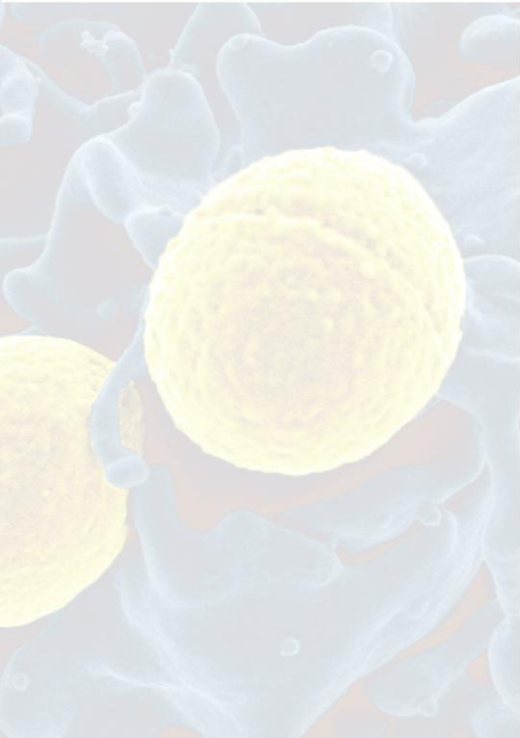


Just Say Sepsis!

A review of the process of care received
by patients with sepsis

@NCEPOD

#sepsis



Method

Hannah Shotton

Study Advisory Group

- Study proposal
- Study Advisory Group
 - Study design: key themes, method, questionnaire
 - Acute medicine
 - Emergency medicine
 - General practice
 - Surgery
 - Intensive care medicine
 - Microbiology
 - Pathology
 - Nursing, critical care outreach
 - Patient representative

Study aim

To identify and explore avoidable and remediable factors in the process of care for patients with sepsis.

Study objectives

- To examine organisational structures, processes, protocols and care pathways for sepsis recognition and management
- To identify remediable factors in the management of the care of adult patients with sepsis

Study objectives

- Timely identification, escalation and treatment of sepsis: use of systems, EWS, care bundles
- Multidisciplinary team approach
- Communication:
 - Primary/secondary care
 - Healthcare professionals; documentation of sepsis
 - Patients, families and carers
- End of life care

Study population

Adult patients diagnosed with sepsis and admitted to critical care (HDU/ICU) or reviewed by CCOT or equivalent during the study period:

6th-20th May 2014

Exclusions

- Pregnant women up to 6 weeks post partum
- Patients undergoing chemotherapy, organ transplant
- Patients already on end of life care pathway when sepsis diagnosed
- Patients who developed sepsis after 48 hours on ICU

Case ascertainment

- Prospective case identification
 - Study contact
 - Identify cases
 - Spreadsheet
 - Clinician details
- Case selection
 - 5 randomly selected at each hospital
- Questionnaire/ case note request sent to each named clinician

Data collection

- Cases reviewed by panel of Reviewers
 - Assessment form
- Identified cases where patient attended the GP
 - Sent request for GP notes
 - GP Reviewers
- Organisational questionnaire
 - Acute / non-acute hospitals

Returns

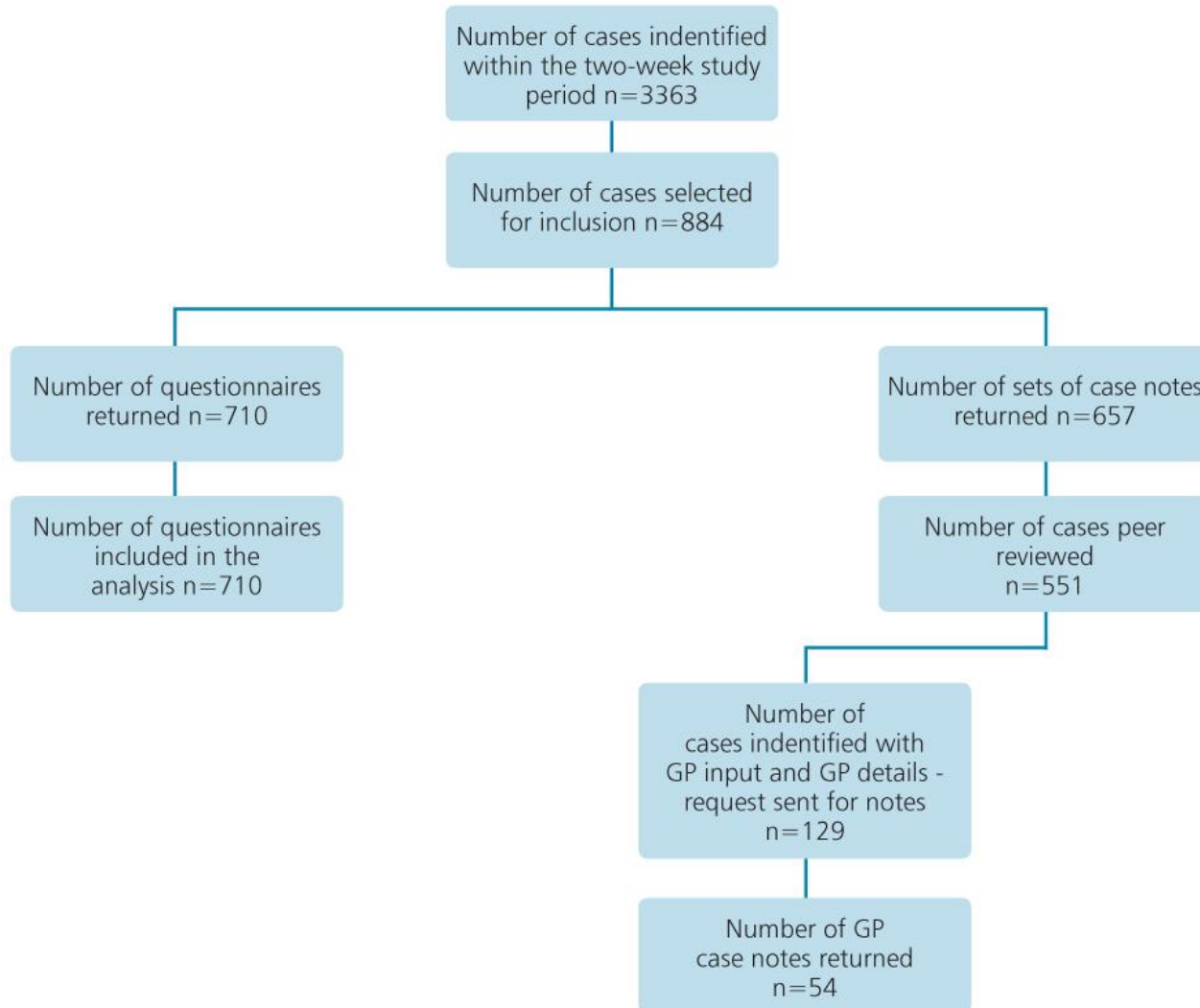


Figure 1 Data returns

Demographics

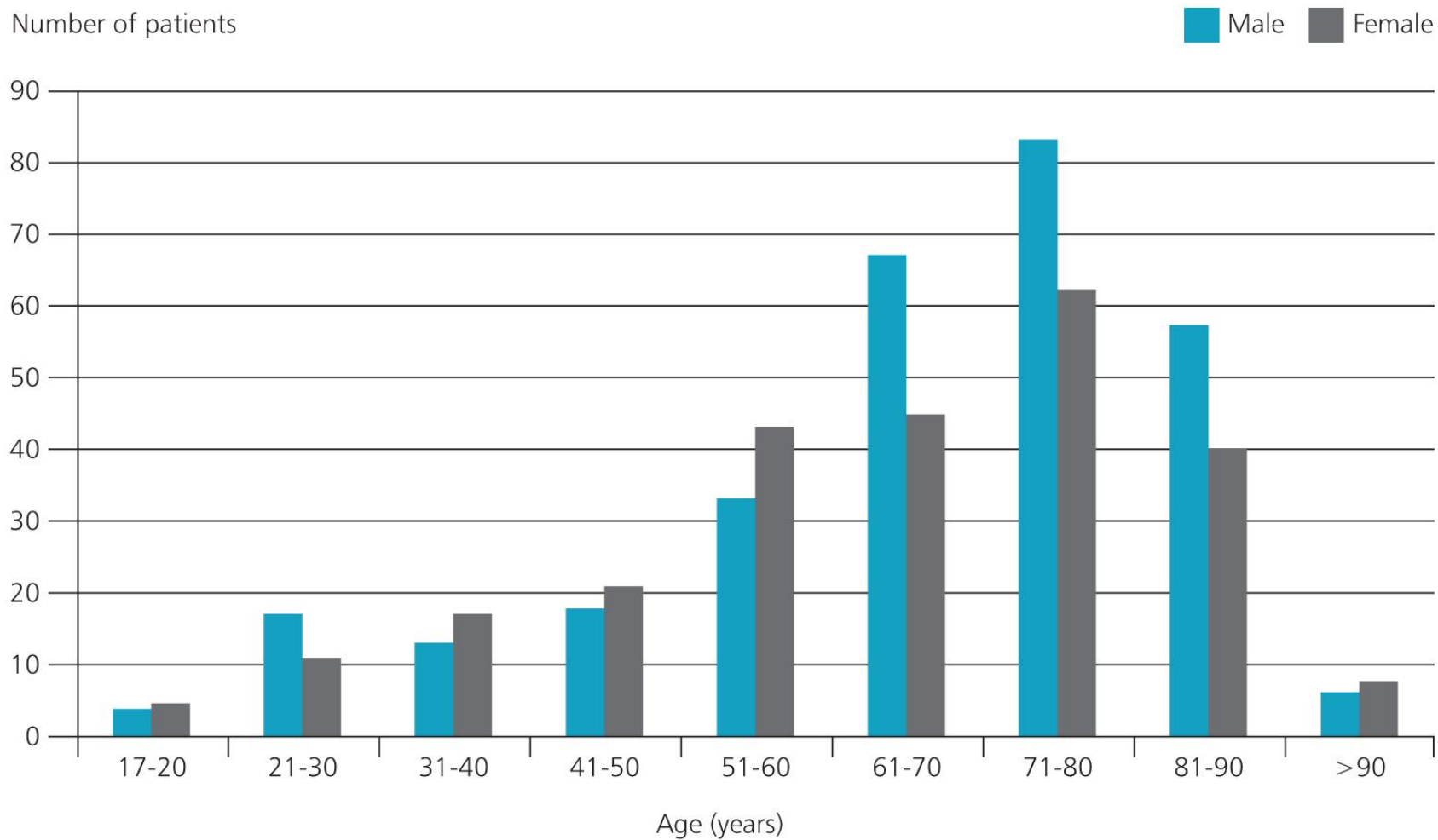


Figure 3.1 Age and gender of the study population

Co-morbidities

Number of patients (*answers may be multiple*)

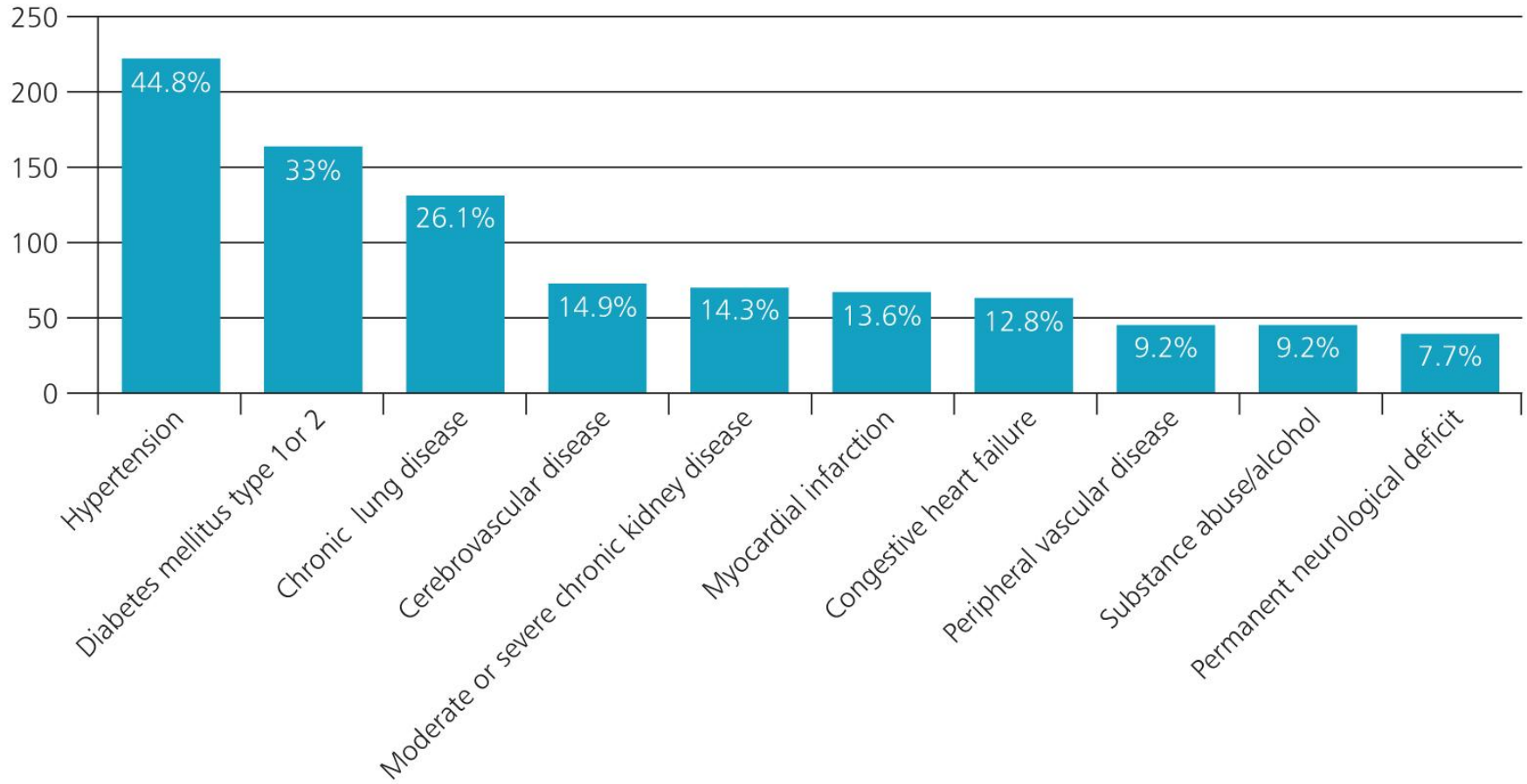


Figure 3.2 Top ten co-morbidities on admission (Clinician questionnaire n=513)

Mode of admission

**Table 3.5 Mode of admission to hospital –
Reviewers' opinion**

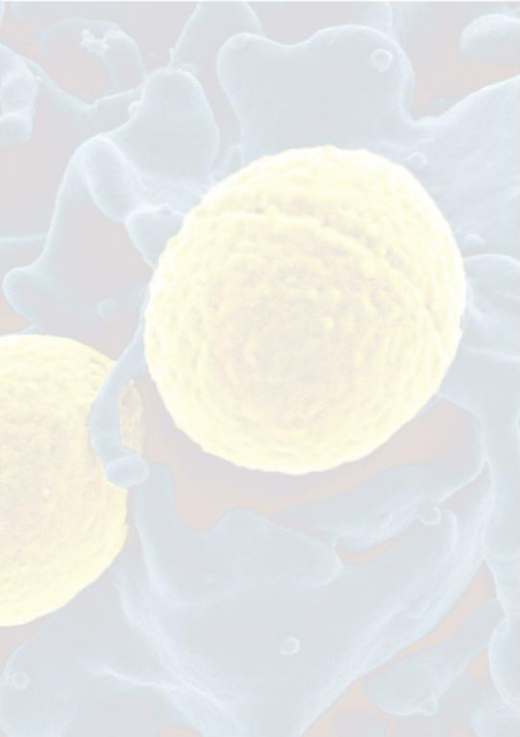
Mode of admission	Number of patients	%
Via the emergency department - ambulance/air evacuation	278	51.9
Via the emergency department - self referral	67	12.5
Via the emergency department - general practitioner referral	57	10.6
General practitioner referral - direct to ward	44	8.2
Transfer from another hospital	27	5.0
Elective admission	29	5.4
Transferred from out-patients clinic	15	2.8
Via the emergency department - out of hours GP/111 call	8	1.5
Transfer from psychiatric unit	4	0.7
Transfer from nursing home	4	0.7
Via emergency department - other	3	0.6
Subtotal	536	
Insufficient data	15	
Total	551	

Previous admission to hospital

Table 3.3 Length of time from previous admission – Clinician questionnaire

Time from previous admission	Number of patients	%
<1 month	39	22.5
1-6 months	56	32.4
>6 months-1 year	19	11.0
> 1 year	59	34.1
Subtotal	173	
Unknown	19	
Total	192	

192/702 (27.4%) previous admission for sepsis



Organisational data

Vivek Srivastava

Organisational data

Table 2.2 Availability of an emergency department

Available	Yes	No	Subtotal	Not answered	Total
District General Hospital (DGH) ≤ 500 beds	90	11	101	1	102
District General Hospital (DGH) > 500 beds	59	1	60	0	60
University Teaching Hospital (UTH)	40	13	53	0	53
Tertiary Specialist Centre (TSC) – stand alone	5	23	28	0	28
Independent Hospital (IH)	1	77	78	5	83
Community or Cottage Hospital (CH)	5	171	176	28	204
Peripheral Hospital (PH)	1	5	6	0	6
Rehabilitation Hospital (RH)	0	11	11	2	13
Total	201 (39.2%)	312 (60.8%)	513	36	549

Organisational data

Table 2.4 Presence of a specific protocol/care pathway/ bundle for recognition and management of patients with sepsis

Sepsis protocol	Yes	No	Subtotal	Not answered	Total
District General Hospital (DGH) ≤ 500 beds	91	10	101	1	102
District General Hospital (DGH) > 500 beds	55	5	60	0	60
University Teaching Hospital (UTH)	48	3	51	2	53
Tertiary Specialist Centre (TSC) – stand alone	18	9	27	1	28
Independent Hospital (IH)	54	29	83	0	83
Community or Cottage Hospital (CH)	79	124	203	1	204
Peripheral Hospital (PH)	4	2	6	0	6
Rehabilitation Hospital (RH)	11	2	13	0	13
Total	360 (66.1%)	184 (33.8%)	544	5	549

81% protocols are based on national/ international guidance

93% hospitals without a sepsis protocol had a protocol for deteriorating patients

Organisational data

Table 2.6 Details of protocol

Actions included:	Yes	%	No	%	Subtotal
Administering IV fluids	330	94.3	19	5.4	349
Administering IV antimicrobials	323	95.3	16	4.7	339
Blood cultures to be taken before antimicrobials administered	320	93.6	22	6.4	342
Administering oxygen therapy	328	95.1	17	4.9	345
Early lactate measurement	307	91.4	29	8.6	336
Catheterisation/urine output measurement	323	93.9	21	6.1	344

Answers may be multiple

95% protocols – timeframe for actions within 1 hour of diagnosis

Organisational data

Table 2.11 Provision of education around sepsis recognition and management, including the use of the protocol for hospital staff

Education regarding sepsis	Medical staff				Nursing staff			
	Emergency department	%	Other wards	%	Emergency department	%	Other wards	%
Yes	149	84.2	240	78.7	150	83.3	228	72.6
No	28	15.8	65	21.3	30	16.7	86	27.4
Subtotal	177		305		180		314	
Not answered	32		55		143		46	
Not applicable	151		0		37		0	
Total	360		360		360		360	

Protocol available on hospital intranet in 97.4% hospitals

Organisational data

Table 2.14 Pre-alert system for incoming sepsis patients

Pre-alert system	Yes	No	Subtotal	Not answered	Total
District General Hospital (DGH) ≤ 500 beds	44	39	83	10	93
District General Hospital (DGH) > 500 beds	25	30	55	5	60
University Teaching Hospital (UTH)	24	17	41	8	49
Tertiary Specialist Centre (TSC) – stand alone	2	5	7	17	24
Total	95 (51.1%)	91 (48.9%)	186	40	226

Table 3.21 - Pre-alert sent for 8/133 patients attending the ED

Organisational data

165/216 acute hospitals had a policy for who can administer antimicrobials

Table 2.17 Detail of staff who can administer intravenous antimicrobials (Acute hospitals only)

Staff	Number of hospitals	%
Senior doctor (ST3 or above)	133	81.1
Junior doctor (below ST3)	135	82.3
Other healthcare worker	37	22.6
Senior nurse (senior staff nurse or above)	140	85.4
Staff nurse	125	76.2
Healthcare assistant	3	1.8

Answers may be multiple n=164; not answered in 1

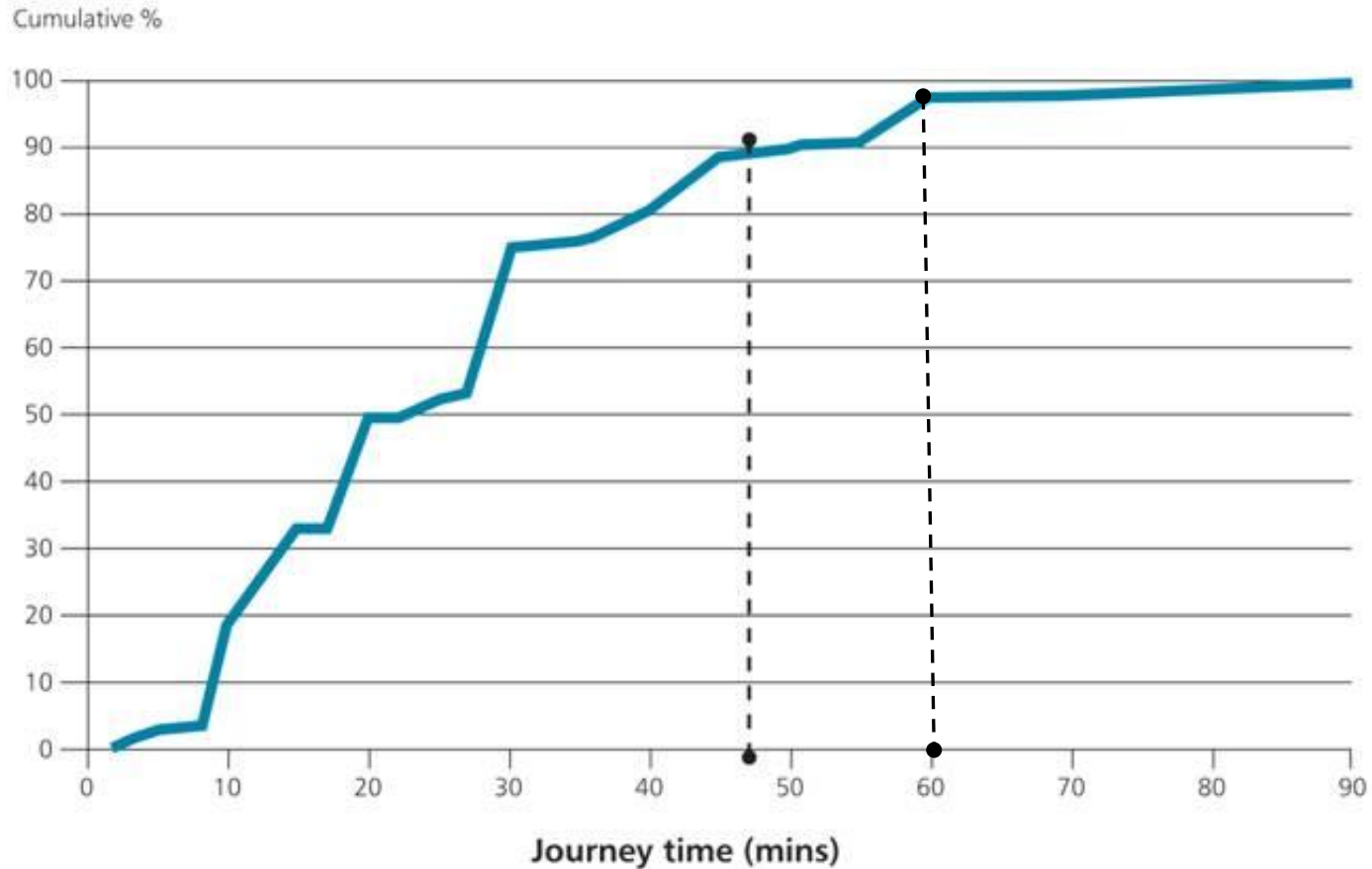
Organisational data

**Table 2.18 Hospitals without critical care onsite
critical care transfer arrangement exists with nearby hospital(s)**

Critical care transfer arrangement	Yes	No	Subtotal
District General Hospital (DGH) ≤ 500 beds	11	0	11
University Teaching Hospital (UTH)	4	0	4
Tertiary specialist centre (TSC) – stand alone	5	1	6
Independent Hospital (IH)	33	1	34
Community or Cottage Hospital (CH)	130	55	185
Peripheral Hospital (PH)	5	0	5
Rehabilitation Hospital (RH)	13	0	13
Total	201 (77.9%)	57 (22.1%)	258

Organisational data

Time to transfer to critical care if not on-site



Organisational data

Table 2.19 Steps performed prior to transfer for off-site critical care

Steps taken	Total	
Take blood cultures	99	56.9%
Administer antimicrobials	84	48.3%
Administer oxygen therapy	136	78.2%
Haemodynamically stabilise the patient (fluids)	81	46.6%
Measure lactate	38	21.8%
Attempt to isolate the source of infection	50	28.7%
Monitor urine output	105	60.3%
Other	24	13.8%
None	30	17.2%

Answers may be multiple n=174; not answered in 27

Organisational data

Table 2.20 Specific proforma to monitor progress of patients with sepsis (Acute hospitals only)

Sepsis proforma	Yes	No	Subtotal	Not answered	Total
District General Hospital (DGH) \leq 500 beds	28	61	89	4	93
District General Hospital (DGH) $>$ 500 beds	14	45	59	1	60
University Teaching Hospital (UTH)	10	34	44	5	49
Tertiary Specialist Centre (TSC) – stand alone	3	20	23	1	24
Total	55 (25.6%)	160 (74.4%)	215	11	226

Organisational data

Table 2.22 Policy for staff handover (All hospitals)

Policy	Yes	No	Subtotal
DGH ≤ 500 beds	70	27	97
DGH > 500 beds	39	17	56
University teaching hospital	33	13	46
Tertiary specialist centre - stand alone	17	9	26
Independent hospital	36	43	79
Community or cottage hospital	93	95	188
Peripheral Hospital (PH)	6	0	6
Rehabilitation Hospital (RH)	6	7	13
Total	300 (58.7%)	211 (41.3%)	511

Hospitals with policy - 94% had time set aside for face-to-face handover

Organisational data

Table 2.24 Patients provided with printed information about sepsis (All hospitals)

Patients information about sepsis	Number of hospitals	%
Yes	29	5.6
No	490	94.4
Subtotal	519	
Not answered	30	
Total	549	

Organisational data

Table 2.25 Follow-up service for patients post discharge (Acute hospitals only)

Follow-up service	Yes	No	Subtotal	Not answered	Total
DGH ≤ 500 beds	32	59	91	2	93
DGH > 500 beds	21	39	60	0	60
University Teaching Hospital	20	21	41	8	49
Tertiary Specialist Centre - stand alone	5	18	23	1	24
Total	78 (36.3%)	137 (63.7%)	215	11	226

Organisational data

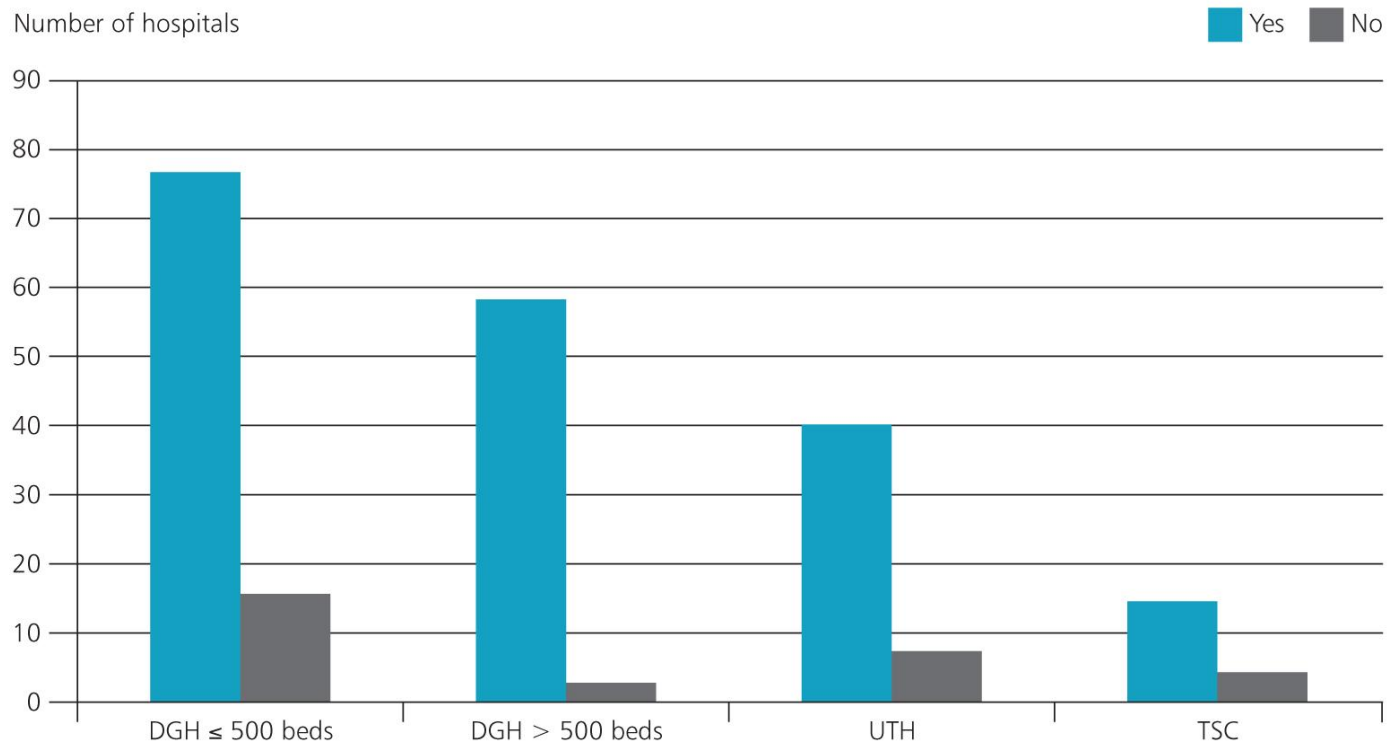


Figure 2.2 Hospital type and presence of a Critical Care Outreach Team

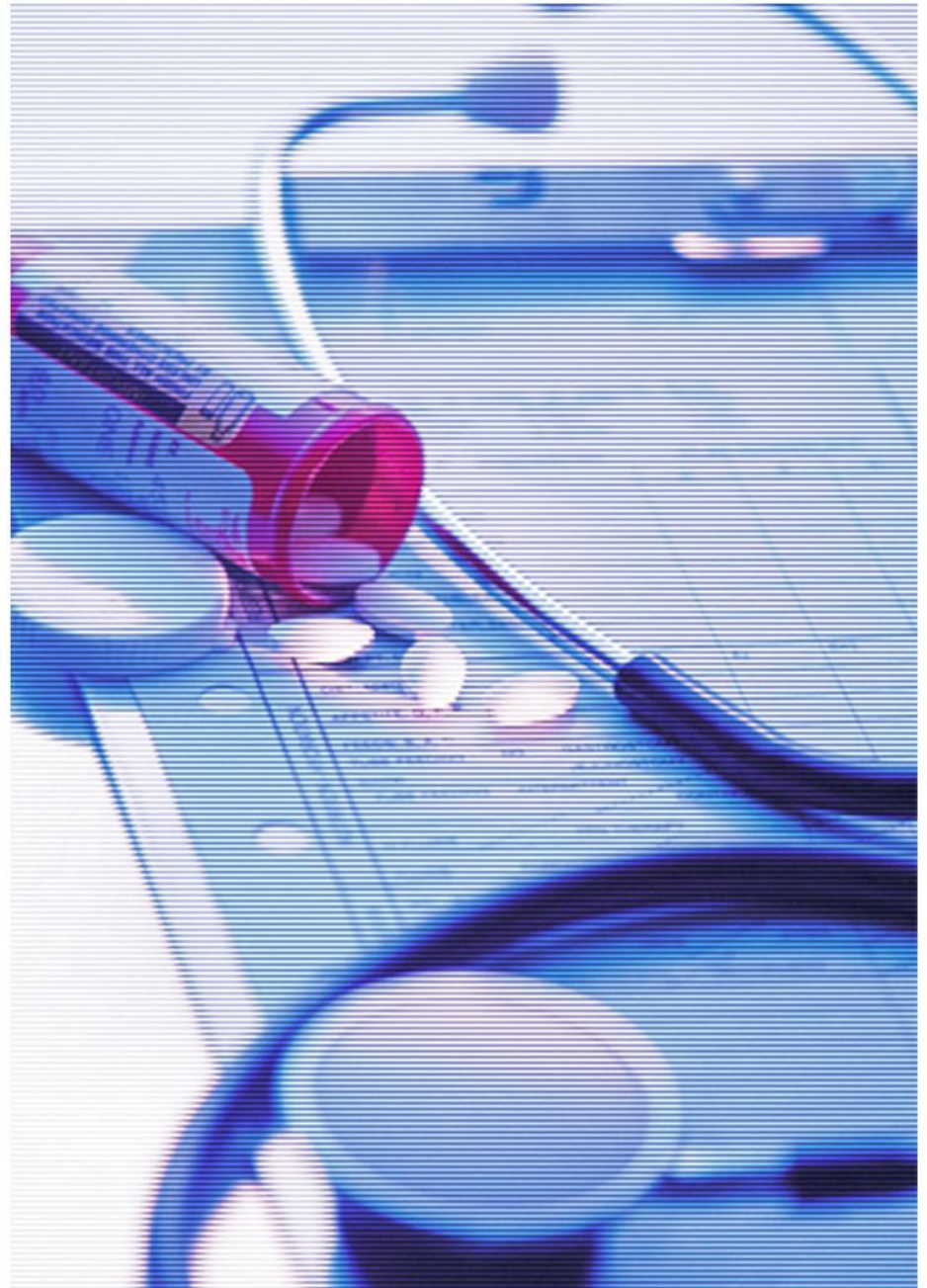
199/223 (89%) hospitals with critical care have a CCOT

NCEPOD

2005 Report

An Acute Problem?

44.2% of hospitals
had CCOT



Organisational data

Table 2.29 Availability of Critical Care Outreach Teams (or equivalent)

Availability	Number of hospitals	%
24 hours, 7 days/week	96	49.0
Normal working hours (8am-6pm) 7 days/week	26	13.3
Normal working hours (8am-6pm) Mon-Fri	14	7.1
Extended working hours, 7 days/week	45	23.0
Extended working hours, Mon-Fri	3	1.5
Extended working hours, Mon-Fri + reduced cover on weekends	2	1.0
Other	10	5.1
Subtotal	196	
Not answered	3	
Total	199	

Organisational data

Table 2.31 Lead clinician responsible for improving care of patients with sepsis (All hospitals)

Lead clinician for sepsis	Yes	No	Subtotal	Not answered	Total
District General Hospital (DGH) ≤ 500 beds	51	28	79	14	93
District General Hospital (DGH) > 500 beds	39	17	56	3	59
University Teaching Hospital (UTH)	28	16	44	1	45
Tertiary specialist centre (TSC) – stand alone	3	8	11	6	17
Independent Hospital (IH)	3	27	30	16	46
Community or Cottage Hospital (CH)	37	54	91	44	135
Peripheral Hospital (PH)	2	2	4	1	5
Rehabilitation Hospital (RH)	3	4	7	1	8
Total	166 (51.6%)	156 (48.4%)	322	86	408

Sepsis nurse in 11%

Organisational data

Table 2.33 Sepsis response kit, bag or trolley (All hospitals)

Sepsis trolley	Yes	No	Subtotal
District General Hospital (DGH) ≤ 500 beds	35	55	90
District General Hospital (DGH) > 500 beds	21	38	59
University Teaching Hospital (UTH)	22	23	45
Tertiary Specialist Centre (TSC) – stand alone	5	10	15
Independent Hospital (IH)	15	31	46
Community or Cottage Hospital (CH)	11	121	132
Peripheral Hospital (PH)	1	4	5
Rehabilitation Hospital (RH)	2	6	8
Total	112 (28.0%)	288 (72.0%)	400

Organisational data

Table 2.35 Audit of antimicrobial delivery (Acute hospitals)

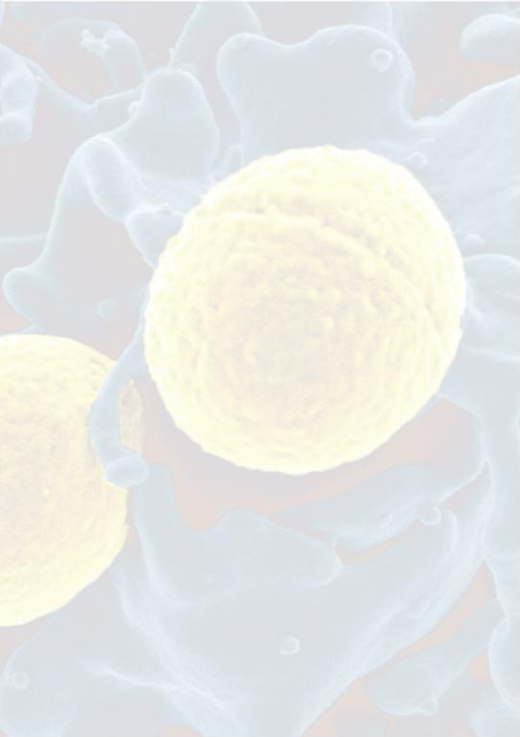
Hospital audits number of episodes of sepsis where patient receives antimicrobials within the first hour of:	Yes	%	No	%	Subtotal	Not answered	Total
Severe sepsis identification	90	44.1%	114	55.9%	204	22	226
Sepsis identification	75	36.9%	128	63.1%	203	23	226
Other identification	32	24.2%	100	75.8%	132	94	226

Answers may be multiple

Organisational data

Table 2.36 Hospital mechanism to centrally record all incidents of sepsis

Recorded	Yes	%	No	%	Subtotal	Not answered	Total
Sepsis	46	21.2	171	78.8	217	9	226
Severe sepsis	43	19.8	174	80.2	217	9	226
Septic shock	46	22.0	163	78.0	209	17	226
Septicaemia	52	25.2	154	74.8	206	20	226



Pre hospital care

Vivek Srivastava

Pre hospital care

Table 3.5 Mode of admission to hospital – Reviewers’ opinion

Mode of admission	Number of patients	%
Via the emergency department - ambulance/air evacuation	278	51.9
Via the emergency department - self referral	67	12.5
Via the emergency department - general practitioner referral	57	10.6
General practitioner referral - direct to ward	44	8.2
Transfer from another hospital	27	5.0
Elective admission	29	5.4
Transferred from out-patients clinic	15	2.8
Via the emergency department - out of hours GP/111 call	8	1.5
Transfer from psychiatric unit	4	0.7
Transfer from nursing home	4	0.7
Via emergency department - other	3	0.6
Subtotal	536	
Insufficient data	15	
Total	551	

Pre hospital care

- 129 hospital notes had details of GP consultation
- Named GP contacted requesting their notes from the last 3 contacts before admission
- 60 sets of notes returned
- 54 suitable for review
- 3 GP case note reviewers recruited and trained

Pre hospital care

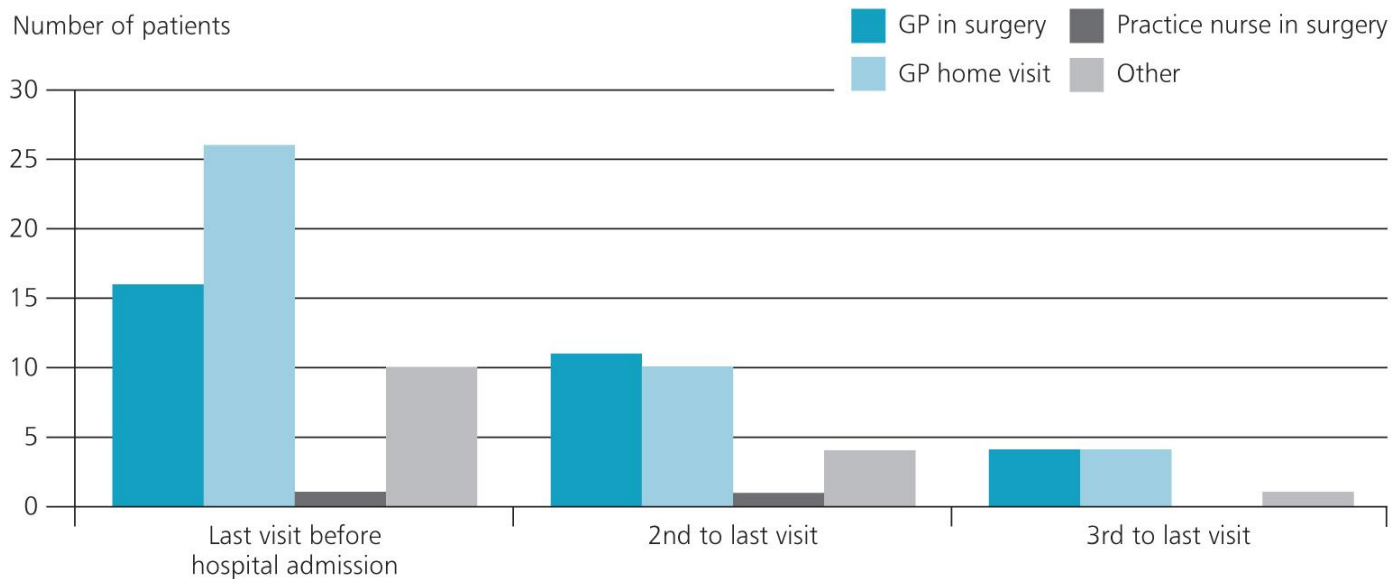


Figure 3.3 Type of visit to the surgery

- Last visit before hospitalisation:
 - 16/54 in surgery
 - 27/54 home visit
 - 10/54 other: telephone/nursing home

Pre hospital care

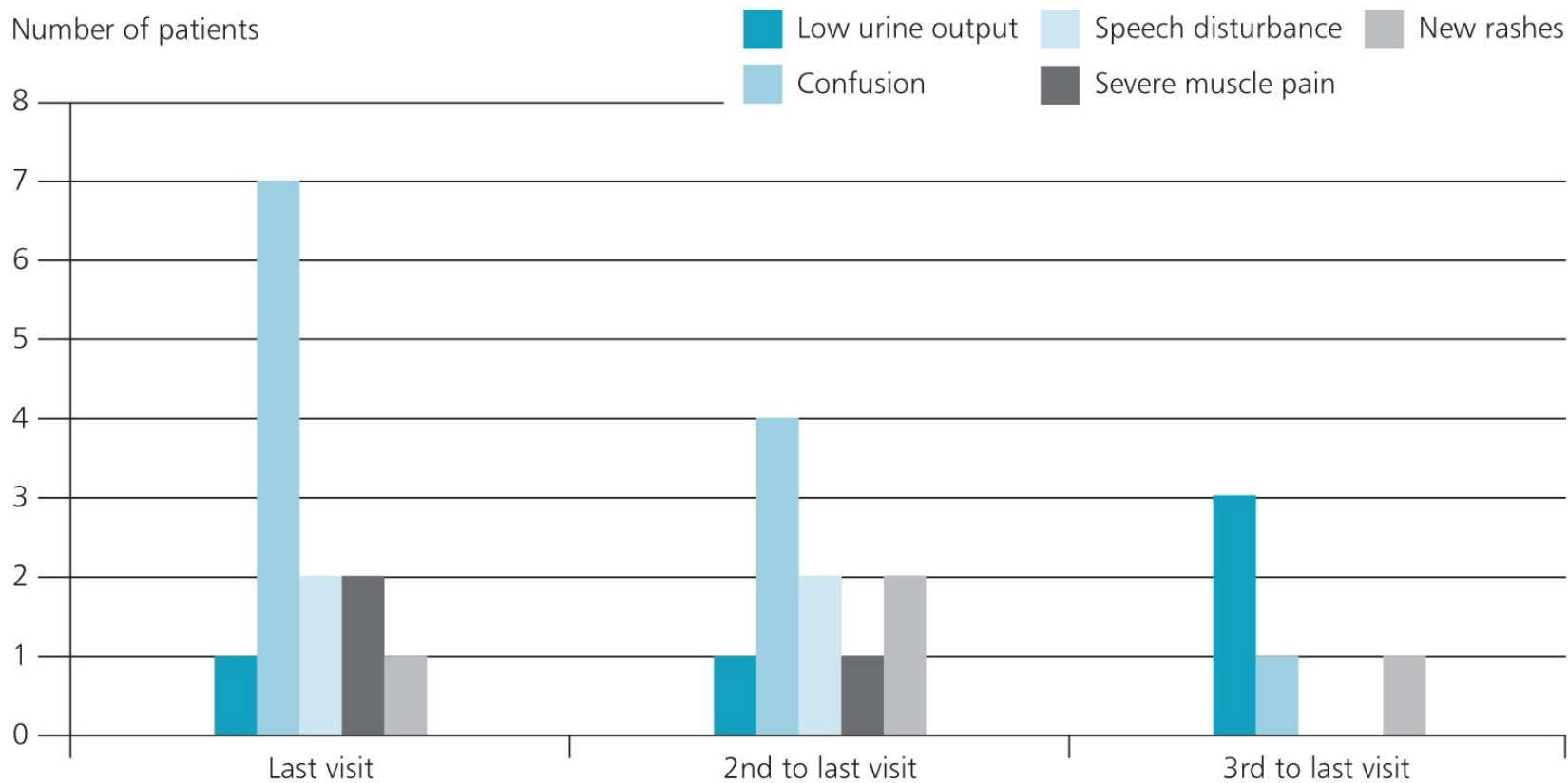


Figure 3.7 Symptoms of sepsis documented

Pre hospital care

Table 3.9 An early warning score or track and trigger tool should have been used for this patient

	Yes	No	Subtotal	Insufficient data	Total
Last visit	30	13	43	11	54
2nd to last visit	19	4	23	3	26
3rd to last visit	6	1	7	4	11

EWS was not used in any of the cases reviewed

Pre hospital care

GP case note review

Tables 3.6 Assessment of vital signs and the healthcare provider that recorded them

Last visit	Assessment done			Who made assessment				
	Yes	No	Total	GP	Nurse	Other	Unknown	Total
Heart rate	33	21	54	31	1	1	0	33
Blood pressure	23	31	54	19	1	0	3	23
Respiratory rate	10	44	54	8	1	0	1	10
Temperature	25	29	54	18	1	0	6	25
Mental state	8	46	54	6	1	0	1	8
Blood glucose	2	52	54	0	0	2	0	2
Other	16	38	54	5	0	0	11	16

Pre hospital care

Hospital case note review

Table 3.22 Details of pre-hospital vital signs

Vital signs recorded	GP (n/129)	%	Paramedic (n/163)	%	Other (n/24)
Temperature	34	26.4	146	89.6	3
Blood pressure	32	24.8	157	96.3	5
Heart rate	40	31.0	163	100.0	6
Respiratory rate	8	6.2	159	97.5	2
Alert, voice, pain, unresponsive (AVPU)	8	6.2	144	88.3	1
Change in mental status	11	8.5	81	49.7	1
Blood glucose	3	2.3	129	79.1	1

Answers may be multiple

Emergency care

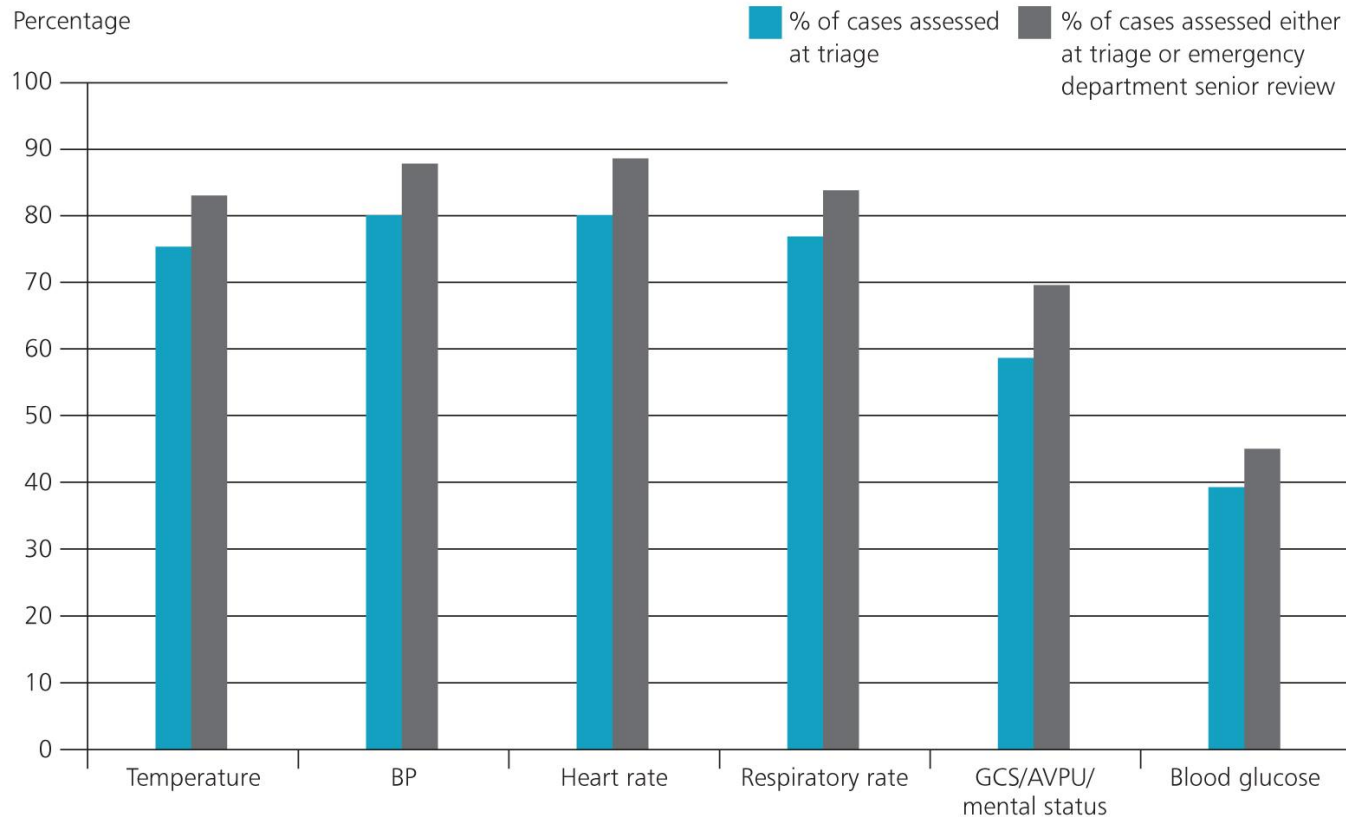


Figure 3.14 Vital signs assessed in the emergency department n=369

37 patients had no vital signs recorded at triage or senior review
152 patients complete set between 2 assessments

Organisational data

Table 2.12 Early warning score linked to escalation protocols

Early warning score linked to escalation	Number of hospitals	%
Yes	516	97.9
No	11	2.1
Subtotal	527	
Not answered	3	
Total	530	

Inpatient care

Table 5.9 Use of early warning scores in patients who developed hospital-acquired infections

Early warning score used	Number of patients	%
Yes	71	85.5
No	12	14.5
Subtotal	83	
Insufficient data	32	
Total	115	

Inpatient care

Table 6.5 Vital signs taken at time of sepsis identification

Vital signs	Number of patients	%
Yes	507	96.6
No	18	3.4
Subtotal	525	
Insufficient data	26	
Total	551	

Table 6.6 Detail of vital signs measured and recorded

Vital signs taken	Number of patients	%
GCS/AVPU	218	52.9
Temperature	378	91.7
Blood pressure	364	88.3
Heart rate	387	93.9
Respiratory rate	344	83.5

Answers may be multiple n=412; 57 not answered

Pre hospital care

Table 3.12 Appropriateness and timeliness of hospital referrals – GP Reviewers’ opinion

Referral	Last visit (n/34)	
	Yes	No
Appropriate	33	0
Timely	22	3
Successful	33	0

Table 3.17 Room for improvement in pre-hospital care - Reviewers’ opinion

Room for improvement	Yes	No	Subtotal	Not answered	Total
Diagnosis missed by general practitioner	28	49	77	52	129
Severity underestimated by general practitioner	19	53	72	57	129
General practitioner missed the opportunity to refer	28	49	77	52	129

Pre hospital care

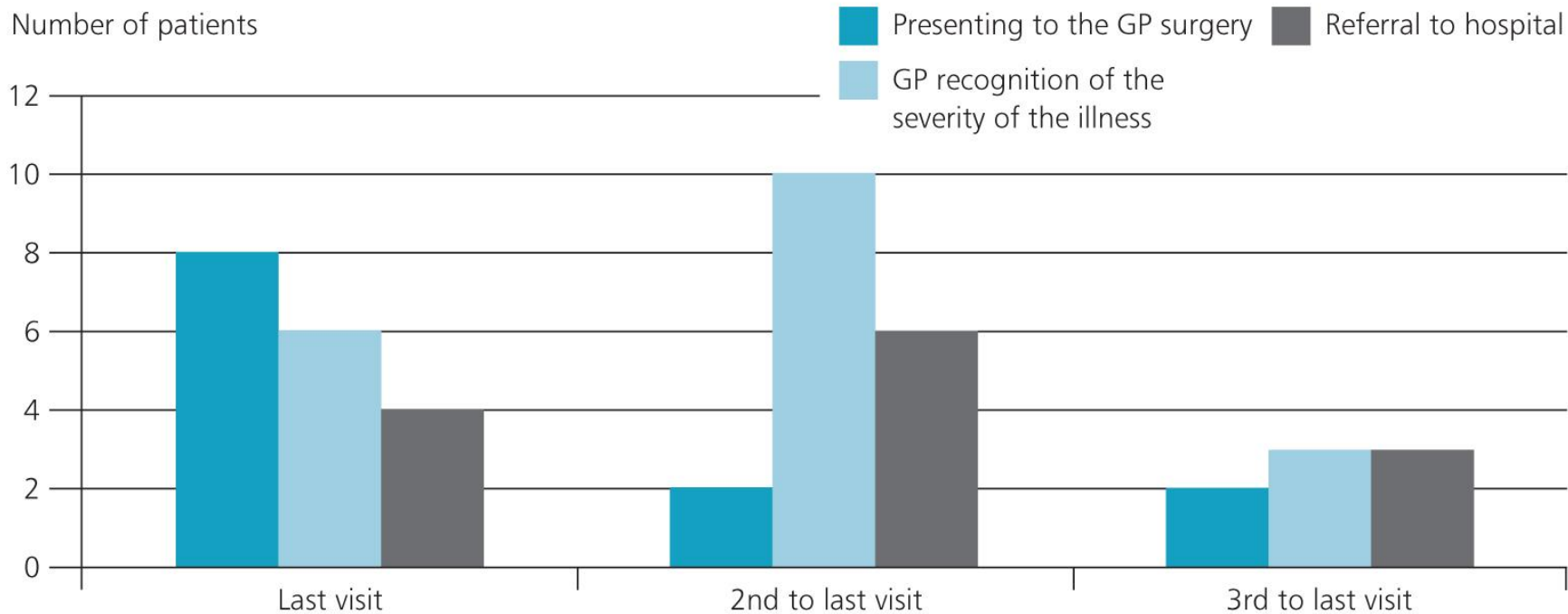


Figure 3.5 Delay in presentation/diagnosis

CASE STUDY 1

A young patient presented to their GP with fever, lethargy and dizziness. A diagnosis of viral infection was made. The following day, the patient deteriorated and called an emergency ambulance. On arrival, their vital signs were recorded as pulse 124 bpm, BP 80/40 mmHg, respiratory rate 36/min and temperature 38.2 °C. A diagnosis of severe sepsis due to community acquired pneumonia was made following admission to hospital.

The Reviewers felt that a standardised approach to vital signs monitoring in primary care could have identified the low blood pressure at an earlier stage and helped to prevent deterioration.

Pre hospital care

GP case note review

Table 3.11 Type of treatment given by the general practitioner

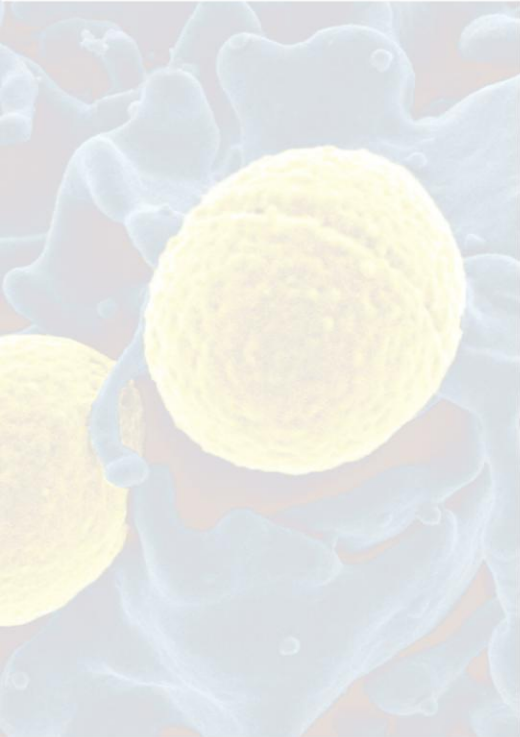
	Last visit		2nd to last visit		3rd to last visit	
Treatment given	n/54	Appropriate	n/26	Appropriate	n/11	Appropriate
IV fluids	N/A	N/A	N/A	N/A	N/A	N/A
Oxygen	1	1	0	N/A	0	N/A
Antimicrobials	12	9	14	8	6	5
Other	7	4	4	3	4	4

Pre hospital care

Hospital case note review

Table 3.25 Healthcare professional providing treatment

Healthcare professional	Fluids	Oxygen	Antimicrobials	Other
General practitioner (129)	0	0	19	6
Paramedic (163)	26	65	0	56
Other (2)	1	2	2	0
Inappropriate therapy	9	12	5	2



Emergency care

Vivek Srivastava

Emergency care

Table 3.30 Delayed review in the emergency department

Delay	In triage - number of patients	%	In senior review - number of patients	%
Yes	27	9.2	112	40.1
No	267	90.8	167	59.9
Subtotal	294		279	
Insufficient data	75		90	
Total	369		369	

Emergency care

Table 3.36 Detail of missing information from treatment and monitoring plans

Treatment plan	Number of patients (n=117)	%
Oxygen	59	50.4
Fluids	39	33.3
Antibiotics	44	37.6
Others	21	17.9
Monitoring plan	Number of patients (n=136)	%
Urine output	106	77.9
Early warning score	75	55.1
Other	20	14.7

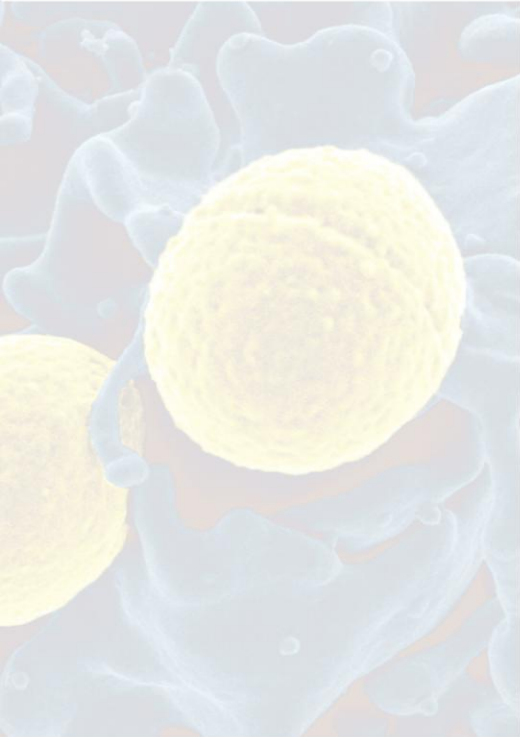
Answers may be multiple

Emergency care

Table 3.35 Areas needing improvement in the initial assessment

Room for improvement	Number of patients	%
History taking	4	1.1
Investigations	95	25.7
Treatment plan	117	31.7
Monitoring plan	136	36.9

Answers may be multiple n=369



Inpatient care

Alex Goodwin

Inpatient care

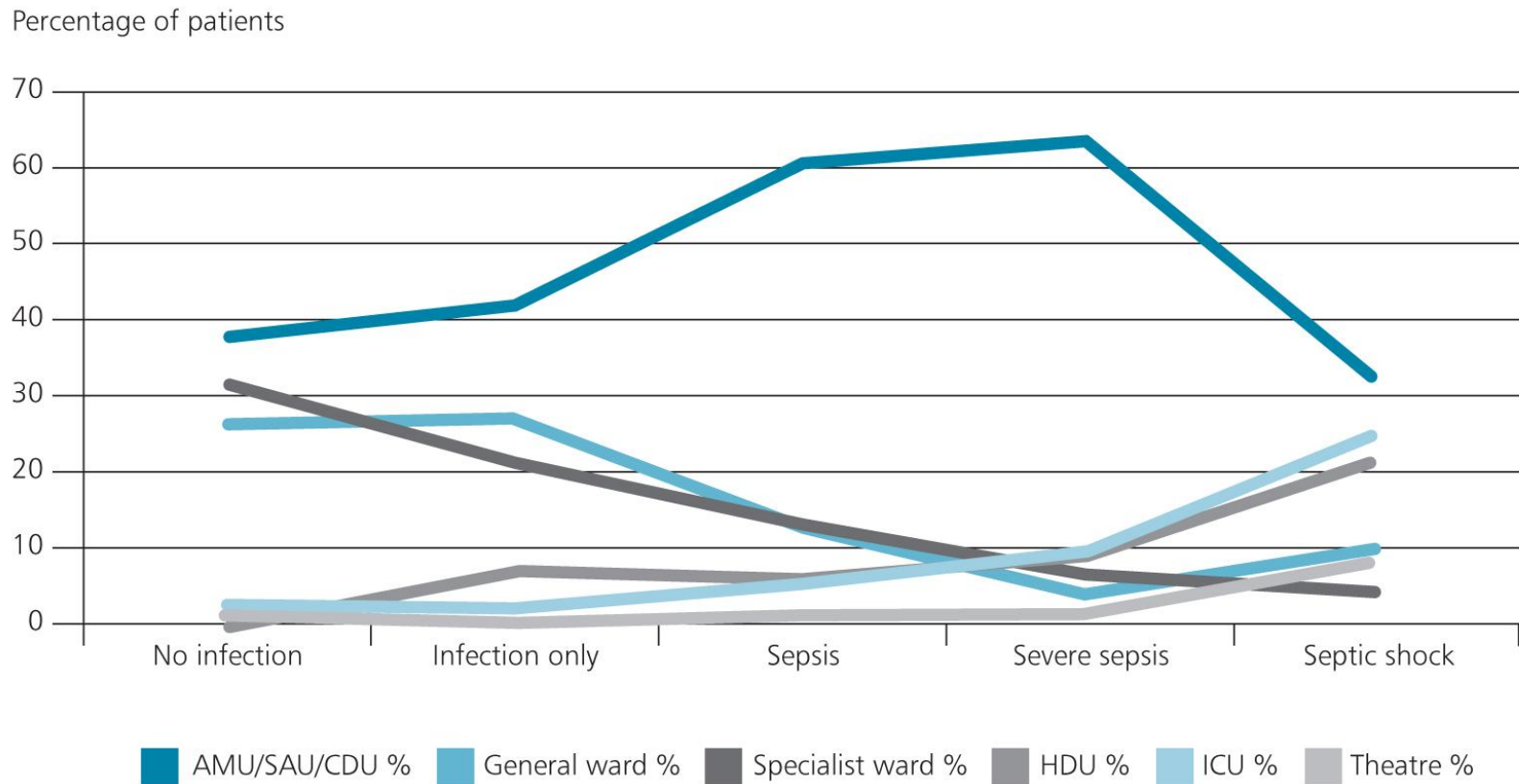


Figure 4.3 Location admitted to and severity of sepsis

Correct location according to Reviewers in 93%

Inpatient care

Admission to ward delayed in 49/361 (13.9%)

Table 4.5 Reason for delay to admit to a ward – Reviewers' opinion

Reason admission to ward was delayed	Number of patients
Lack of beds	16
Delays in the emergency department	8
Portering delay	2
Clinical reason	2
Delayed investigations	1
Lack of staff	1
Subtotal	30
Not answered	19
Total	49

Inpatient care

**Table 4.8 Time from admission to consultant review
– Clinician questionnaire**

Time from admission to consultant review	Number of patients	%
Negative time - seen in the emergency department before admission	42	7.4
0-1 hours	80	14.0
>1-4 hours	107	18.7
>4-6 hours	69	12.1
>6-8 hours	48	8.4
>8-12 hours	88	15.4
>12-14 hours	21	3.7
>14-24 hours	86	15.1
>24 hours	30	5.3
Subtotal	571	
Missing data	139	
Total	710	

20.4% > 14 hours

17.9% consultant review delayed according to Reviewers

Inpatient care

Changes made following consultant review in 281/457 (61.5%)

Table 4.10 Changes made to patient care following a consultant review – Reviewers' opinion

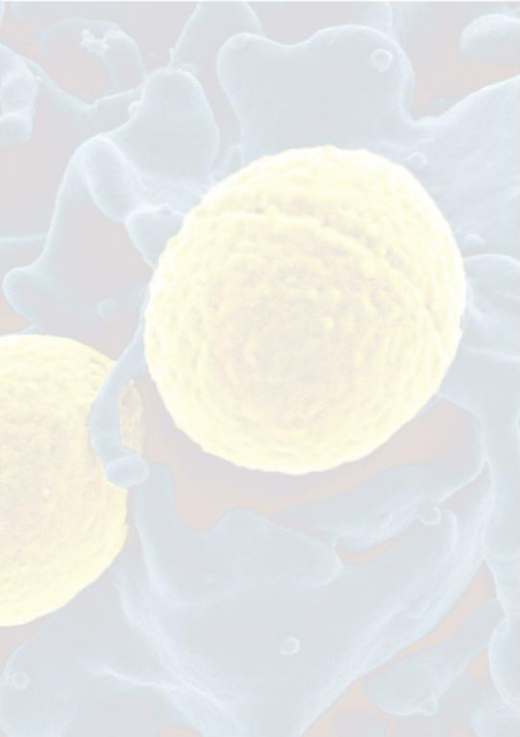
Changes made	Number of patients	%
Diagnosis of sepsis	38	13.5
Documentation of diagnosis of sepsis	34	12.1
Documentation of severity of sepsis	22	7.8
Investigations	154	54.8
Other	62	22.1
Treatment plan	185	65.8
Starting care bundle	7	2.5
Monitoring plan	76	27.0

Answers may be multiple n=281

CASE STUDY 4

An elderly patient was admitted to a small district general hospital with abdominal pain and vomiting. The patient was diagnosed with gallstone pancreatitis and was given antibiotics and supportive treatment. The inpatient notes for the admission were poor and there was no evidence of senior input. After two weeks the patient was transferred to a tertiary unit with a necrotic pancreas for percutaneous drainage of a peripancreatic collection. Over the next two weeks the patient's condition slowly deteriorated and the patient died.

The Reviewers were of the opinion that there had been inadequate senior review, there was no clear management plan and that initial fluid resuscitation had been inadequate. Earlier structured treatment may have produced a better outcome.



Hospital-acquired infection

Alex Goodwin

Inpatient care - source of infection

Table 5.1 Patient developed the infection that caused the episode of sepsis whilst in hospital – Reviewers' opinion

Hospital-acquired infection	Number of patients	%
Yes	115	23.1
No	383	76.9
Subtotal	498	
Not answered	53	
Total	551	

Inpatient care

Table 5.2 Source of the hospital-acquired infection

Source of infection	Number of patients
Chest infection/hospital-acquired pneumonia/aspiration pneumonia	38
Directly related to a procedure	30
Related to the post-op care following a procedure	10
Catheter	8

*Answers may be multiple,
n=115*

Inpatient care

Table 5.5 Evidence that a surgical site bundle was used

Evidence of surgical site bundle	Number of patients
Yes	30
No	9
Subtotal	39
Insufficient data	34
Total	73

CASE STUDY 6

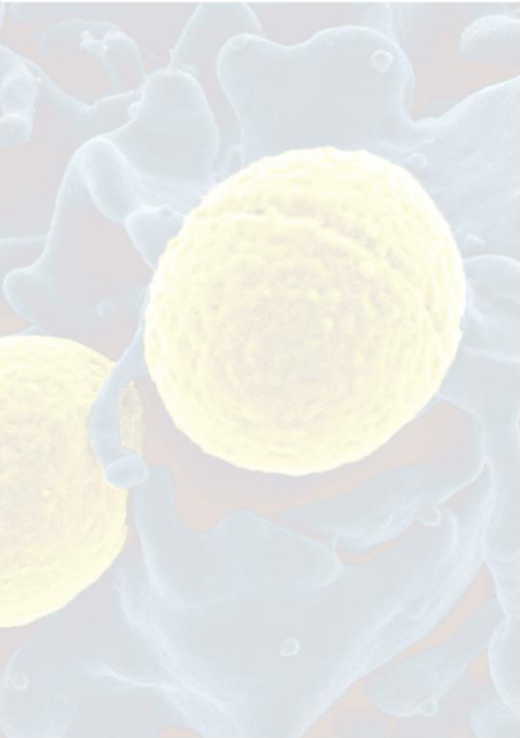
A patient developed a hospital-acquired pneumonia following a laparotomy for bowel obstruction. Although there was prompt identification of the pneumonia, key microbiological investigations and arterial blood gases were omitted. There was also no mention of triggering the sepsis pathway or utilising a care bundle. Sepsis was diagnosed by the Critical Care Outreach Team 12 hours later. The patient died one day later.

The Reviewers were of the opinion that had a diagnosis of sepsis been considered and documented the patient's care might have been more comprehensive and quicker.

Inpatient care

Table 5.7 Preventable hospital-acquired infection – Reviewers' opinion

Preventable infection	Number of patients	%
Yes	10	11.4
No	78	88.6
Subtotal	88	
Insufficient data	27	
Total	115	



Diagnosis

Alex Goodwin

Inpatient care

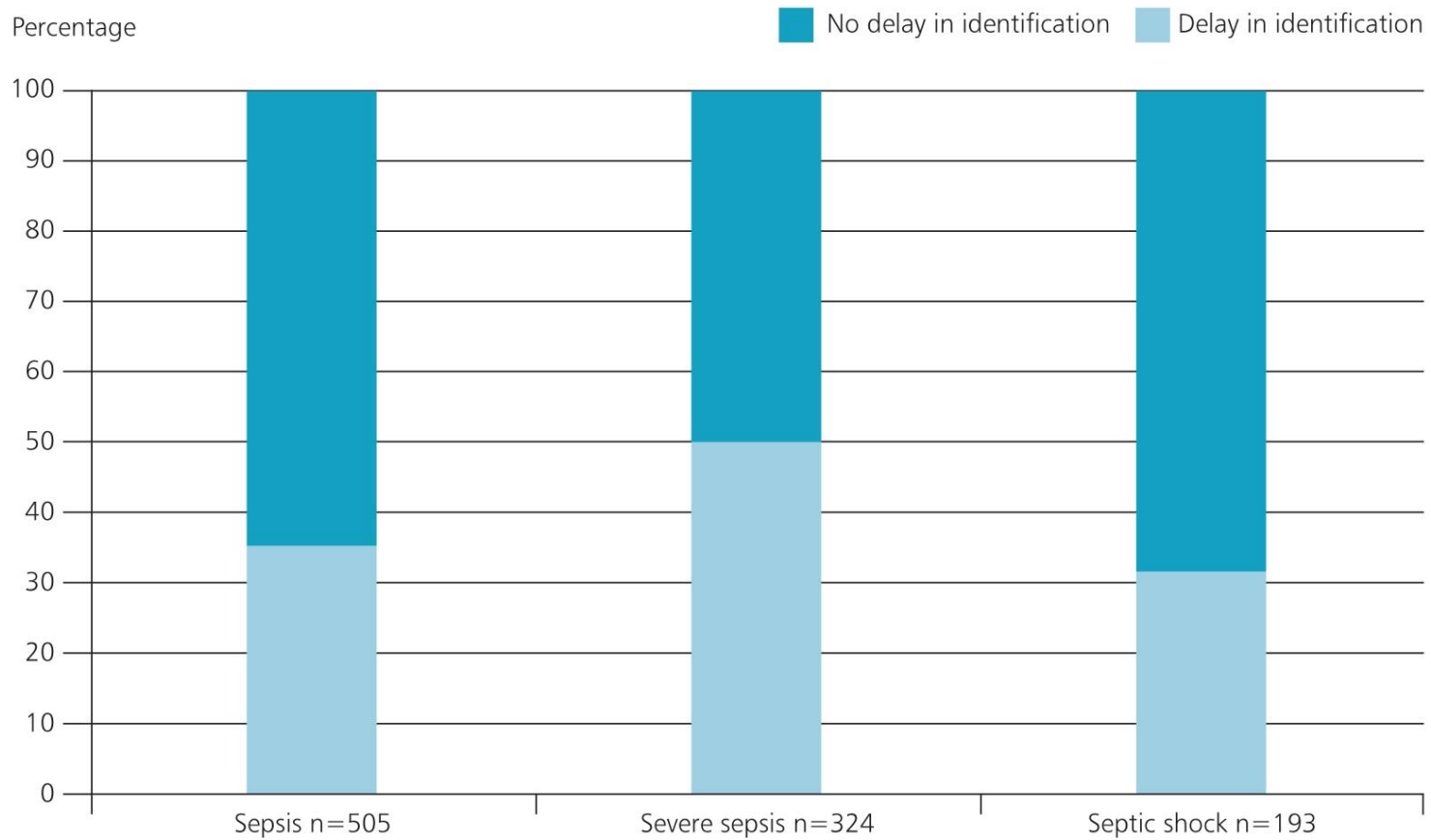


Figure 6.1 Delay in identifying sepsis, severe sepsis and septic shock – Reviewers' opinion

Inpatient care

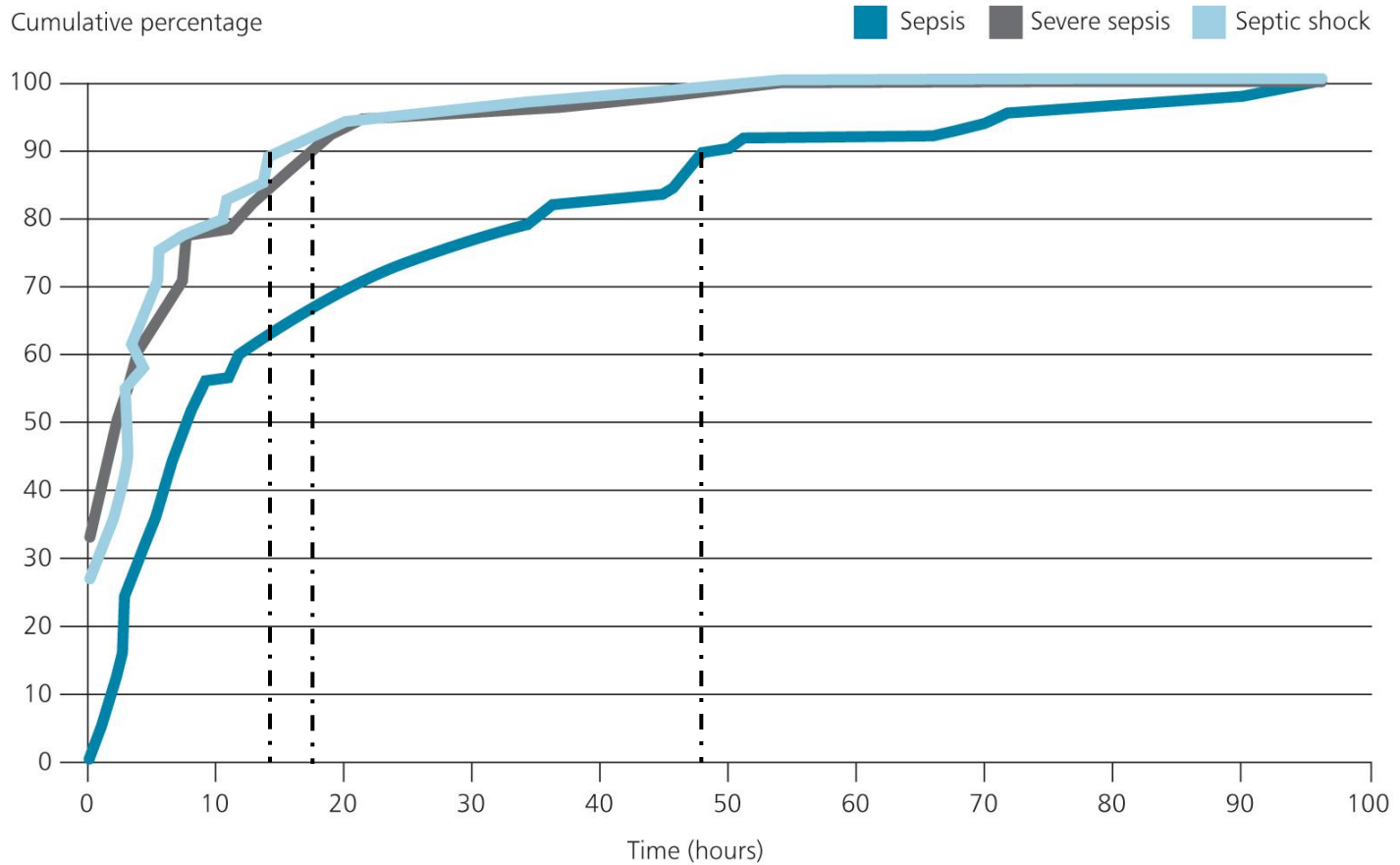


Figure 6.2 Cumulative percentage of time delay in diagnosing sepsis, severe sepsis and septic shock

Inpatient care

Table 6.2 Reason for the delay in diagnosis of sepsis

Reason for delay in diagnosis:	Sepsis: Number of patients	%	Severe sepsis: Number of patients	%	Septic shock: Number of patients	%
Incorrect calculation of early warning score	3	1.7	1	0.6	0	0
Missed by reviewing clinician	97	55.4	105	66.0	36	62.1
Lack of senior review	18	10.3	10	6.3	6	10.3
Insufficient frequency of clinical review	7	4.0	5	3.1	4	6.9
Insufficient monitoring/investigations	6	3.4	9	5.7	0	0
Other	44	25.1	29	18.2	12	20.7
Subtotal	175		159		58	
Not answered	7		8		5	
Total	182		167		63	

Inpatient care

Table 6.3 Use of sepsis screening tool to diagnose sepsis

Diagnosis made using	Number of patients	%
Sepsis screening tool	62	12.9
Other track & trigger tool	15	3.1
National early warning score (NEWS)	51	10.6
None of the above - clinical signs only	351	73.3
Subtotal	479	
Insufficient data	72	
Total	551	

128/479 (26%) used screening tool/ EWS

CASE STUDY 7

An elderly patient was admitted to hospital following a minor trauma and developed a large retroperitoneal haematoma. The patient was on warfarin for atrial fibrillation and it was subsequently found that their INR was >8 . Whilst in hospital the patient developed a hospital-acquired pneumonia. The patient became hypotensive and oliguric and it was 24 hours before any recognition of their condition was acknowledged. Documentation was poor and sepsis was not mentioned in the case notes despite clear evidence from physiological observations and blood results that this patient had severe sepsis. Despite the delay in recognition and treatment the patient was discharged home from hospital, but with significant cognitive impairment.

The Reviewers commented on the delay in recognition, poor documentation and failure to mention the word 'sepsis'. They considered that the clinical care could have been greatly improved.

Inpatient care

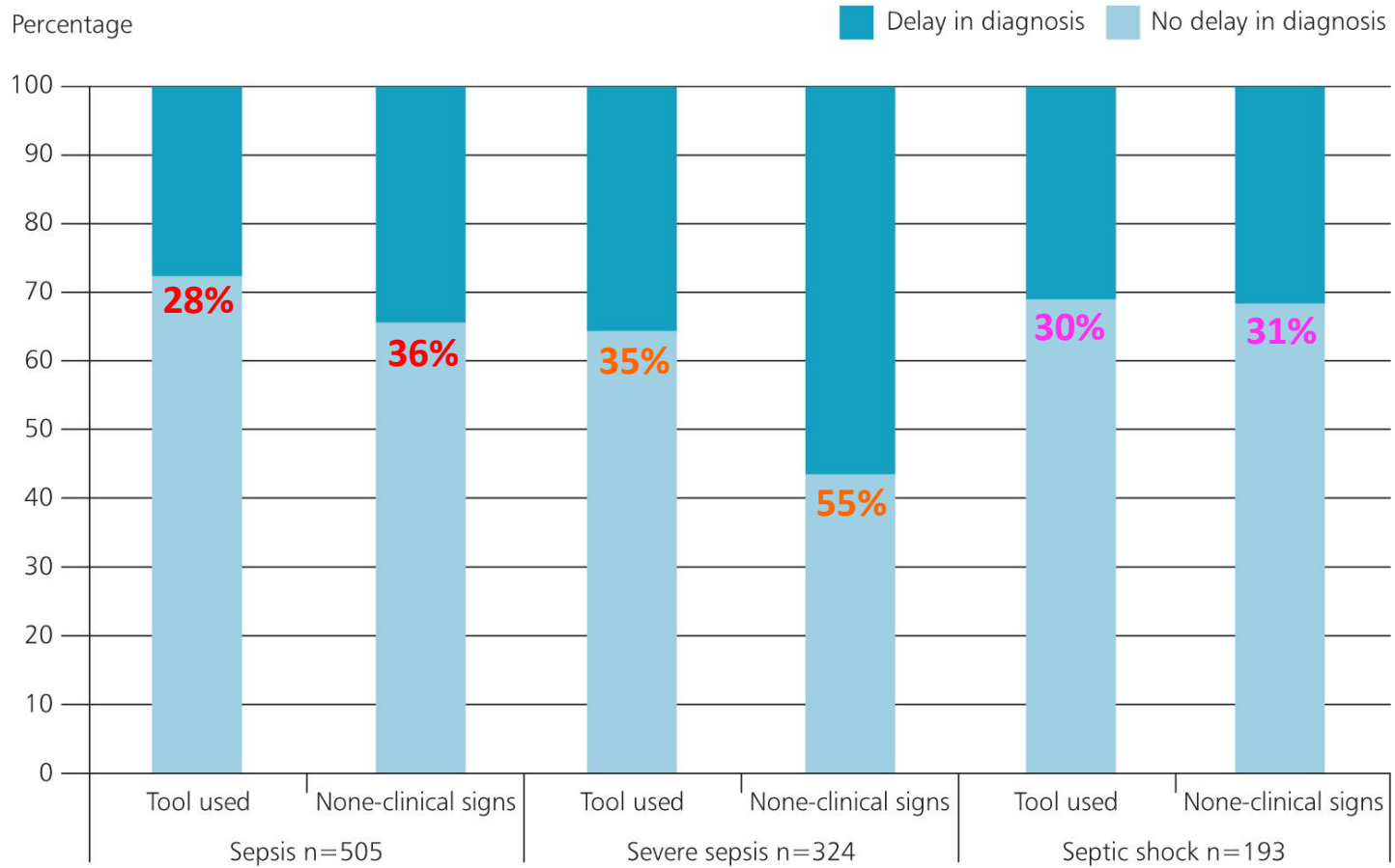


Figure 6.4 Effect of using a screening tool on the delay in diagnosis of sepsis

Inpatient care

Table 6.4 Documentation of 'sepsis' in the case notes – Reviewers' opinion

Sepsis documentation	Number of patients	%
Good	152	29.0
Adequate	212	40.5
Poor	160	30.5
Subtotal	524	
Insufficient data	27	
Total	551	

Inpatient care

Blood cultures taken in 366/477 (77%)
fluid cultures in 48, tissue cultures in 43

Table 6.8 Delay in blood cultures being taken – Reviewers' opinion

Delay in blood cultures	Number of patients	%
Yes	52	17.4
No	246	82.6
Subtotal	298	
Insufficient data	68	
Total	366	

Inpatient care

Blood gases taken in 375/509 (74%)

Table 6.11 Time frame for taking blood gases

Hours	Number of patients	%
Immediately	132	52.0
within 1 hour	69	27.2
>1-4 hours	24	9.4
>4-8 hours	8	3.1
>8-12 hours	10	3.9
>12-24 hours	6	2.4
>24 hours	5	2.0
Subtotal	254	
Not answered	121	
Total	375	

Inpatient care

Table 6.12 Investigations carried out

Investigations carried out	Number of patients	%
Full blood count	490	93.9
Urea and electrolytes	491	94.1
Liver function tests	388	74.3
Amylase	114	21.8
CRP	396	75.9
Ultrasound	29	5.6
Urine analysis	234	44.8
CT scan	101	19.3
Lactate	322	61.7
Estimated glomerular filtration rate	174	33.3
Chest X-ray	364	69.7
Coagulation screening	230	44.1
Other	48	9.2

Answers may be multiple n=522

Inpatient care

Table 7.2 Timely escalation/commencement of treatment – Reviewers' opinion

Timely escalation/ commencement of treatment	Number of patients	%
Yes	406	80.6
No	98	19.4
Subtotal	504	
Insufficient data	47	
Total	551	

Where not timely, patient deteriorated in 51
Outcome affected in 20

Inpatient care

Table 7.8 Principal reasons for room for improvement in fluid management

Reason	Number of patients	%
Documentation of fluid balance	95	51.6
Delay in commencing fluid resuscitation	71	38.6
Monitoring-frequency/type	58	31.5
Type of fluid	20	10.9
Too slow rate of IV fluids	13	7.1
Delay commencing vasopressors	11	6.0
Overloading with fluids	5	2.7
Catheterisation	5	2.7
Other documentation	5	2.7
Blood products	3	1.6
Lack of planning for fluid management	3	1.6
Other	41	22.3

Answers may be multiple n=184; 19 not answered

Room for improvement in fluid management in 203/447 cases

Inpatient care

Table 7.12 Presumed source of infection – Clinician questionnaire

Infection	Number of patients	%
Respiratory tract	297	42.8
Urinary tract	168	24.2
Acute abdominal/upper gastrointestinal tract	127	18.3
Skin/soft tissue	65	9.4
Post operative	43	6.2
Intracranial/ear, nose and throat	21	3.0
Perianal/ischio-rectal/ lower gastrointestinal tract	17	2.4
Bone/joint	11	1.6
Endocarditis	9	1.3
Implantable device	8	1.2
Gynaecological/sexually transmitted infection	7	1.0
Other	41	5.9

Answers may be multiple n=694; not answered in 16

Pathogen identified in 198/481 (41%)

Inpatient care

Table 7.15 Time delay for administration of antimicrobials

Time first dose of antimicrobials given from first diagnosis of sepsis	Number of patients	%
<30 minutes	118	32.7
>30 mins - < 1 hour	108	29.9
>1 hour - < 2 hours	70	19.4
>2 hours - < 6 hours	43	11.9
>6 hours - < 12 hours	17	4.7
> 12 hours	5	1.4
Subtotal	361	
Time antimicrobials administered not documented	100	
Time sepsis diagnosed not documented	32	
Neither time documented	7	
Not applicable - already on antimicrobials	33	
Not applicable - antimicrobials not given	1	
Insufficient data	17	
Total	551	

Inpatient care

Table 7.17 Avoidable delay in administering antimicrobial – Reviewers' opinion

Avoidable delay	Number of patients	%
Yes	114	29.2
No	277	70.8
Subtotal	391	
Insufficient data	160	
Total	551	

Outcome affected in 43 cases

Inpatient care

- Reviewers: patient started on sepsis care bundle following diagnosis: 135/434 (31%)
- Clinician questionnaire: 207/318 (39%)

Inpatient care

	With care bundle	Without care bundle
Delay in escalation	9%	26%
Delay in administration of administration of antimicrobials	18.5%	38%
Fluids delayed/ not received	13%	23%
Oxygen delayed / not received	5%	15%
Investigation of source of infection	10%	28%
Blood cultures not taken	60%	79.5%
Less than good documentation of sepsis	19%	33%
Blood gases not taken	19%	33%

Inpatient Care (organisational data)

- 224/226 (99%) acute hospitals had an antimicrobial policy
- 139/204 (68%) daily microbiology ward rounds on ICU
- 20/194 (10%) daily microbiology ward rounds on general medical wards
- 13/196 (7%) daily microbiology ward rounds on general surgical wards

Inpatient care

Table 7.22 How the antimicrobial was chosen

Antimicrobial choice	Number of patients	%
According to local hospital policy	191	36.0
Previous culture results	25	4.7
Based on site of infection	121	22.8
Administered broad spectrum antibiotics	128	24.1
Rationale not documented	181	34.1
Other	33	6.2

Appropriate antimicrobial in 472/571(91%)

Correct dose in 405/414 (98%)

Inpatient care

Table 7.25 Consultation with a microbiologist

Consultation with a microbiologist	Number of patients	%
Yes	244	51.8
No	227	48.2
Subtotal	471	
Insufficient data	80	
Total	551	

Regular review of antimicrobial therapy in 317/404 (78.5%)

Inpatient care

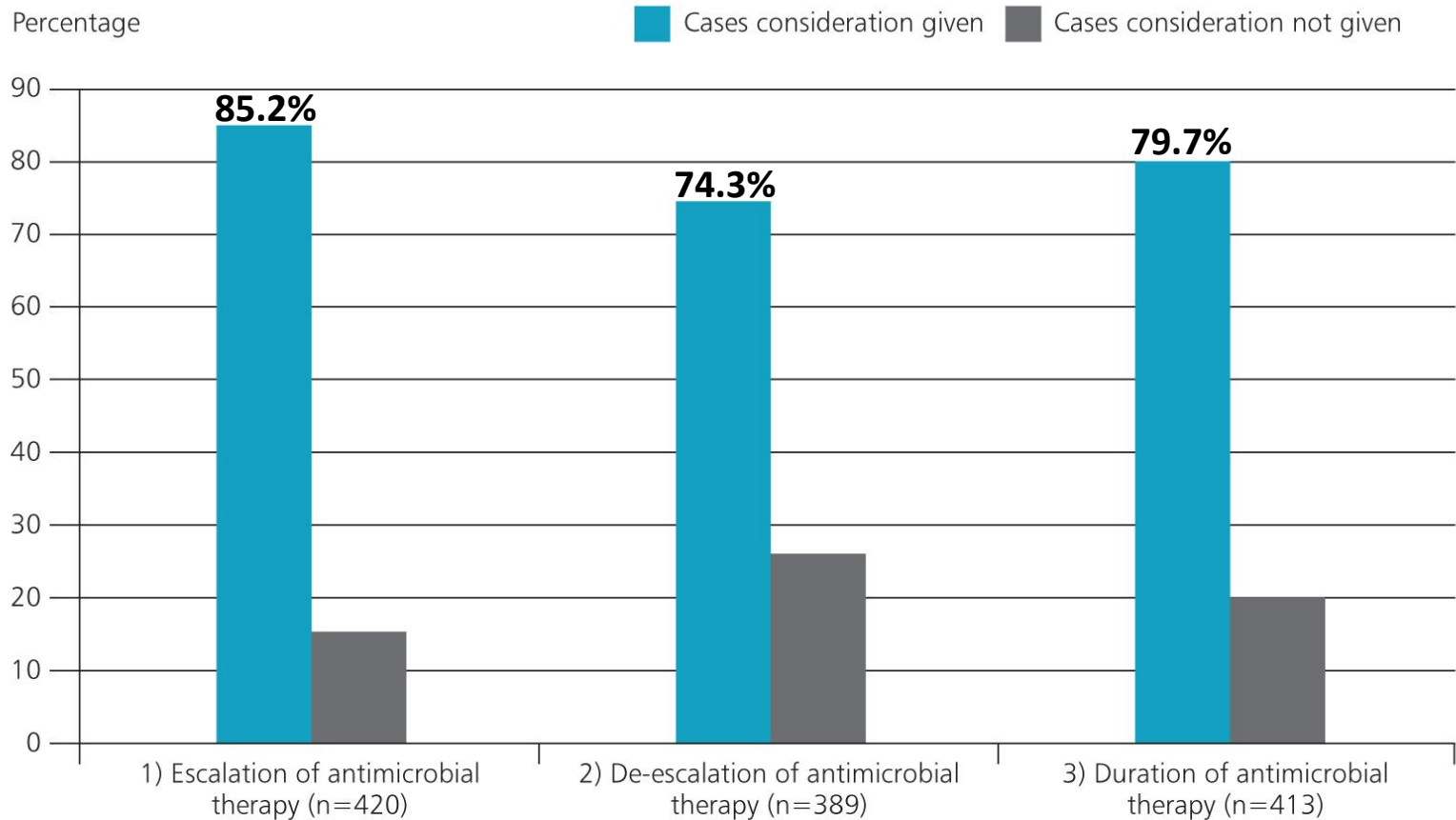


Figure 7.4 Details of antimicrobial therapy considered

Inpatient care

- Opinion of treating clinician
 - Investigations to identify source omitted/delayed:
80/649 (12.3%)
- Reviewer opinion
 - Investigations to identify source delayed:
101/505 (20%)
 - Investigations to identify source omitted:
113/495 (23%)

Inpatient care

- Source of sepsis identified in 434/493 (88%)
- Identified in appropriate timeframe in 340/421 (80%)

Emergency care

Comparison in identification of source

Table 3.33 Likely source of infection was documented

Likely source of infection was documented	Triage	%	Review	%
Yes	148	46.1	227	78.0
No	173	53.9	64	22.0
Subtotal	321		291	
Insufficient data	48		78	
Total	369		369	

Inpatient care

Table 7.33 Procedure performed to control the source of infection

Procedure performed	Number of patients	%
Laparotomy +/- wash out	35	25.5
Abscess drainage under interventional radiology	8	5.8
Chest drain	7	5.1
Nephrostomy	7	5.1
Catheter irrigation/replacement	6	4.4
Laparoscopy and wash out	5	3.6
Endoscopic retrograde cholangiopancreatography (ERCP)	4	2.9
Line/peg replacement	4	2.9
Amputation	3	2.2
Joint debridement/washout	3	2.2
Gallbladder drainage	3	2.2
Ventricular drain	2	1.5
Other	8	5.8

Answers may be multiple n=137

Inpatient care

Table 7.34 Delay in source control – Reviewers' opinion

Delay	Number of patients	%
Yes	55	42.6
No	74	57.4
Subtotal	129	
Insufficient data	8	
Total	137	

Inpatient care

Table 7.35 Reasons for delay in controlling the source of infection – Reviewers' opinion

Reason for delay	Number of patients
Patient too unwell to tolerate surgery	7
Lack of beds	2
Out of hours/weekend	4
Delay in investigations	15
Lack of available staff	7
Delay in identifying source	16
Lack of specialist	5
Patient reasons - refusal, consent	3
Next scheduled list	2
Reason not documented	4

Answers may be multiple n=137

Inpatient care

Table 7.36 Delay in source control affected the outcome – Reviewers' opinion

Outcome affected	Number of patients
Yes	33
No	14
Subtotal	47
Insufficient data	8
Total	55

Inpatient Care (Organisational data)

Table 2.21 Hospital had a care bundle for source isolation/control

Care bundle for source control	Yes	No	Subtotal
District General Hospital (DGH) ≤ 500 beds	16	71	87
District General Hospital (DGH) > 500 beds	8	44	52
University Teaching Hospital (UTH)	8	37	45
Tertiary specialist centre (TSC) – stand alone	5	17	22
Independent Hospital (IH)	12	28	40
Community or Cottage Hospital (CH)	31	68	99
Peripheral Hospital (PH)	1	3	4
Rehabilitation Hospital (RH)	1	7	8
Total	82 (23%)	275 (77%)	357

CASE STUDY 8

An elderly patient with prostate cancer was admitted with a urinary tract infection and signs of sepsis. The diagnosis of sepsis due to perinephric abscess was made and within one hour the patient had undergone appropriate imaging and 90 minutes after the imaging the patient underwent a percutaneous nephrostomy. The patient was discharged from hospital 9 days later.

The Reviewers considered that this demonstrated the value of early source control in sepsis.

Inpatient care

- Room for improvement in initial management in 292/551 (53%)

Inpatient care

Table 7.41 Reasons for room for improvement in the initial management of patients – Reviewers' opinion

	Listed reason for room for improvement					If YES - outcome affected					
	Yes	Yes %	No	Subtotal	ID	Outcome affected	Outcome affected %	No	Subtotal	ID	Total
Failure to adhere to sepsis 6 pathway	201	76.4	62	263	29	116	67.1	57	173	28	292
Documentation	183	69.6	80	263	29	58	39.7	88	146	37	292
Delay in diagnosis of sepsis	173	65.8	90	263	29	107	66.9	53	160	13	292
Communication with patient/relatives	137	53.9	117	254	38	25	21.0	94	119	18	292
Inadequacies in review	129	51.4	122	251	41	84	73.7	30	114	15	292
Inadequacies in monitoring	99	39.6	151	250	42	99	39.6	151	250	15	292
Delay in diagnosis of infection	92	35.9	164	256	36	59	71.1	24	83	9	292
Failure to deal with source of infection within acceptable timeframe	78	31.7	168	246	46	55	87.3	8	63	15	292
Other	51	64.6	28	79	213	19	70.4	8	27	24	292

ID = insufficient data

Inpatient care

Table 7.46 Critical Care Outreach Team arrived promptly following contact with them – Reviewers' opinion

Prompt arrival	Number of patients	%
Yes	237	88.8
No	30	11.2
Subtotal	267	
Not applicable	13	
Insufficient data	126	
Total	406	

Inpatient care

278 referred to critical care

Table 7.49 Timely response from critical care

Timely response	Number of patients	%
Yes	222	93.3
No	16	6.7
Subtotal	238	
Insufficient data	40	
Total	278	

CASE STUDY 9

An elderly patient with a history of ischaemic heart disease, hypertension and 40 years of smoking was admitted with pneumonia and acute kidney injury. A diagnosis of pneumonia and sepsis was made in the emergency department. The patient was put on a sepsis pathway and transferred to critical care. Within 30 minutes of arriving in hospital the 'sepsis six' had been completed. Relatives were informed of the patient's condition and escalation of care discussed. The patient required ventilatory support for three days in critical care. The patient made a full recovery and was discharged from hospital 10 days later.

The Reviewers considered that this patient had received prompt care that was at a standard that should be expected for all patients. The relatives were kept informed throughout the admission and the severity of the sepsis was identified early and documented clearly in the case notes.

Inpatient care

Table 8.12 Complications present at discharge

Complications	Number of patients	%
Yes	71	21.5
No	260	78.5
Subtotal	331	
Insufficient data	60	
Total	391	

Inpatient care

Table 8.13 List of complications present at discharge

Complications at discharge	Number of patients	%
Worsened physical function	38	53.5
Worsened cognitive state	14	19.7
Kidney injury/ impaired kidney function	10	14.1
Post-sepsis syndrome	4	5.6

Answers may be multiple; n=71

Inpatient care

Table 8.14 Patient's discharge from hospital was delayed – Reviewers' opinion

Delay in discharge	Number of patients	%
Yes	68	19.3
No	284	80.7
Subtotal	352	
Insufficient data	39	
Total	391	

Delayed discharge:

28/56 less than 1 week

11/56 1-2 weeks

17/56 more than 2 weeks

Inpatient care

Table 8.5 Specialty referrals post discharge

Referrals made	Number of patients	%
Physiotherapy	138	53.5
Occupational therapy	93	36.0
Psychology	9	3.5
Specialist rehabilitation	28	10.9
Speech & language therapy	59	22.9
Other therapy	20	7.8
No referral	3	1.2
Other	37	14.3

Answers may be multiple n=258; insufficient data in 133

Inpatient care

Table 8.6 Follow-up appointment post discharge

Follow-up appointment with	Number of patients	%
Admitting physician	95	28.5
General practitioner	56	16.8
Admitting surgeon	71	21.3
No follow-up appointment	61	18.3
Intensivist who cared for the patient	2	<1
Other	80	24.0
No referral	3	<1
Other	37	11.1

Answers may be multiple n= 333; not answered in 58

Inpatient care

Table 8.10 Sepsis was mentioned on the discharge summary – Clinician questionnaire

Sepsis mentioned	Number of patients	%
Yes	264	53.9
No	226	46.1
Subtotal	490	
Not applicable - still an inpatient	10	
Not answered	210	
Total	710	

GP was informed of admission in 222/294 (75.5%)

Inpatient care

Table 8.16: Patient was readmitted

Readmitted	Number of patients	%
Yes	31	10.1
No	275	89.9
Subtotal	306	
Insufficient data	85	
Total	391	

Inpatient care

Percentage of patients

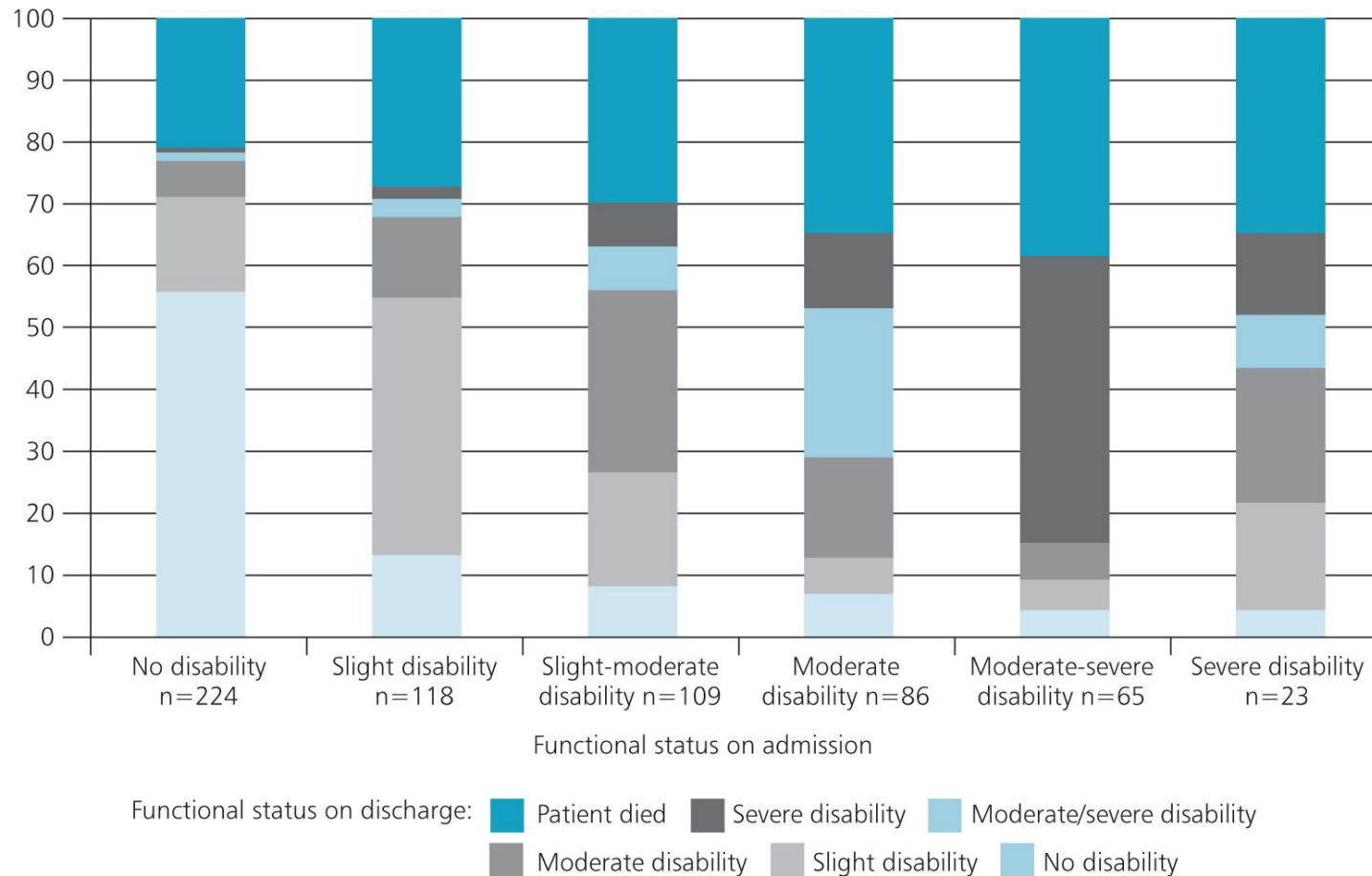


Figure 8.1 Functional status of patients at admission and at discharge – Clinician questionnaire

Inpatient care

Table 8.24 Autopsy performed

Autopsy performed	Number of patients	%
Yes	15	12.1
No	109	87.9
Subtotal	124	
Insufficient data	36	
Total	159	

Sepsis not recorded on the death certificate in 61/103 patients;
should have been in 48/61

Overall quality of care

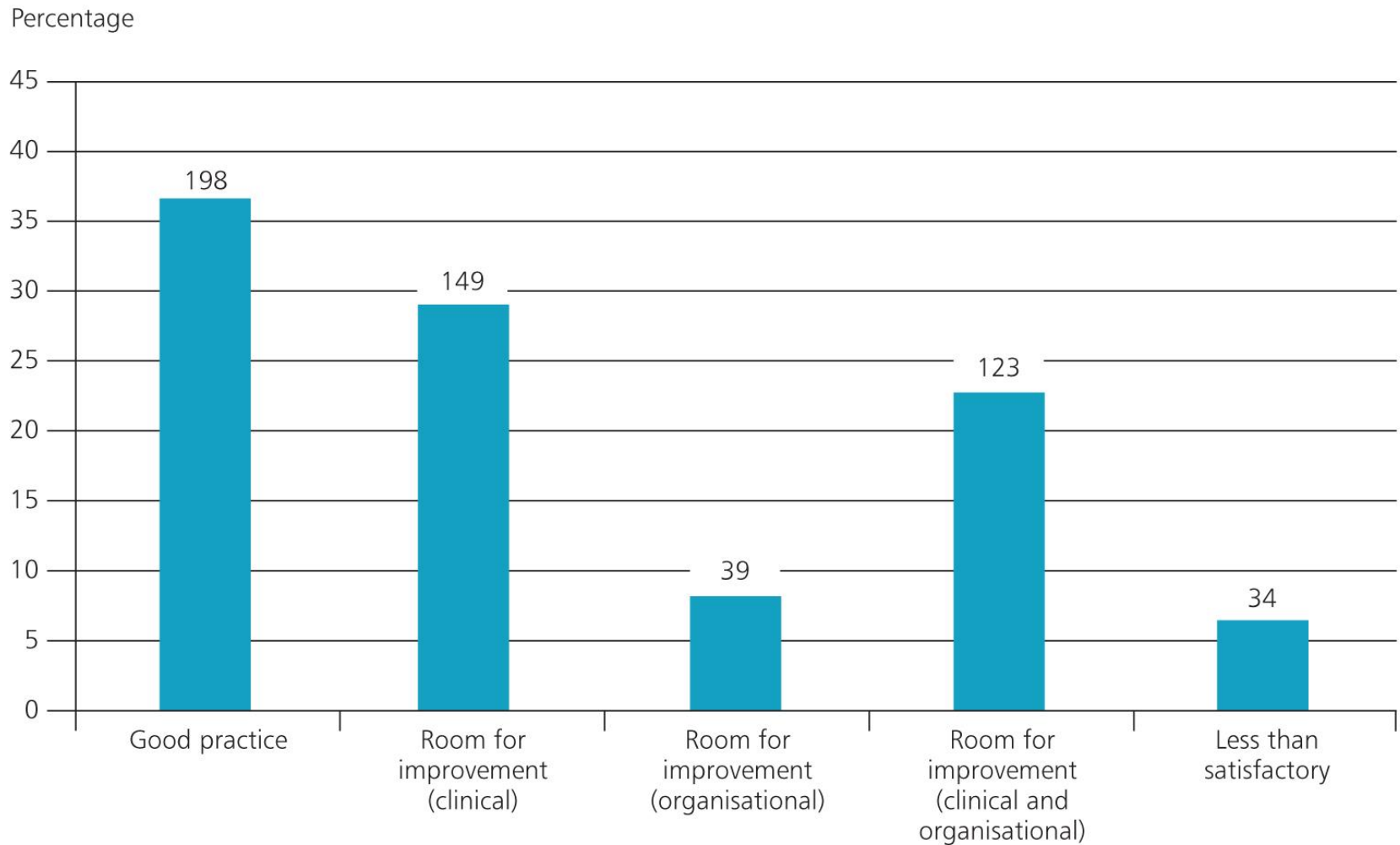


Figure 9.1 Overall quality of care

Summary

- Care less than good in 64% cases
- Identification
 - Vital signs recording
 - Use of EWS
 - Communication between primary and secondary care
- Treatment
 - Delay, Delay, Delay
 - Benefit of pathways, bundles and documentation
 - Antibiotic stewardship
- Follow up
 - Recognition of complications and appropriate treatment
 - Information

Recommendations

All hospitals should have a formal protocol for the early identification and immediate management of patients with sepsis.

The protocol should be easily available to all clinical staff, who should receive training in its use. Compliance with the protocol should be regularly audited. This protocol should be updated in line with changes to national and international guidelines and local antimicrobial policies.

Recommendations

An early warning score, such as the National Early Warning Score (NEWS) should be used in both primary care and secondary care for patients where sepsis is suspected. This will aid the recognition of the severity of sepsis and can be used to prioritise urgency of care.

Recommendations

On arrival in the emergency department a full set of vital signs, as stated in the Royal College of Emergency Medicine standards for sepsis and septic shock should be undertaken.

Recommendations

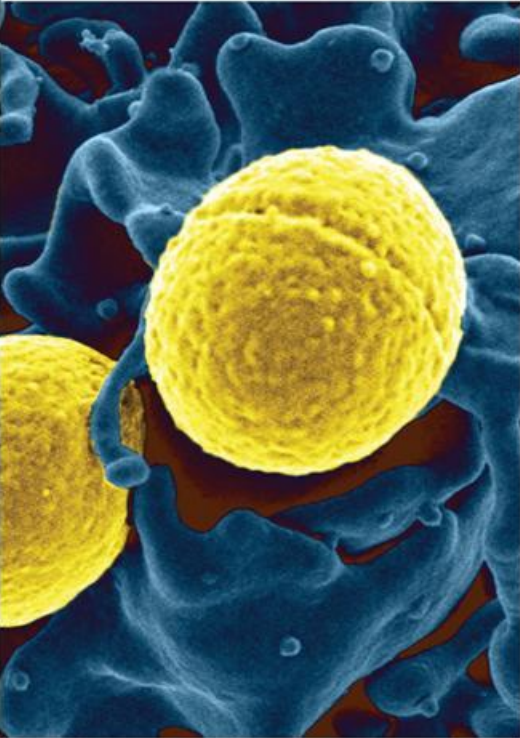
In line with previous NCEPOD and other national reports' recommendations on recognising and caring for the acutely deteriorating patients, hospitals should ensure that their staffing and resources enable:

- a. All acutely ill patients to be reviewed by a consultant within the recommended national timeframes (14 hrs post adm.)
- b. Formal arrangements for handover
- c. Access to critical care facilities if escalation is required; and
- d. Hospitals with critical care facilities to provide a Critical Care Outreach service (or equivalent) 24/7.

Recommendations

All patients diagnosed with sepsis should benefit from management on a care bundle as part of their care pathway.

The implementation of this bundle should be audited and reported on regularly. Trusts/Health Boards should aim to reach 100% compliance and this should be encouraged by local and national commissioning arrangements.



Just Say Sepsis!

A review of the process of care received
by patients with sepsis

Thank you

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