

# Nurse-led IVOS pilot: the Cambridge experience

**Reem Santos**

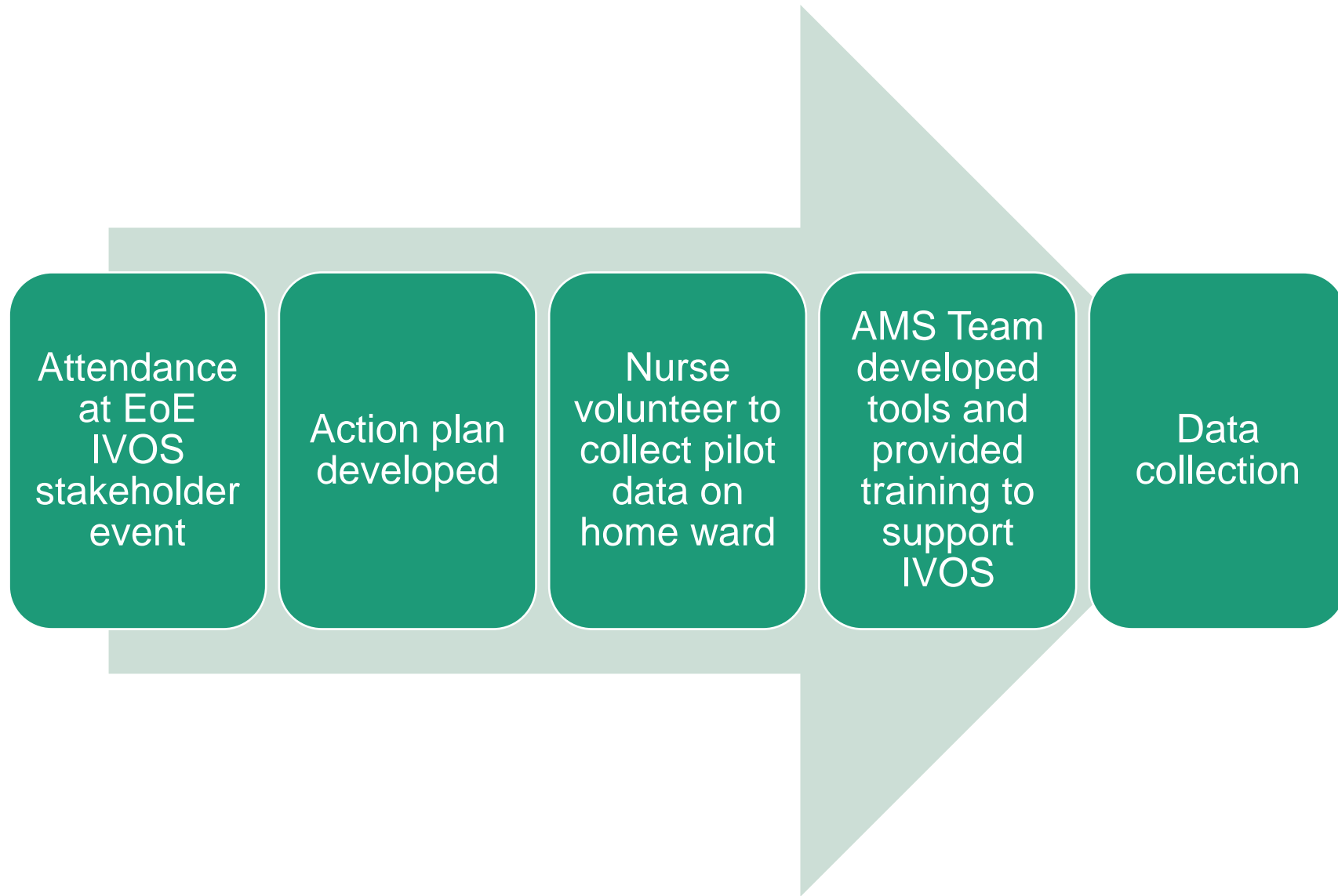
**Principal Pharmacist – AMS and ID**

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University Hospitals**  
NHS Foundation Trust

**Together  
Safe  
Kind  
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# Antimicrobial Intravenous-to-Oral Switch (IVOS) Decision Aid

## Based on the National Antimicrobial IVOS Criteria

Co-produced through a UK-wide multidisciplinary consensus process involving 279 participants

### Why use this IVOS decision aid?

IVOS is an important antimicrobial stewardship intervention.<sup>1,2</sup> Research evidence confirms several IVOS benefits, including decreased risk of bloodstream and catheter-related infections, reduced equipment costs, carbon footprint and hospital length-of-stay, increased patient mobility and comfort, and released nursing time to care for patients.<sup>3,4</sup>

### When to use this IVOS decision aid?

The audit standard recommended for the implementation of this decision aid is that all patients on intravenous (IV) therapy should be reviewed promptly from first dose of IV antimicrobial with formal review completed within 48 hours and daily thereafter, unless clearly documented exemptions.

### Does your patient have an infection that may require special consideration?

Infections that may require special consideration include: deep-seated infections, infections requiring high tissue concentration, infections requiring prolonged intravenous antimicrobial therapy or critical infections with high risk of mortality.

To note: on specialist advice, an IVOS within 48 hours may still be indicated for some patients with these infections.

Infections for special consideration include, but are not limited to, those listed below:

• bloodstream infection	Y/N	• osteomyelitis	Y/N	If <b>YES</b>	→ check for clearly documented plan or seek specialist advice
• empyema	Y/N	• severe or necrotising soft tissue infections	Y/N		
• endocarditis	Y/N	• septic arthritis	Y/N	If <b>NO</b>	→ continue
• meningitis	Y/N	• undrained abscess	Y/N		

### 1a. Enteral route

- 1.1. Is the patient's gastrointestinal tract functioning with no evidence of malabsorption? Y/N
  - 1.2. Is the patient's swallow or enteral tube administration safe? Y/N
- If **NO** → reassess in 24 hours  
If **YES** → continue

### 1b. Enteral route continued

- 1.3. Are there any significant concerns over patient adherence to oral treatment? Y/N
  - 1.4. Has the patient vomited within the last 24 hours? Y/N
- If **YES** → reassess in 24 hours  
If **NO** → continue

### 2. Clinical signs and symptoms

- 2.1. Are the patient's clinical signs and symptoms of infection improving? Y/N
- If **YES** → continue  
If **NO** → reassess in 24 hours

### 3. Infection markers

- 3.1. Has the patient's temperature been between 36-38°C for the past 24 hours? Temp: ..... Y/N
  - 3.2. Is the patient's Early Warning Score (EWS) decreasing? EWS: ..... Y/N
  - 3.3. Is the patient's White Cell Count (WCC) trending towards the normal range?\* WCC: ..... Y/N
  - 3.4. Is the patient's C-Reactive Protein (CRP) decreasing?\* CRP: ..... Y/N
- If **NO** → reassess in 24 hours  
If **YES** → prompt or assess for switch

### PROMPT FOR SWITCH:

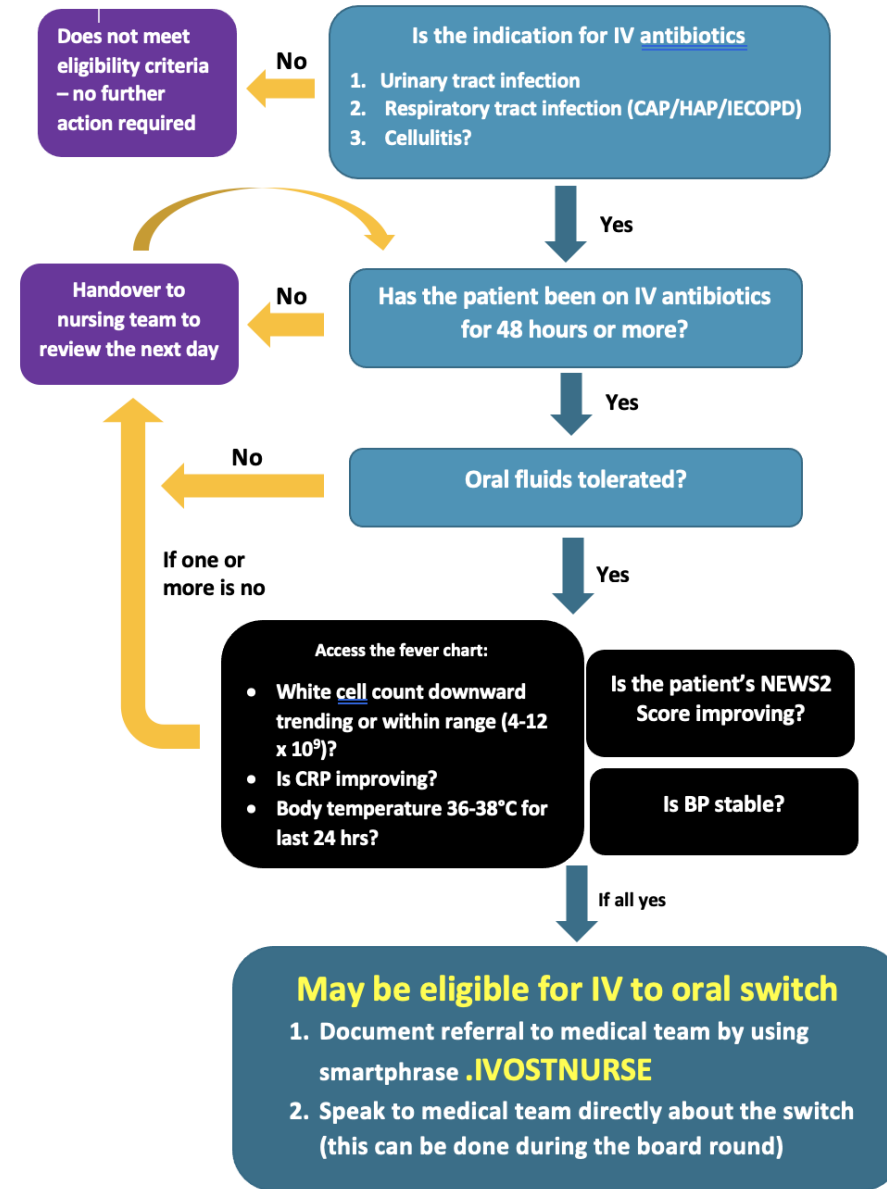
Nursing/pharmacy teams to prompt prescriber or infection specialist to consider IV to oral switch.

### ASSESS FOR SWITCH:

Prescriber or infection specialist to consider IV to oral switch. Identify whether a suitable oral switch option is available, considering for example oral bioavailability, any clinically significant drug interactions, patient allergies or contra-indications.

Intravenous antimicrobial initiation: Date: \_\_/\_\_/\_\_\_\_ Time: ..... Name: .....  
IVOS first assessment (daily thereafter): Date: \_\_/\_\_/\_\_\_\_ Time: ..... Name: .....  
IV to Oral Switch: Date: \_\_/\_\_/\_\_\_\_ Time: ..... Name: .....

## Nurse-led IV to oral switch pathway



## Nurse Review: IV antibiotics to Oral switch

Mrs X is currently on IV antibiotics for community acquired pneumonia and may be eligible to be switched to oral.

The patient meets the following criteria:

**1. Has the patient been on IV antibiotics for 48 hours or more?** Yes (if answer is no, to review in the next 24 hours)

**2. Is the patient clinically improving?** Yes

**3. The patient is tolerating oral fluid?** Yes

### • White blood cell (WBC) count

Date	Value	Ref Range	Status
17/01/2023	9.0	3.6 - 10.5 10 <sup>9</sup> /L	Final
16/01/2023	12.0 (H)	3.6 - 10.5 10 <sup>9</sup> /L	Final
15/01/2023	14.6 (H)	3.6 - 10.5 10 <sup>9</sup> /L	Final

• The patient's white cell count is trending downwards and within the range 4-12 x10<sup>9</sup>/L? Yes

### • CRP

Date	Value	Ref Range	Status
17/01/2023	185 (H)	0 - 9 mg/L	Final
	Comment: Please note change of method and reference interval. For further information please contact the Biochemistry Duty Doctor.		
16/01/2023	282 (H)	0 - 9 mg/L	Final
	Comment: Please note change of method and reference interval. For further information please contact the Biochemistry Duty Doctor.		
15/01/2023	300 (HH)	0 - 9 mg/L	Final
	Comment: Please note change of method and reference interval. For further information please contact the Biochemistry Duty Doctor.		

• The patient's CRP is trending downwards? Yes

### • BP Readings from Last 1 Encounters:

17/01/23 107/63

• The patient's blood pressure is stable? Yes

• The patient's temperature has been between 36-38°C in the last 24 hours? Yes

NB. The patient's NEWS2 score is: (1)

If the answer for all of the above is yes, your patient may be suitable for a step down to oral antibiotic therapy. Please refer the patient to the medical team for review.

Staff Nurse

## Teaching and supportive material – Smart phrase

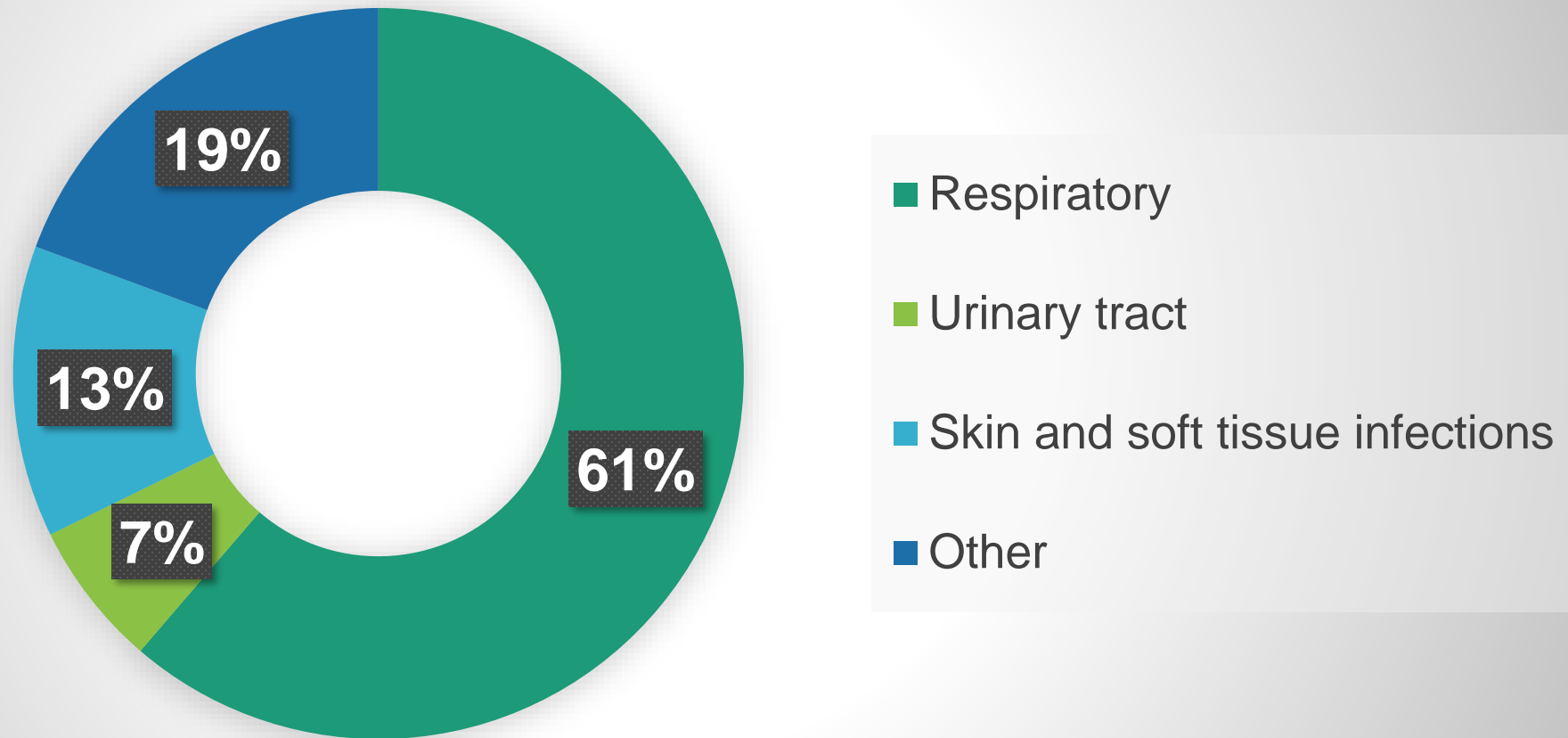
# Data analysis



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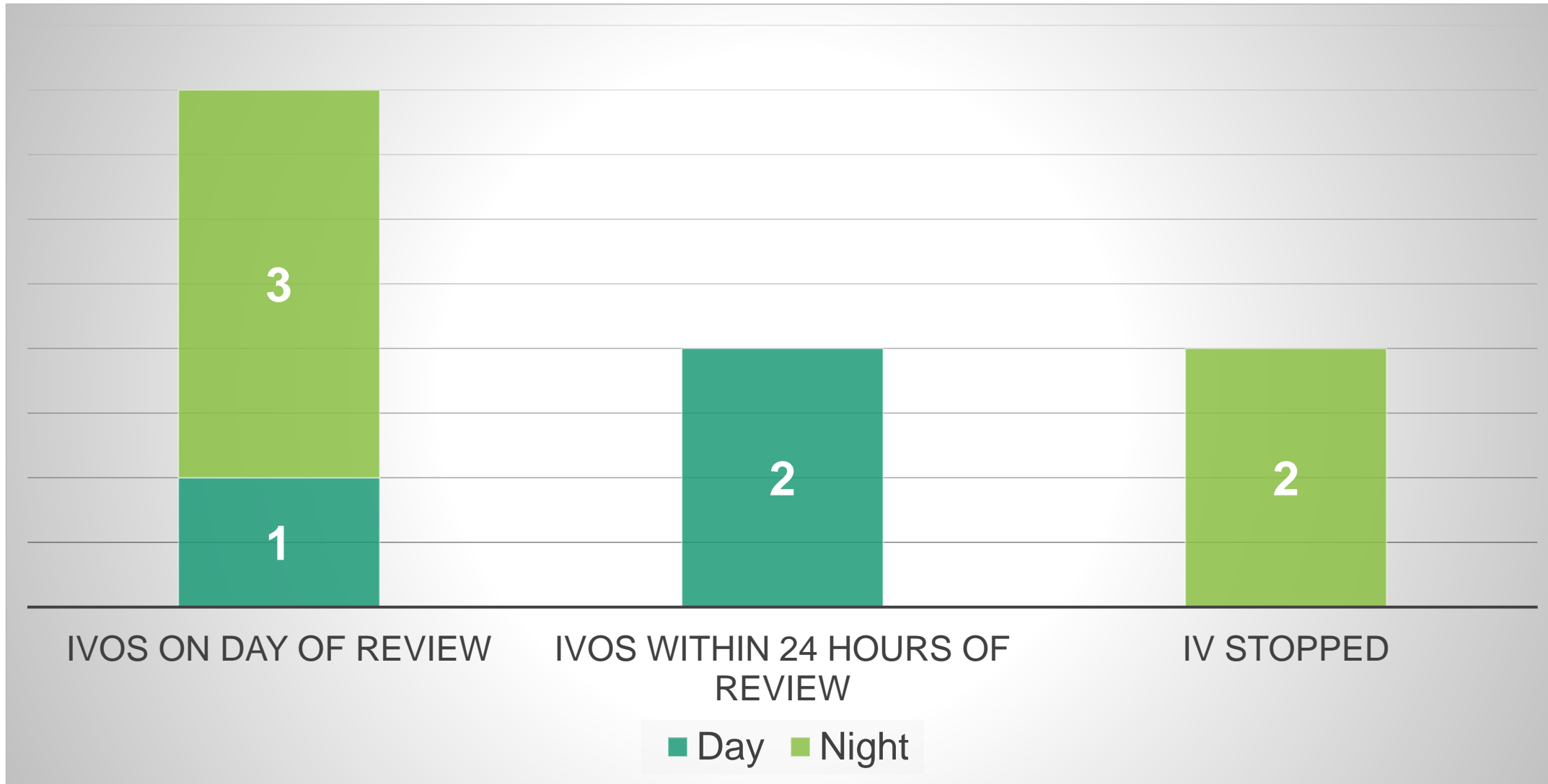


### IV antibiotics by indication (n = 31)

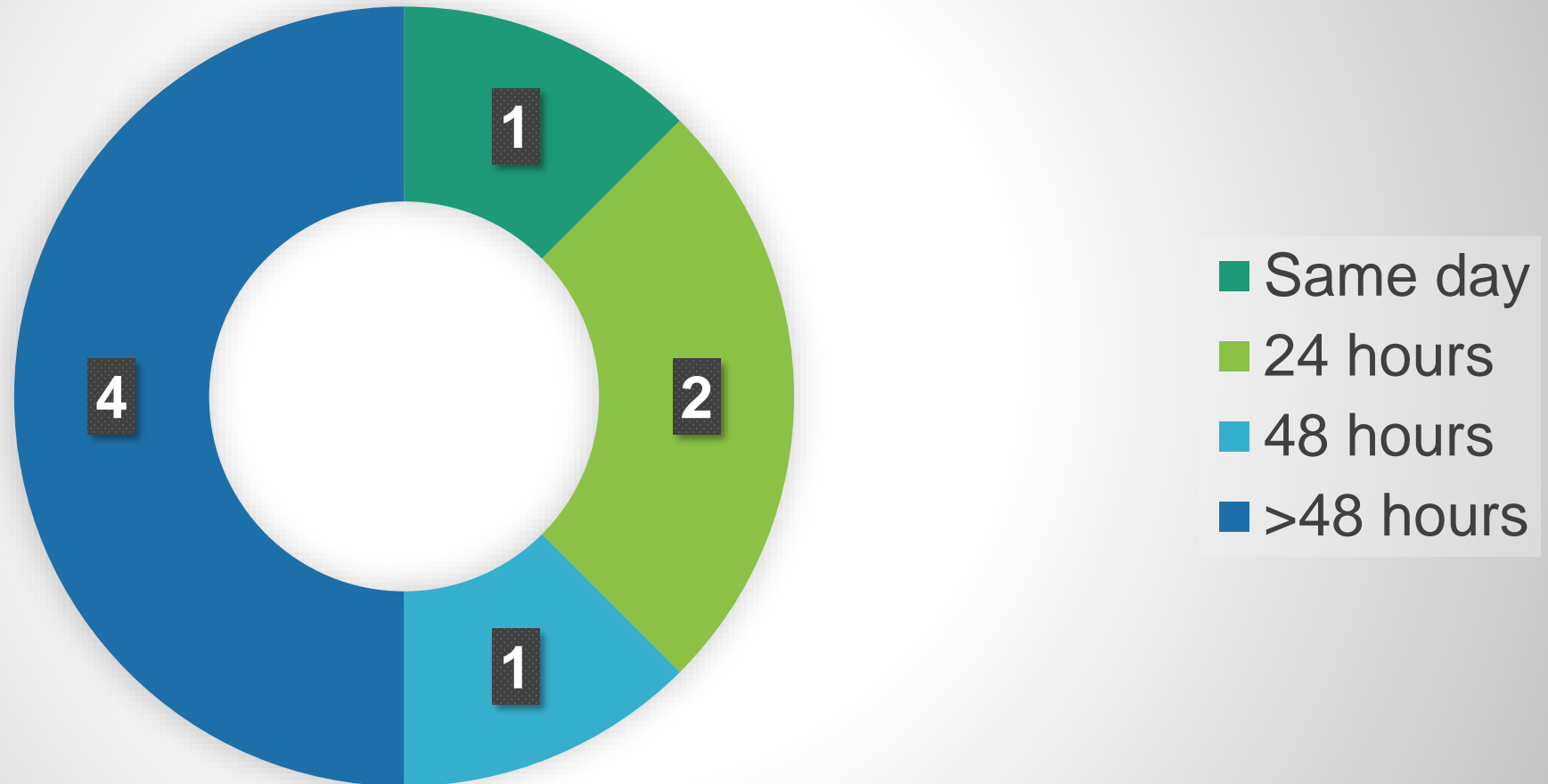


			Clinical markers improving in last 24 hours?					Oral route available?				
on IV for ≥48 hrs?	Type of infection	Indication	Symptoms and signs improving?	Temp >36 or <38?	NEWS2 score improving?	WCC ↓	CRP improving/trending downwards?	No evidence of malabsorption/vomited in last 24 hrs?	Safe swallow/enteral tube administration available?	Suitable oral options available?	Patient able to adhere to oral meds?	suitable for IV to oral switch at time of nurse review?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yes	SSTI	Cellulitis	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Yes	SSTI	Cellulitis	No	No	Yes	No	No	Yes	Yes	Yes	Yes	No
Yes	Respiratory	CAP	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Yes	UTI	UTI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	SSTI	Cellulitis	No	Yes	Yes	No	No	Yes	Yes	yes	Yes	No
Yes	Respiratory	IECOPD, bronchiectasis	Yes	Yes	Yes	No	yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Respiratory	CAP	Yes	Yes	Yes	No	yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Respiratory	IECOPD	Yes	Yes	Yes	No	yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	Yes	Yes	Yes	No	No	Yes	Yes	yes	Yes	No
Yes	Respiratory	HAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	No	No	No	Yes	Yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	No	Yes	Yes	No	Yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	No	No	Yes	Yes	Yes	Yes	Yes	yes	Yes	No
Yes	Respiratory	CAP	Yes	Yes	No	No	Yes	Yes	Yes	yes	Yes	Yes
Yes	Respiratory	CAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Respiratory	CAP	yes	yes	yes	No	No	Yes	Yes	yes	Yes	no
Yes	Respiratory	CAP	No	Yes	Yes	Yes	Yes	Yes	Yes	yes	Yes	no
Yes	Respiratory	HAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	SSTI	Cellulitis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Respiratory	CAP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Respiratory	Aspiration pneumonia	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
Yes	UTI	UTI	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Yes	Respiratory	IECOPD	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No





## Time to discharge (n=8)



**Projected annual bed days saved – linked to patients discharged/ward/month**

Hospital size	No. of wards	Projected annual bed days saved – linked to patients discharged/ward/month					
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Up to 100 beds</b>	<b>5</b>	60	120	180	240	300	360
<b>200-300 beds</b>	<b>10</b>	120	240	360	480	600	720
<b>300-500 beds</b>	<b>15</b>	180	360	540	720	900	1080
<b>500-600 beds</b>	<b>20</b>	240	480	720	960	1200	1440
<b>600-700 beds</b>	<b>25</b>	300	600	900	1200	1500	1800
<b>800-900 beds</b>	<b>30</b>	360	720	1080	1440	1800	2160
<b>900-1000 beds</b>	<b>35</b>	420	840	1260	1680	2100	2520
	<b>40</b>	480	960	1440	1920	2400	2880
<b>&gt;1000 beds</b>	<b>45</b>	540	1080	1620	2160	2700	3240
	<b>50</b>	600	1200	1800	2400	3000	3600

## Key learning

- 1. Workforce engagement**
- 2. Planning**
- 3. Provide regular support and maintain oversight**
- 4. Consider external factors**

- 1. Business case**
- 2. Focus on IVOS training for junior doctors and pharmacists**
- 3. Develop role of AMS Pharmacy technician**

## Acknowledgements

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# Any questions?