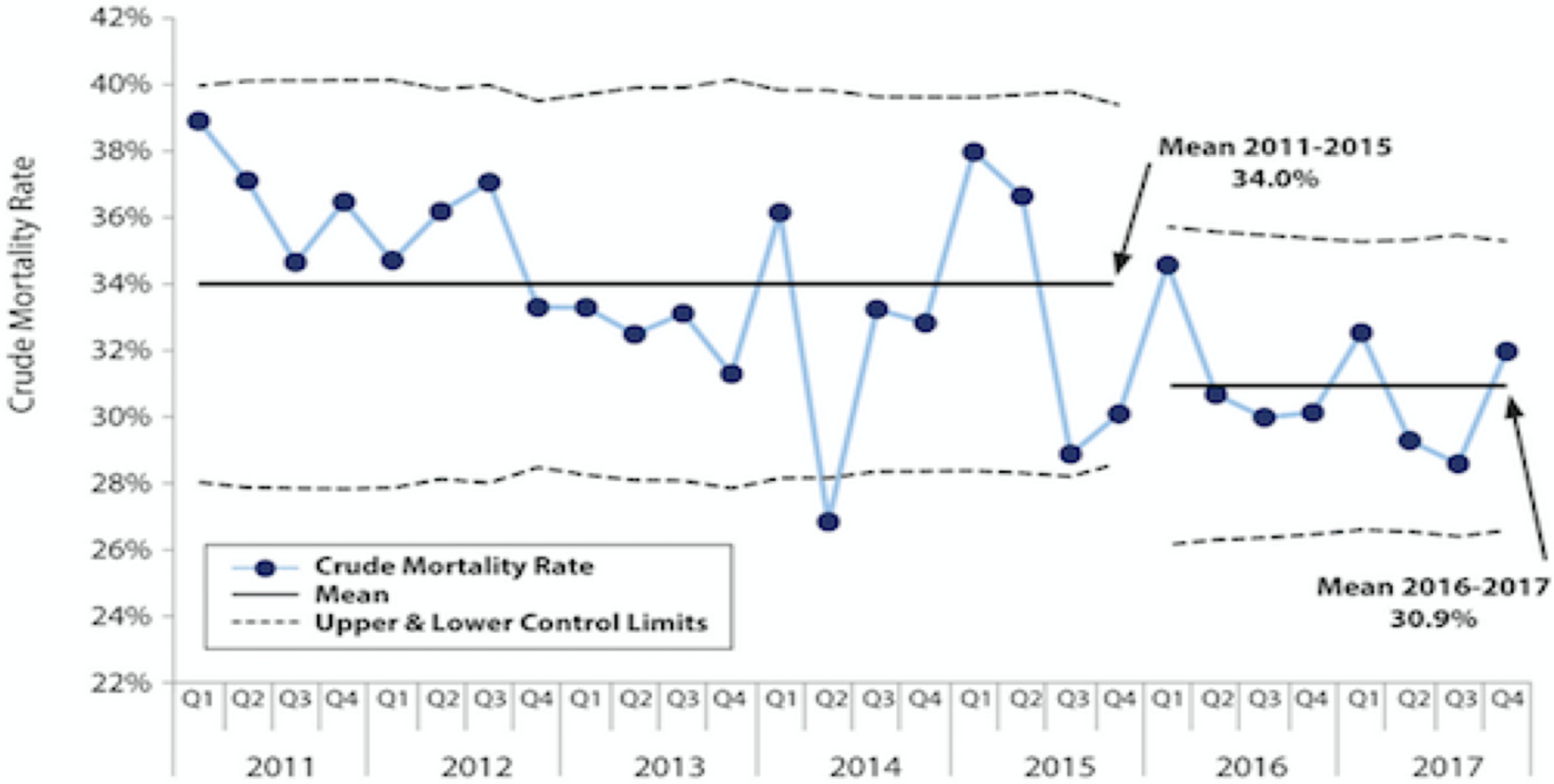
Statistical process control chart early recognition & treatment

FIGURE 8: The in-hospital mortality for adult patients with a diagnosis of SIRS of Infectious Origin and Sepsis, quarterly data, 2011-2017.



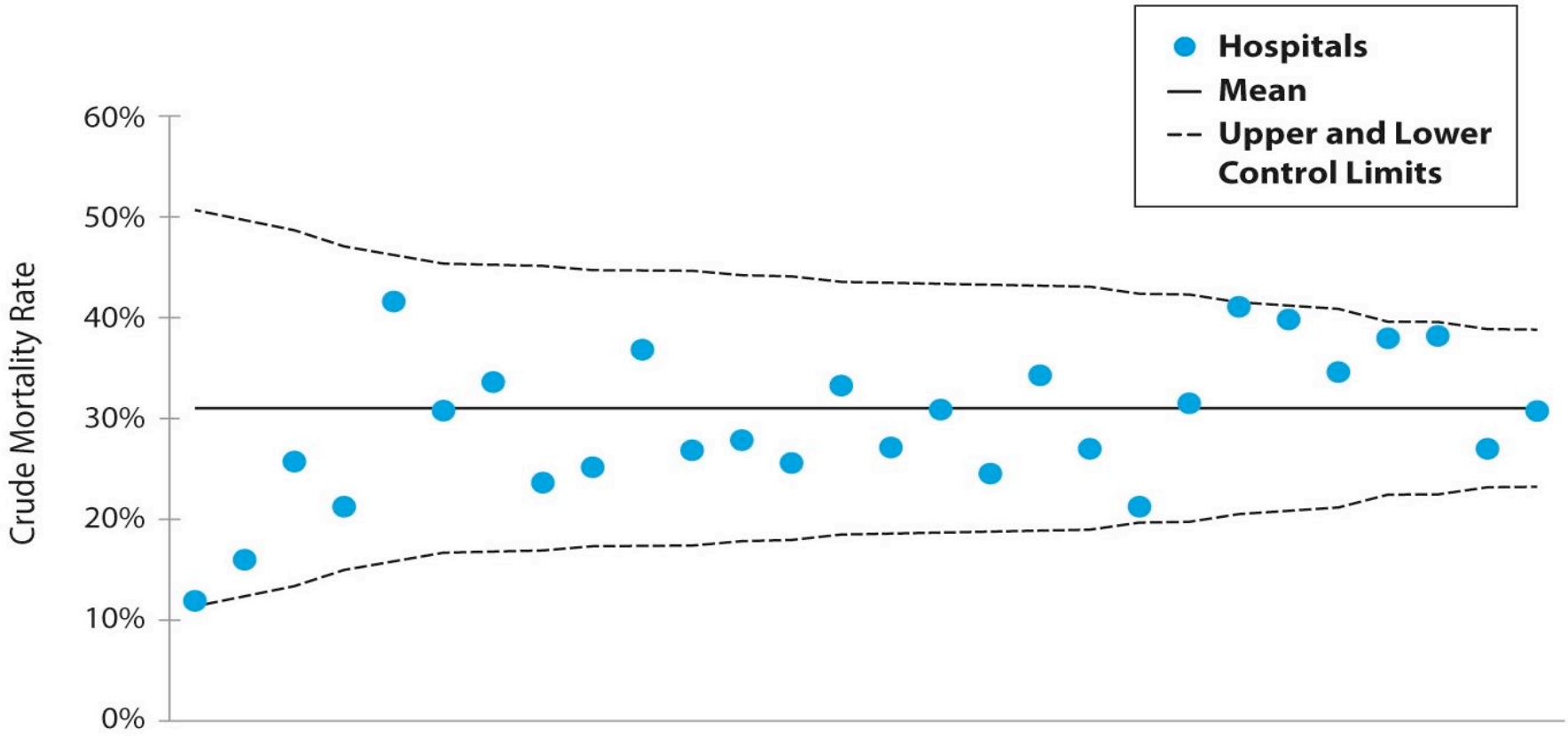
Sepsis in Critical Care

FIGURE 11: In-hospital mortality rate for inpatients with a diagnosis of sepsis and admitted to critical care area, by quarter, 2011-2017.



Critical Care Quality Assurance

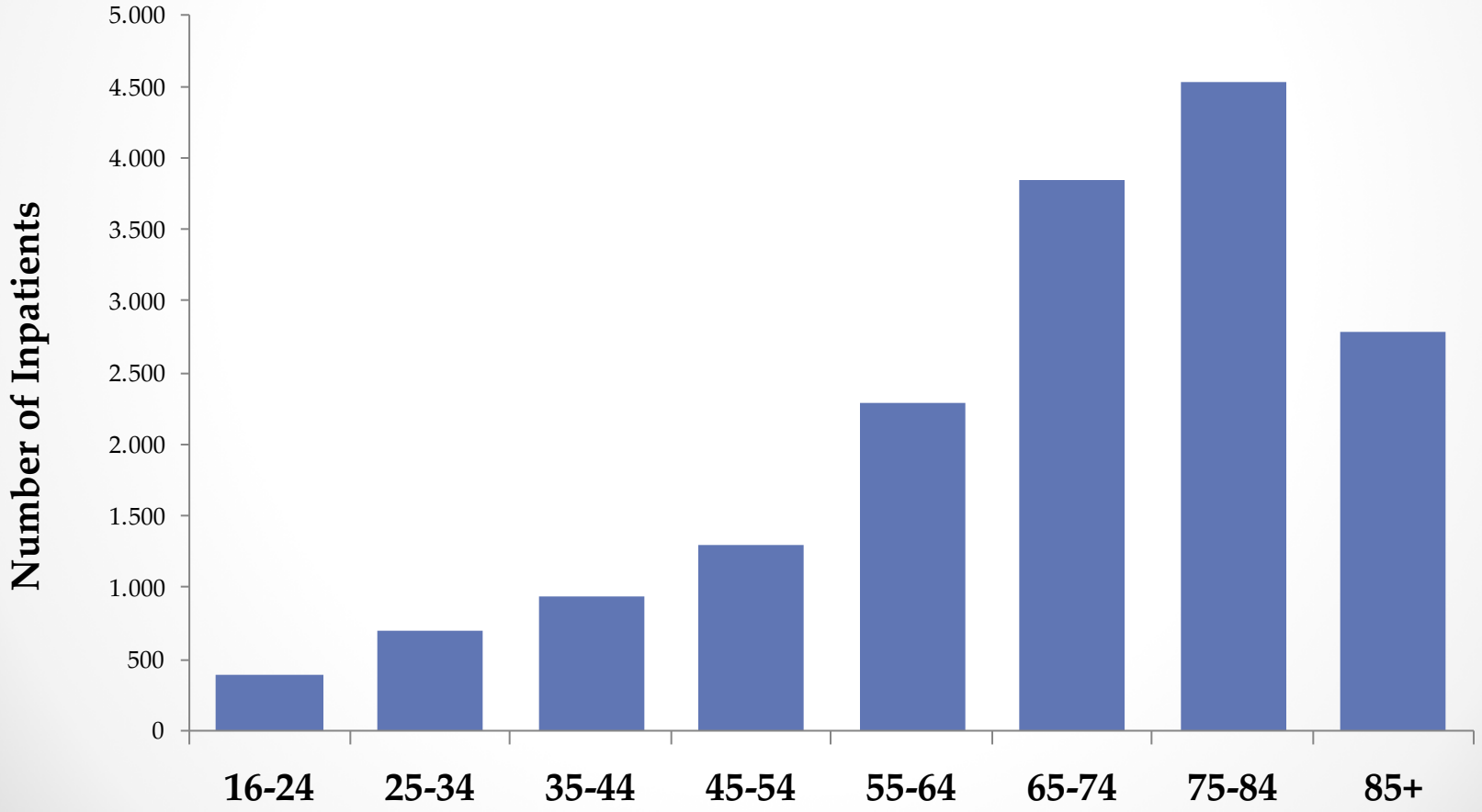
FIGURE 18: In-patient crude mortality rate for adult inpatients with a diagnosis of sepsis and admitted to a Critical Care area, by hospital, 2017.



Key Findings 2017

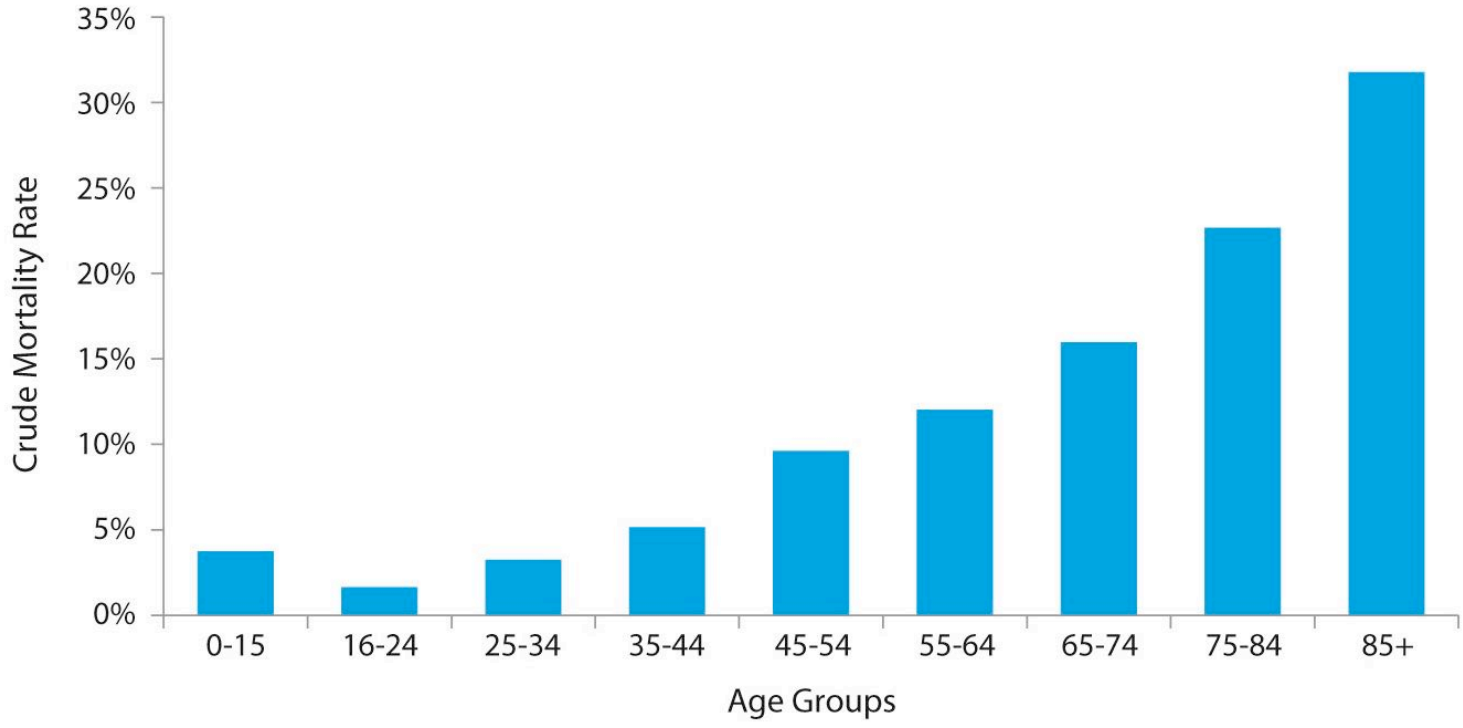
- 16,312 cases of sepsis
  - 18.4% sepsis-associated hospital mortality rate - adults
    - Surgical DRG 23.7%
    - Medical DRG 16.8%
  - 30.6% - Critical care
  - 3.9% - Paediatrics
  - 0.2% - Maternal

Number of cases ↑ with age



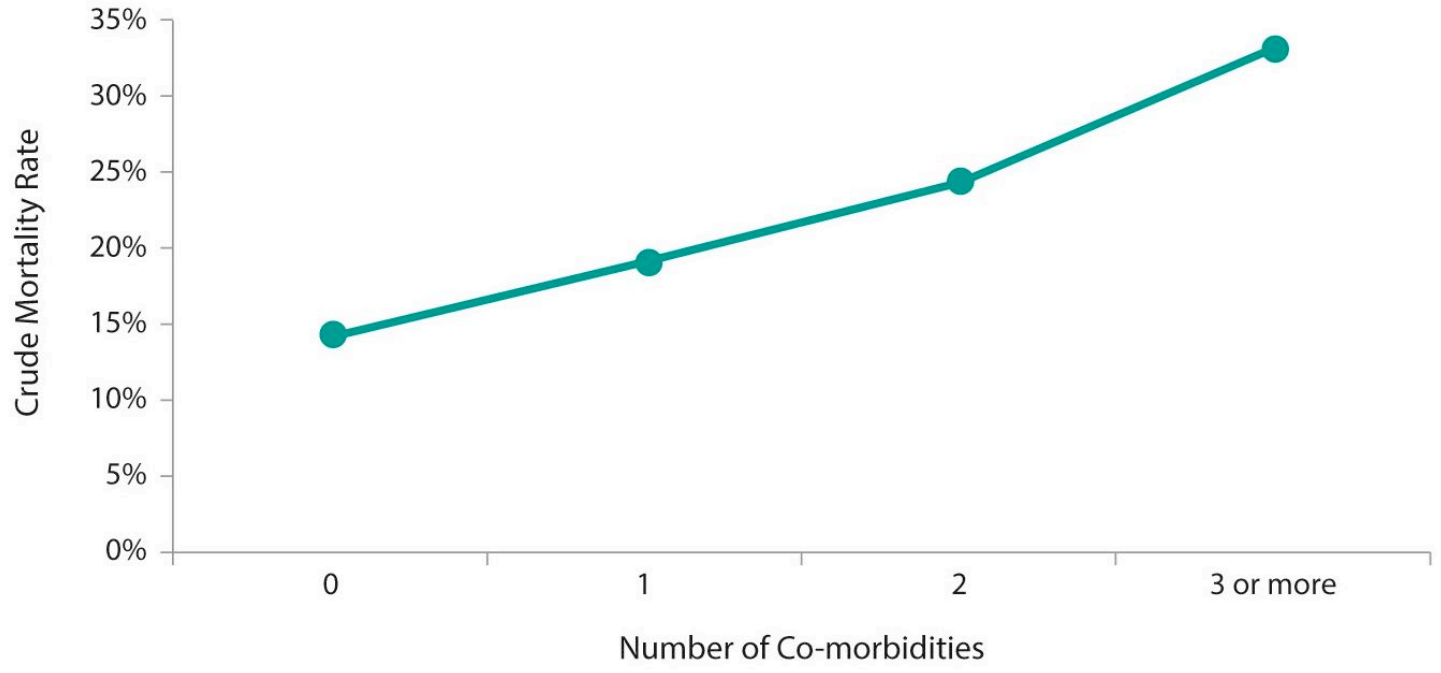
Mortality ↑ with age

FIGURE 3: In-hospital mortality for inpatients with a diagnosis of sepsis by age groups, 2017 (excluding SIRS of infectious origin).



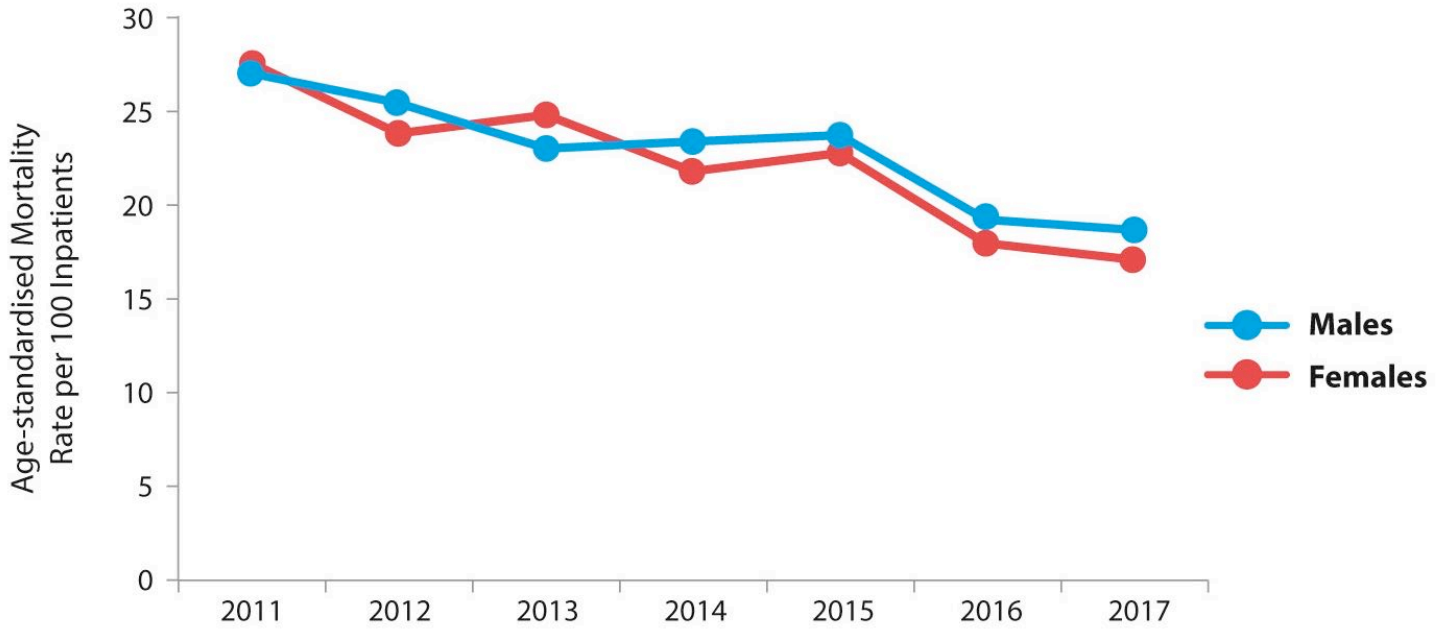
With co-morbidities

FIGURE 4: The in-hospital mortality rate for adult inpatients with a diagnosis of sepsis and selected co-morbidities, 2017.



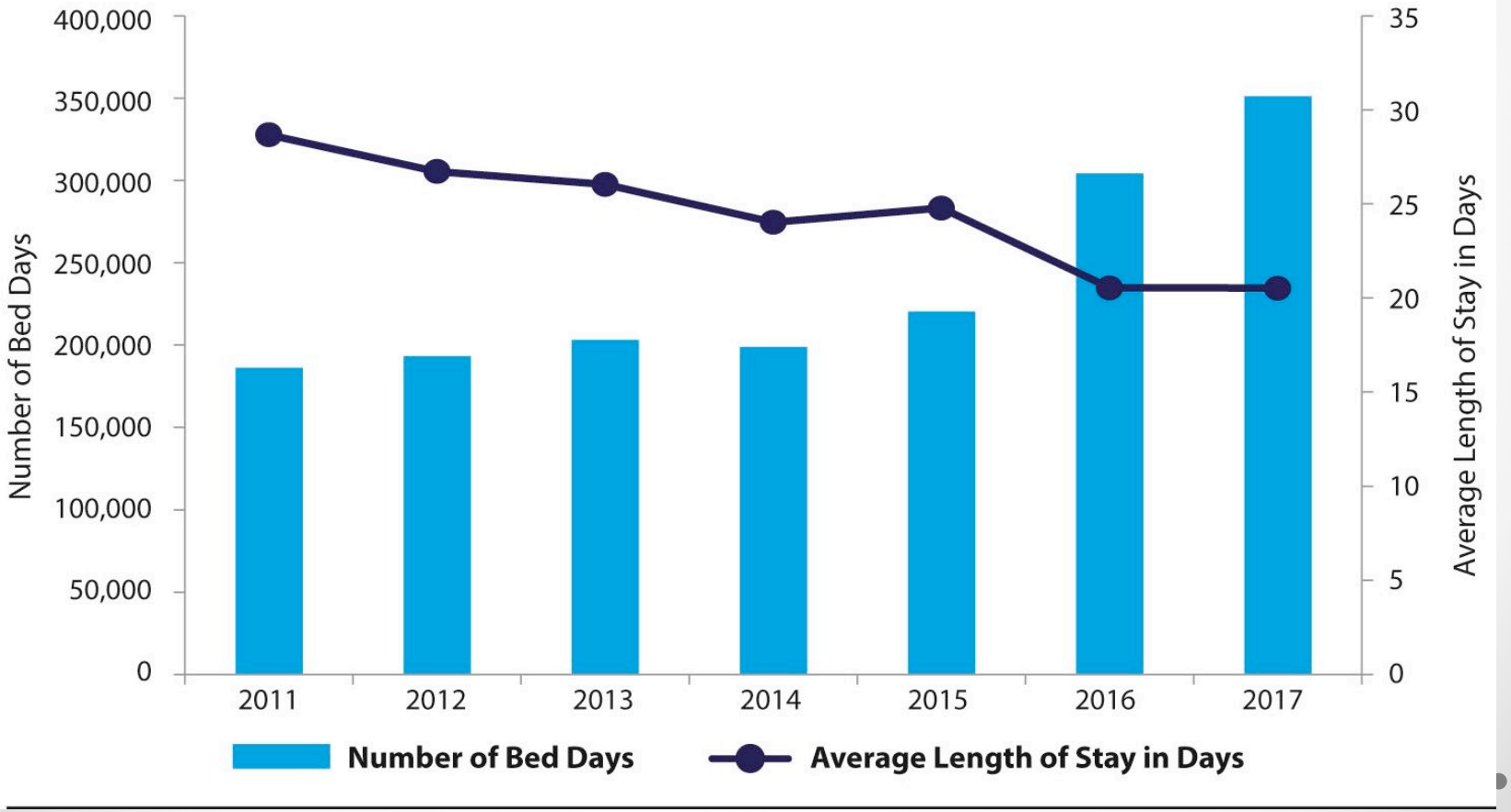
No gender difference

FIGURE 6: The age-standardised in-hospital mortality rates for adult males and females with a diagnosis of SIRS of Infectious Origin and Sepsis, 2011-2017.



28.4% ↓ aLOS

FIGURE 12: The number of bed days and average length of stay for adult inpatients with a diagnosis of Sepsis, 2011-2017.



Process audit: management

2017	Medical	Surgical	ED	Average
Cultures before antimicrobials	72%	56%	82.7%	70.6%
Antibiotics within the hour	58%	60%	61%	59.5%
As per antimicrobial guideline	85%	81%	88%	85%
1st lactate	68%	72%	81%	73%
2nd Lactate	58%	82%	56%	65%
Fluid bolus	72%	65%	80%	72%

Change management

Hospital Group	# of Hospitals	# converted to Sepsis-3
SSHG	10	9
ULHG	6	6
IEHG	11	11
DMHG	7	7
RCSI	8	8
SAOLTA	7	7
Total	49	48

Antimicrobial stewardship
– targeting the infection

- Local antimicrobial guideline
  - Includes no antimicrobial if that is what the guideline says!
- Site
- Source
- Patient characteristics
- Audit

Antimicrobial usage, hpsc.ie

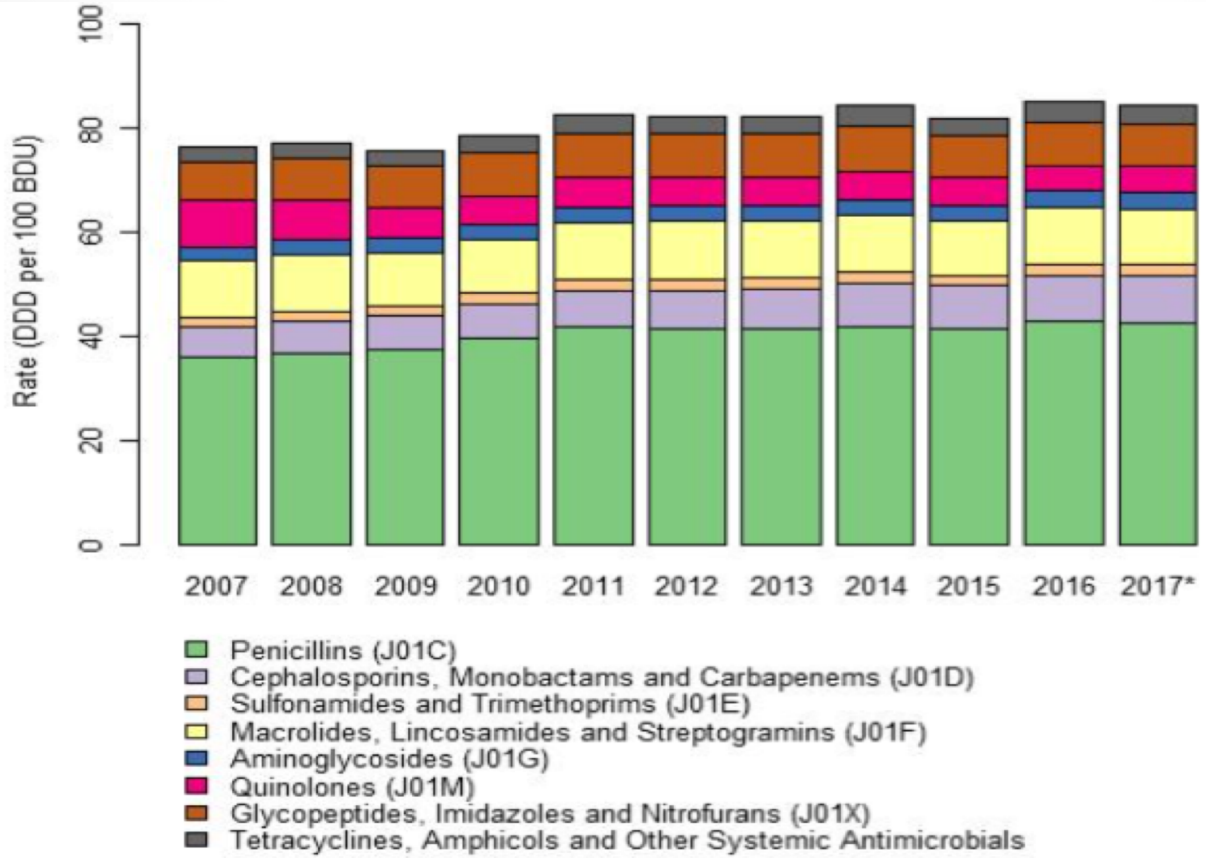


Figure 2. Overall hospital antibiotic consumption rate in DDD per 100 BDU by pharmacological subgroup (ATC level 3) by year

Note: values are overall means for the national data. Note: *Results provisional to the end of 2017Q4

Antimicrobial resistance

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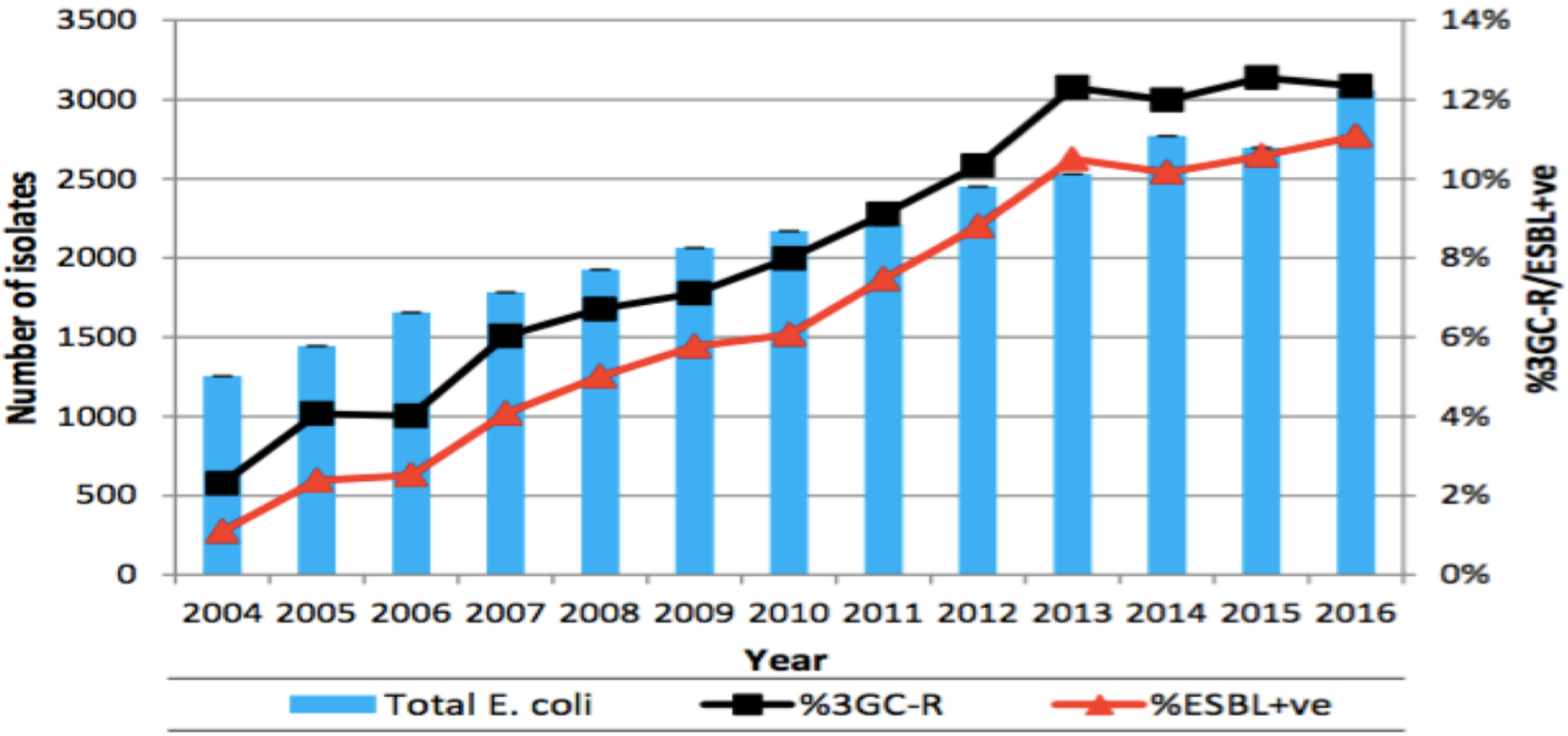

Figure 1. Trends for E. coli – total numbers of E. coli and percentage resistance to 3rd generation cephalosporins (3GC)/ESBL-positive

CDI notifications
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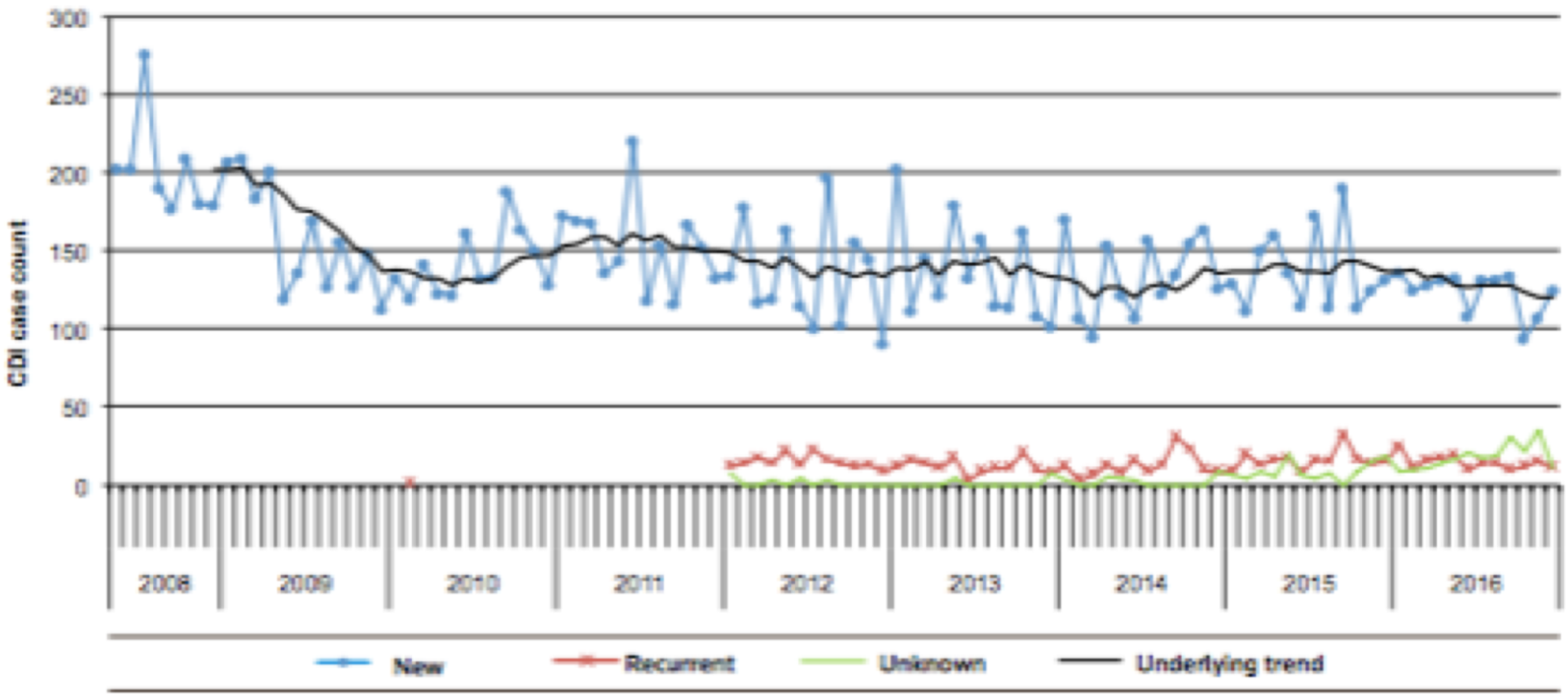

Figure 1. Numbers of CDI notifications by month and case type (2008 – 2016).

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Any Questions?