

On the Right Trach?

A review of the care received by patients who underwent a tracheostomy

@ncepod

#tracheostomy

Introduction

- Tracheostomy:
 - Remedy upper airway obstruction
 - Avoid complications of prolonged intubation
 - Protection & maintenance of airway
- The number of temporary tracheostomies has increased greatly in recent years
- Royal College of Anaesthetists, Difficult Airway Society, & the National Patient Safety Agency
- National Tracheostomy Safety Project/Global Tracheostomy Collaborative

Aim

- To explore factors surrounding the insertion and subsequent management of tracheostomies in both critical care and ward environments by:
 - Exploring (percutaneous and surgical) tracheostomy-related complications following insertion in the operating theatre or the critical care unit
 - Exploring remediable factors in the care of adult patients (aged 16 and over) undergoing the insertion of a surgical or percutaneous tracheostomy tube
 - Assessing the number and variability of percutaneous tracheostomies performed annually in the critical care unit
 - Making recommendations to improve future practice

Objectives

- Insertion of the tracheostomy
 - Indications for the tracheostomy
 - Cautions & contraindications
 - Consent
 - Delays
 - Equipment & monitoring
 - Staffing
 - Anaesthesia
- Environment in which the tracheostomy tube was inserted & cared for

Objectives

- Routine care
 - Essential equipment
 - Cuff management
 - Humidification
 - Suctioning
 - Inner cannula care
 - Swallowing
 - Oral care
 - Communication needs
- Changing tracheostomy tubes

Objectives

- Emergencies, common complications and their management
- Decannulation and long term (30 day) follow up
- Facilities
 - Staff capacity
 - Staff competency
 - Number of patients cared for
 - Training
 - Facilities available
 - Policies & procedures

Method

- Hospital participation
- Study population
 - 16+
 - 25th February – 12th May 2013
- Case identification
 - Prospective study
 - At the point of tracheostomy insertion
 - Study contact
 - Critical care
 - Theatre
 - Ward

Method

- Questionnaires
 - Insertion
 - Critical care discharge
 - Ward discharge
 - Organisational
 - Organisation of ward care

Method

- Case notes
 - Inpatient annotations (main case notes)
 - Nursing/speech and language therapy/physiotherapy notes
 - Intensive Care (Level 3)/High Dependency (Level 2) Unit notes
 - Anaesthetic records
 - Surgical/operation notes
 - Observation charts
 - Tracheostomy care records
 - Ward discharge summaries
- Time period

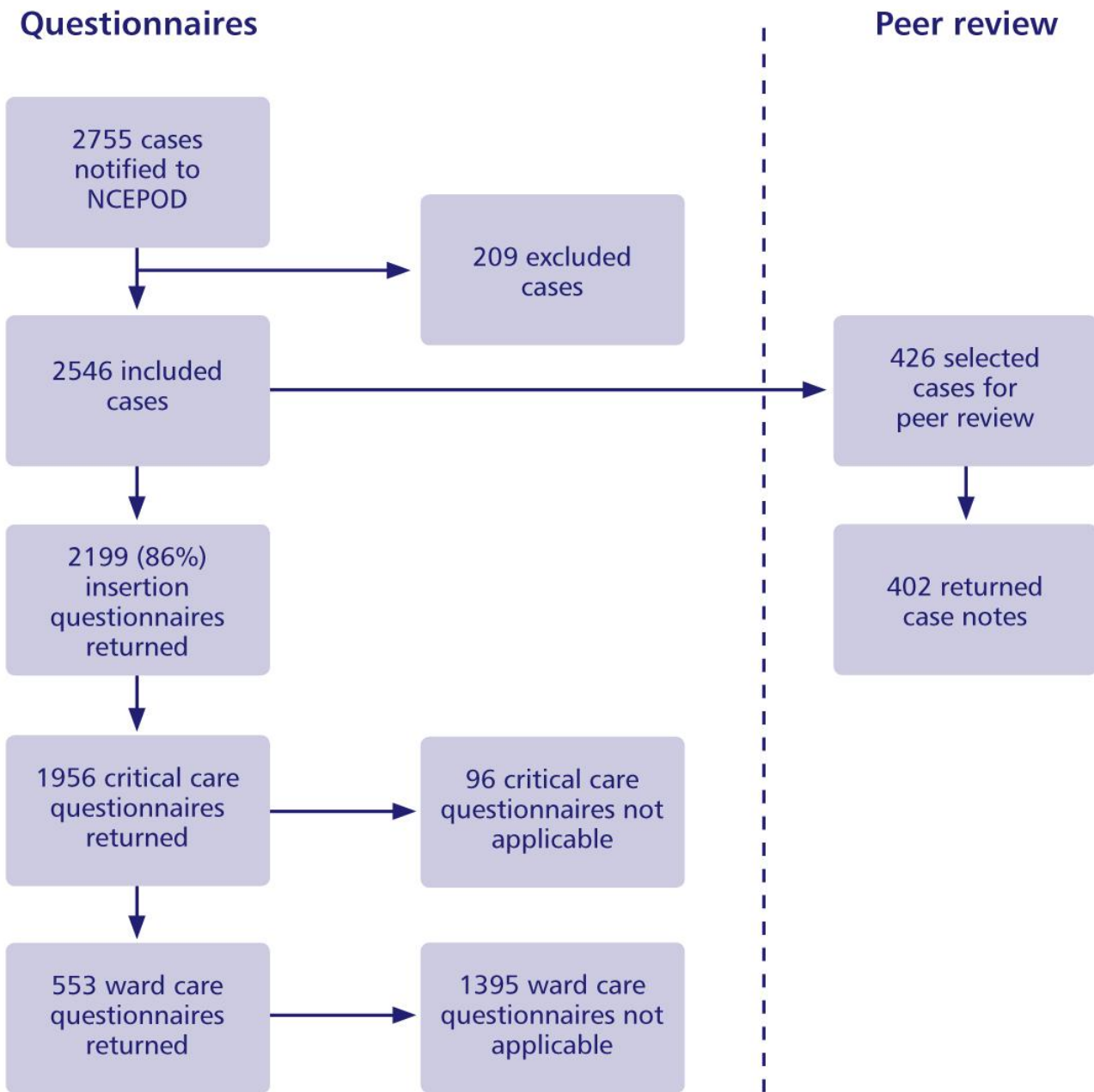


Figure 1.3 Data returns

Patient overview

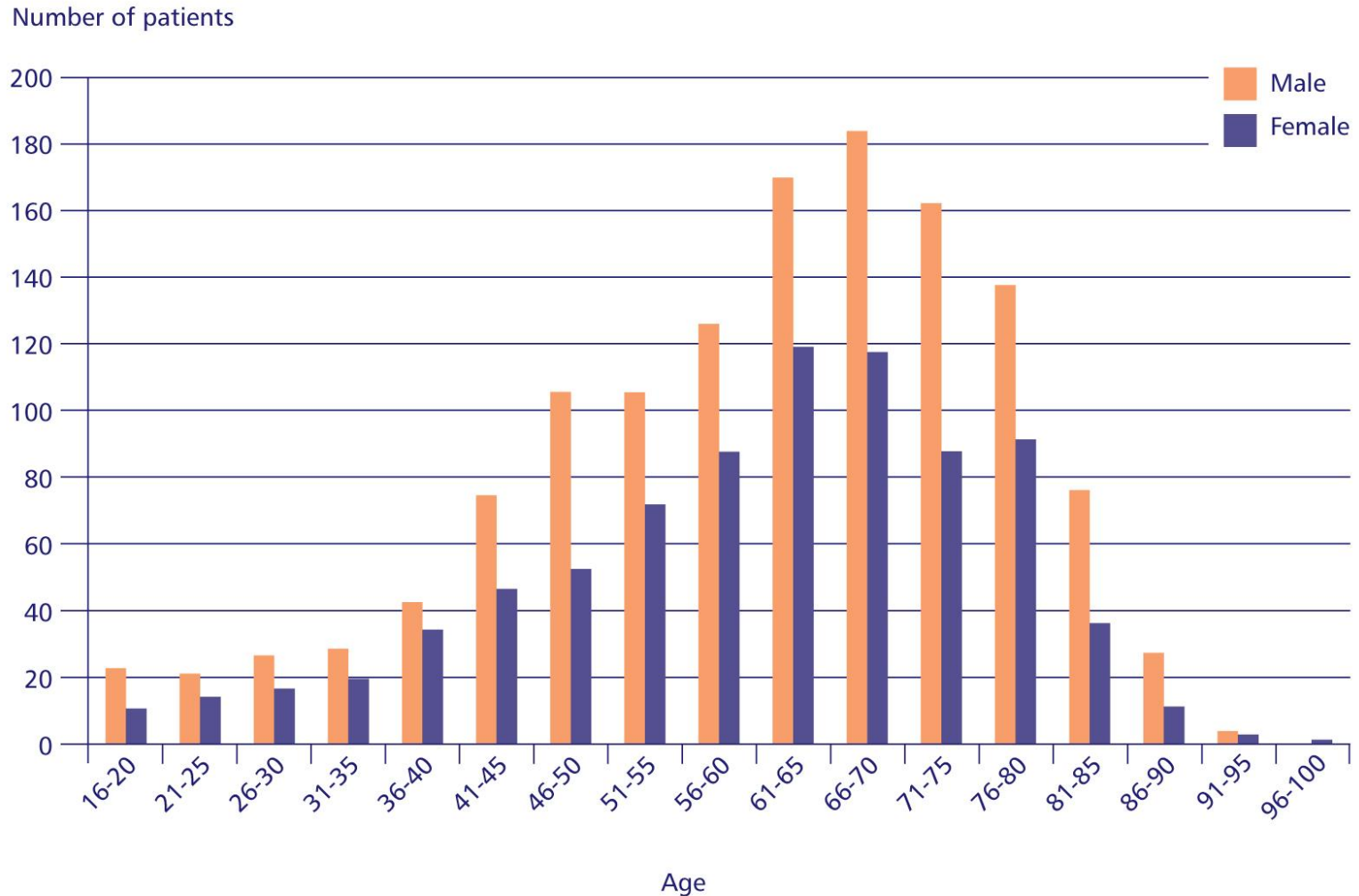


Figure 1.4 Age of patients included in the study

Patient overview

Table 1.1 Mode of insertion

	n	%
Percutaneous	1530	69.6
Surgical	669	30.4
Total	2199	

Patient overview

Table 1.3 Principal diagnosis by gender

	Male		Female		Not answered
	n	%	n	%	n
Respiratory	420	31.7	282	34.9	1
Head & Neck	163	12.3	107	13.2	0
Neurological	158	11.9	106	13.1	1
Cardiac	134	10.1	50	6.2	0
Abdominal Aortic Aneurysm	122	9.2	100	12.4	1
Trauma	109	8.2	27	3.3	0
Sepsis	74	5.6	57	7.0	0
Out of hospital cardiac arrest	42	3.2	9	1.1	0
Abdominal	27	2.0	7	<1	0
Metabolic	25	1.9	25	3.1	0
Renal failure	18	1.4	7	<1	0
Planned operation	16	1.2	12	1.5	0
Urological	12	<1	13	1.6	0
Burns	5	<1	4	<1	0
Vascular	2	<1	3	<1	0
Subtotal	1327		809		3
Not answered	31		26		3
Grand total	1358		835		6

Organisation of care

Table 2.2 Insertion of tracheostomy tube by hospital type

	Elective practice	Emergency practice	Laryngectomies
District General Hospital (<500 beds)	58	77	12
District General Hospital (\geq 500 beds)	37	49	18
University Teaching Hospital	53	57	35
Independent Hospital	4	3	1
Single Specialty Hospital	8	5	1
Other	1	3	1
Total	161	194	68

Organisation of care

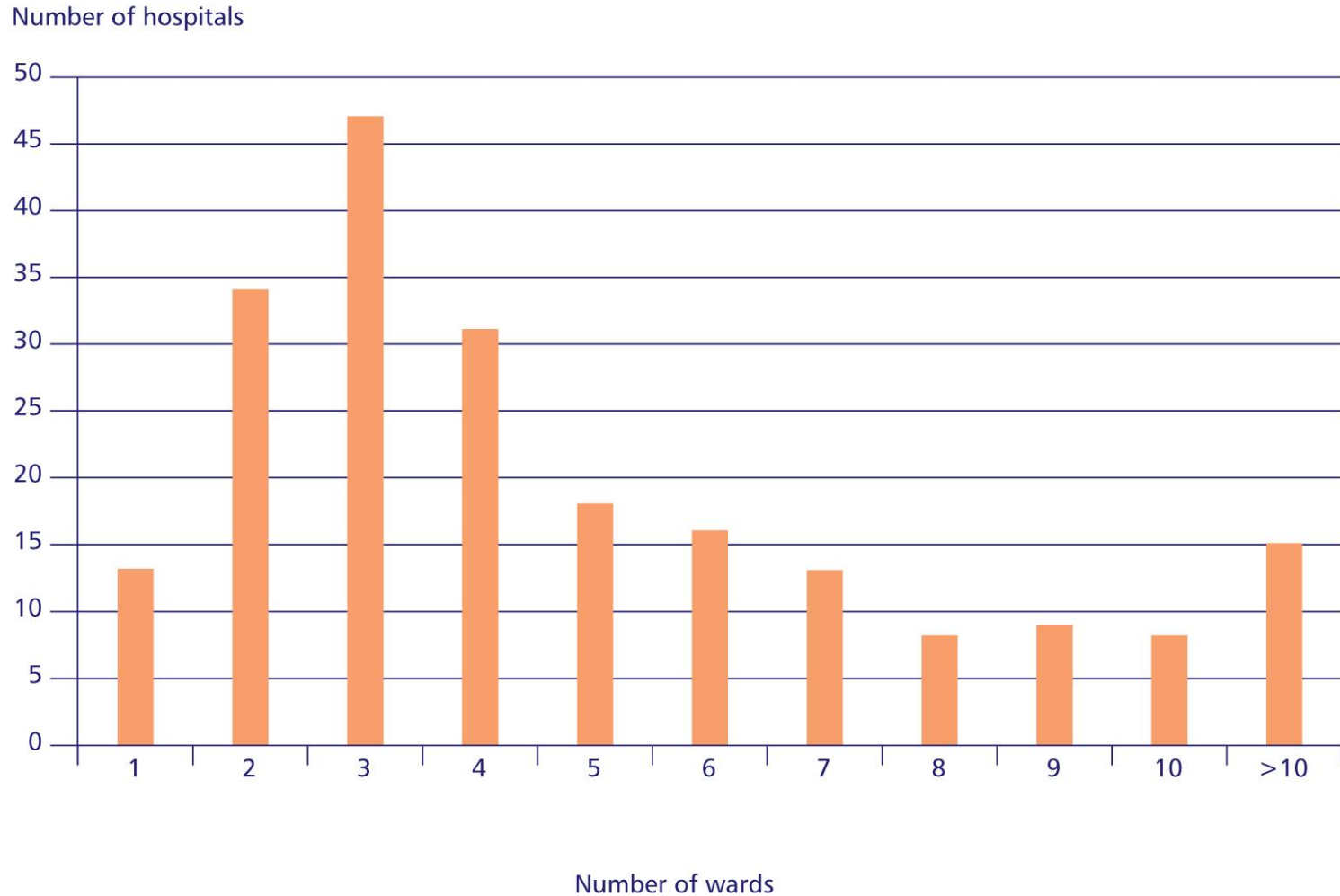


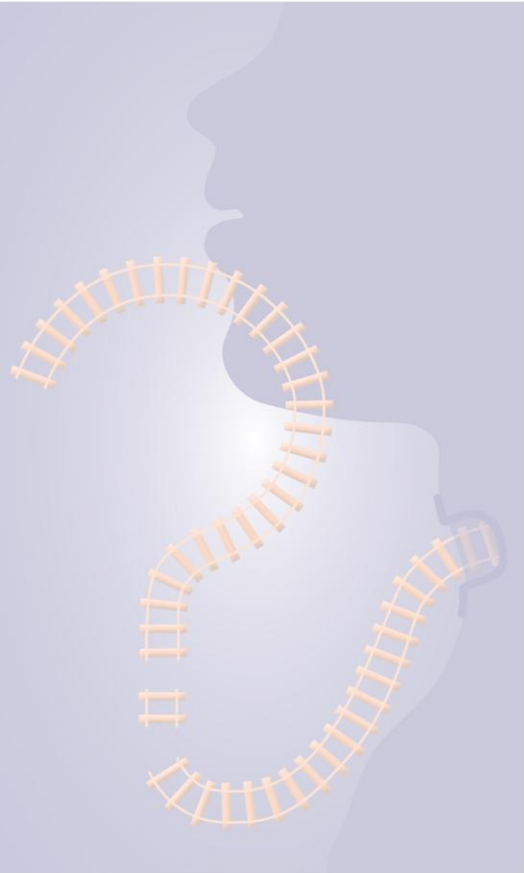
Figure 2.1 Number of wards where patients with tracheostomies may have been cared for (*hospital questionnaire*)

Number of tracheostomies

- 187/219 (85.4%) sites provided data
 - 101/186 (54.3%) estimate
 - 82/186 (44.8% actual figure)
- Range
 - 1 – 375 (average = 64)
- Critical care
 - 1 – 275 (average = 44)
- Theatre
 - 1 – 226 (average = 25)

Recommendation

- Tracheostomy insertion should be recorded and coded as an operative procedure. Data collection in all locations should be as robust as that for a theatre environment.



The insertion of tracheostomies

Urgency of admission

Table 3.3 Classification of urgency of admission to hospital

	n	%
Elective	406	18.8
Emergency	1756	81.2
Subtotal	2162	
Not answered	37	
Total	2199	

ASA prior to insertion

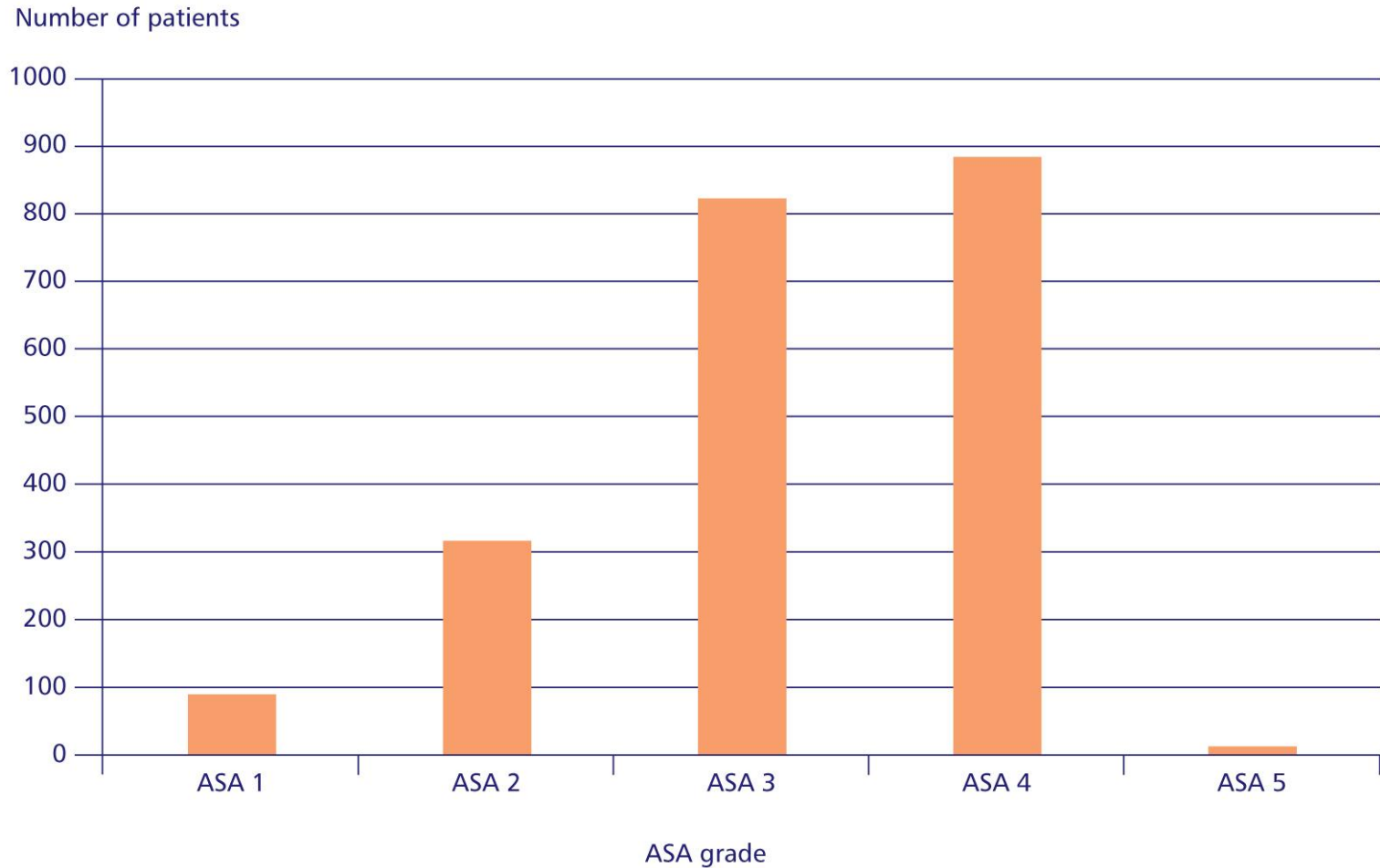


Figure 3.1 ASA status

Patients location after admission

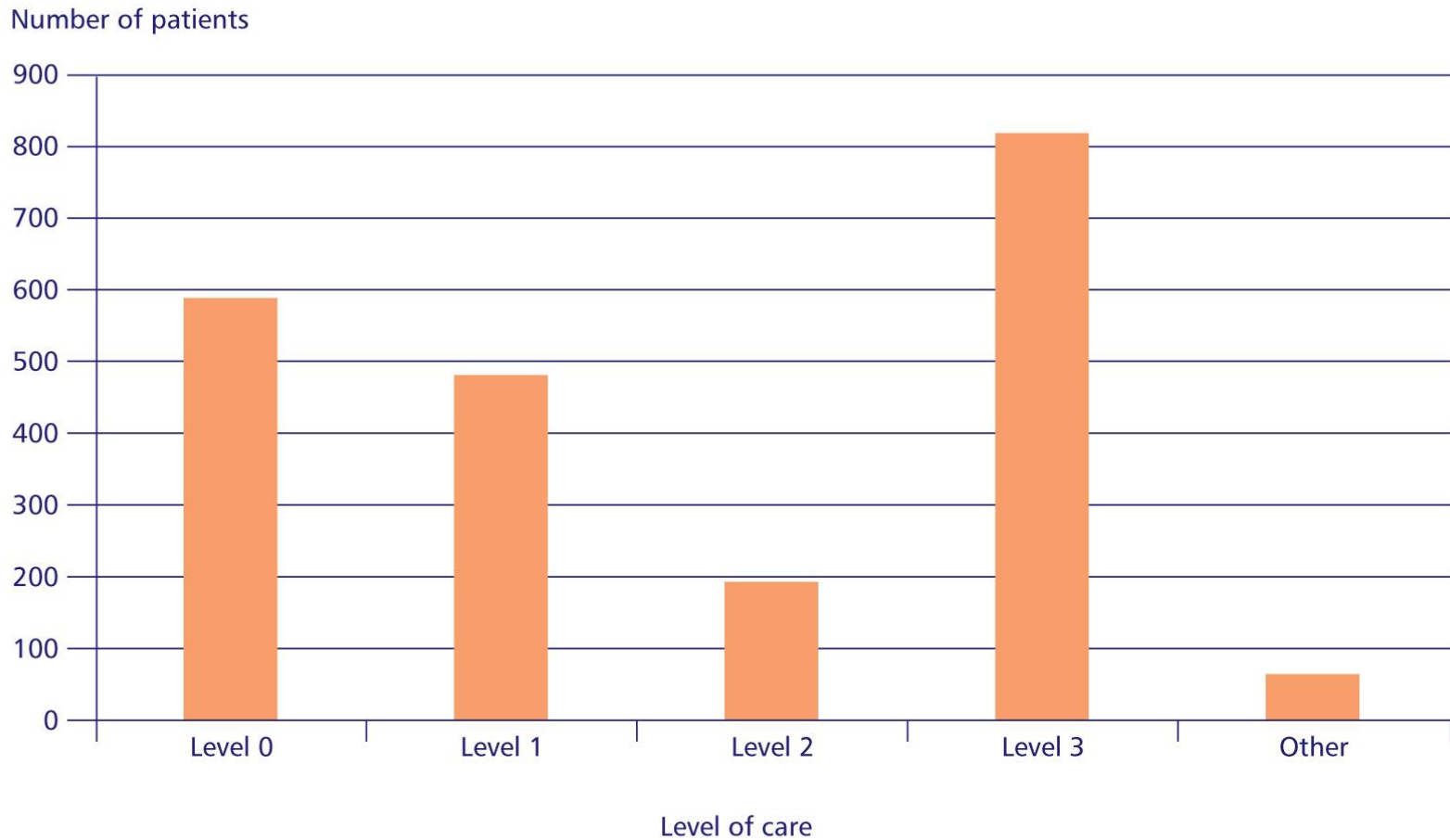


Figure 3.4 Level of care immediately after admission

Patients location prior to insertion

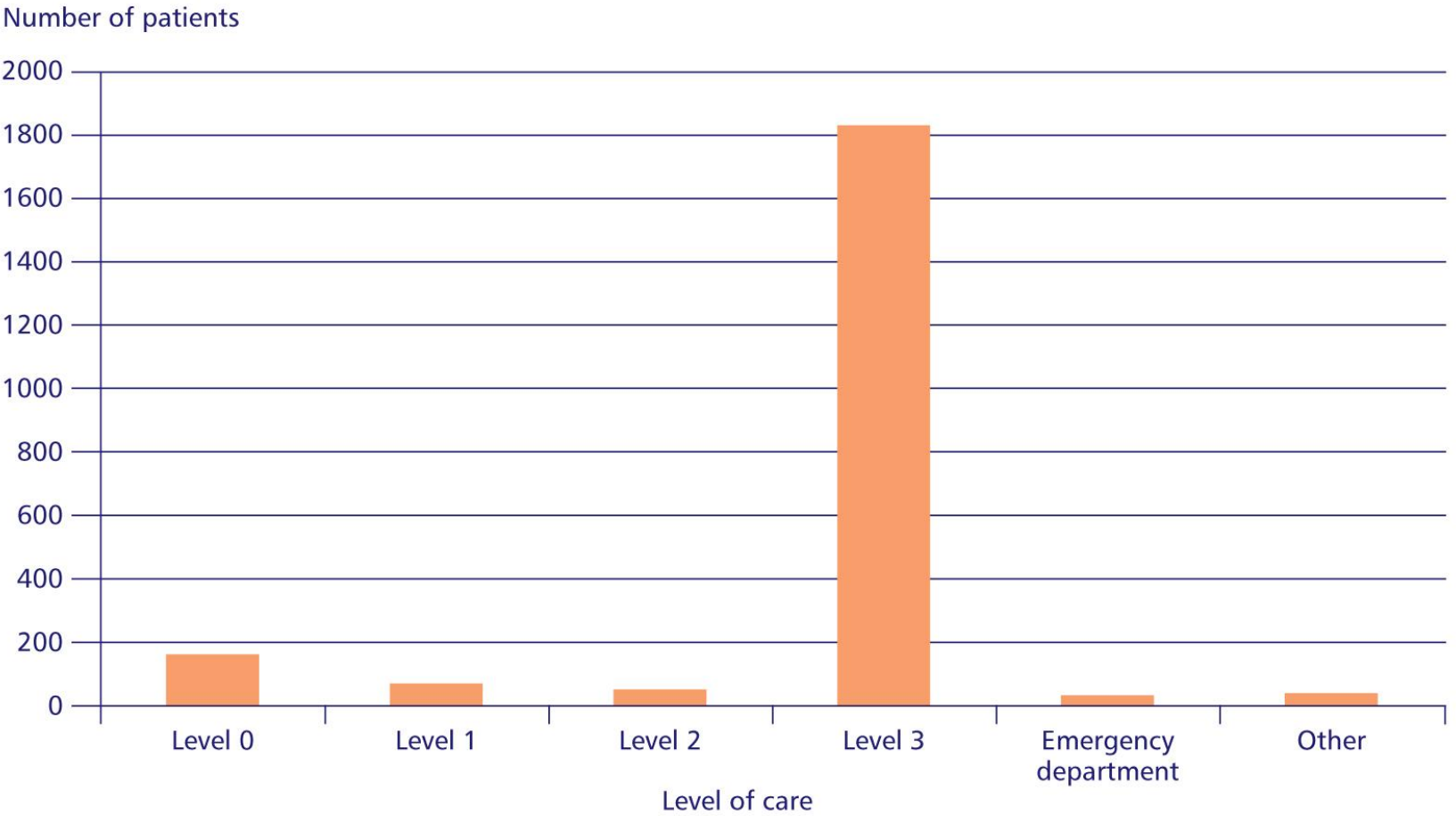


Figure 3.5 Level of care immediately prior to insertion of tracheostomy

Type of insertion & urgency

Table 3.4 Types of insertion technique by urgency of the procedure

	Percutaneous		Surgical	
	n	%	n	%
Elective	162	10.7	244	37.7
Emergency	1353	89.3	403	62.3
Subtotal	1515		647	
Not answered	15		22	
Total	1530		669	

Urgency of procedure

Table 3.5 Urgency of procedure

	n	%
Immediate [Life or limb saving surgery, simultaneous with resuscitation]	41	1.9
Urgent [Acute onset or deterioration of conditions that threaten life, limb or organ survival]	243	11.2
Expedited [Stable patient requiring early intervention for a condition that is not an immediate threat]	1457	67.4
Elective [Surgical procedure planned or booked in advance of routine admission to hospital]	422	19.5
Subtotal	2163	
Not answered	36	
Total	2199	

Day of insertion

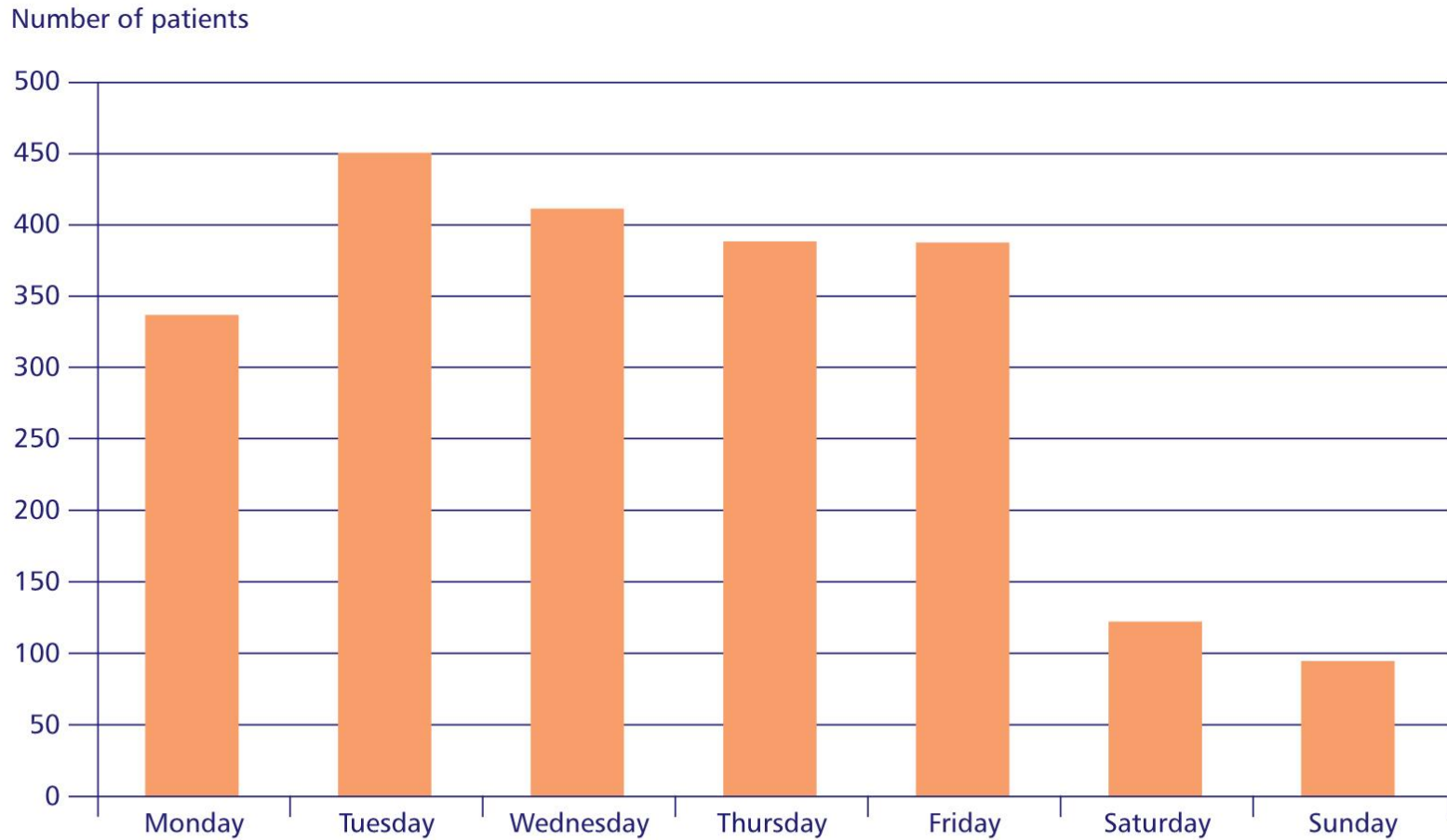


Figure 3.7 Day of insertion

Trials of extubation

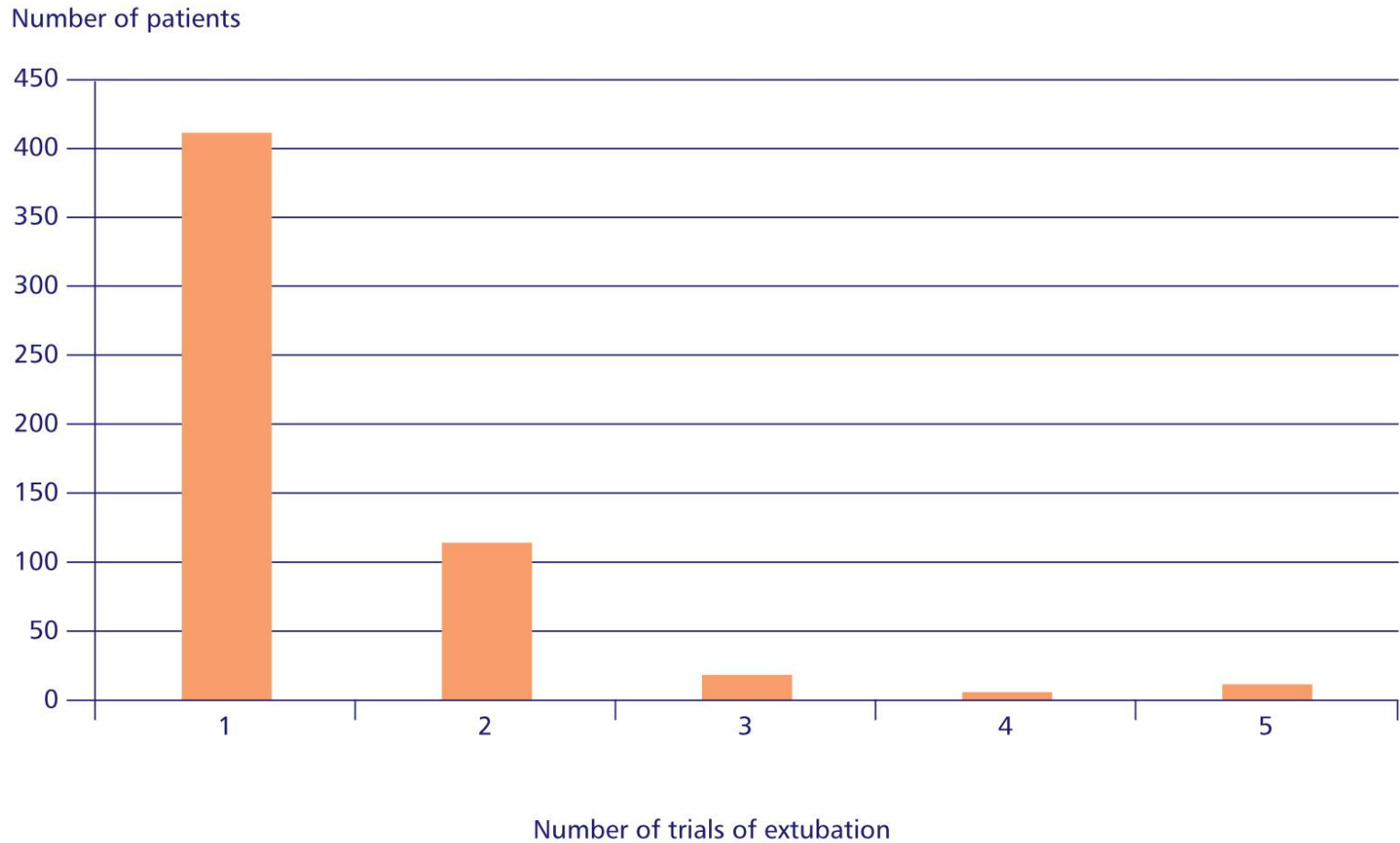


Figure 3.8 Number of trials of extubation prior to tracheostomy

Indication for tracheostomy

Table 3.7 The indication for tracheostomy was clearly documented

	n	%
Yes	287	81.1
No	67	18.9
Subtotal	354	
Insufficient data	32	
Not answered	10	
Total	396	

Documentation of airway difficulty

Table 3.8 There was an adequately documented assessment of airway difficulty

	n	%
Yes	183	62.9
No	108	37.1
Subtotal	291	
Insufficient data	82	
Not answered	23	
Total	396	

Difficult airway trolley

Table 2.14 Availability of a difficult airway trolley IMMEDIATELY within the critical care unit

	n	%
Yes	197	90.8
No	20	9.2
Subtotal	217	
Not answered	1	
Total	218	

BMI

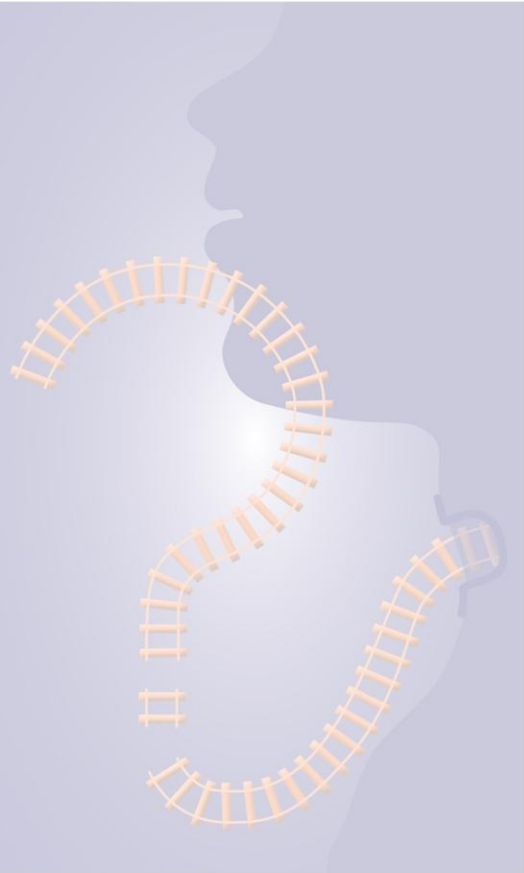
Table 3.9 Classification of BMI where available

	n	%
Underweight	80	4.2
Normal	643	33.7
Overweight	621	32.5
Obese	474	24.8
Morbidly obese	92	4.8
Total	1910	

Case study

An elderly and obese patient with sepsis and peritonitis was transferred to ICU following a Hartman's procedure. A consultant intensivist inserted a standard length percutaneous tracheostomy tube after 6 days because of failure to wean. The following day the patient de-saturated and suffered a PEA cardiac arrest whilst being positioned for physiotherapy. Thoracocentesis identified a tension pneumothorax.

Advisors felt that the wrong sized tube had been used, and that there had been inadequate checking of tube position at insertion



Percutaneous tracheostomy insertion

Days between admission & insertion

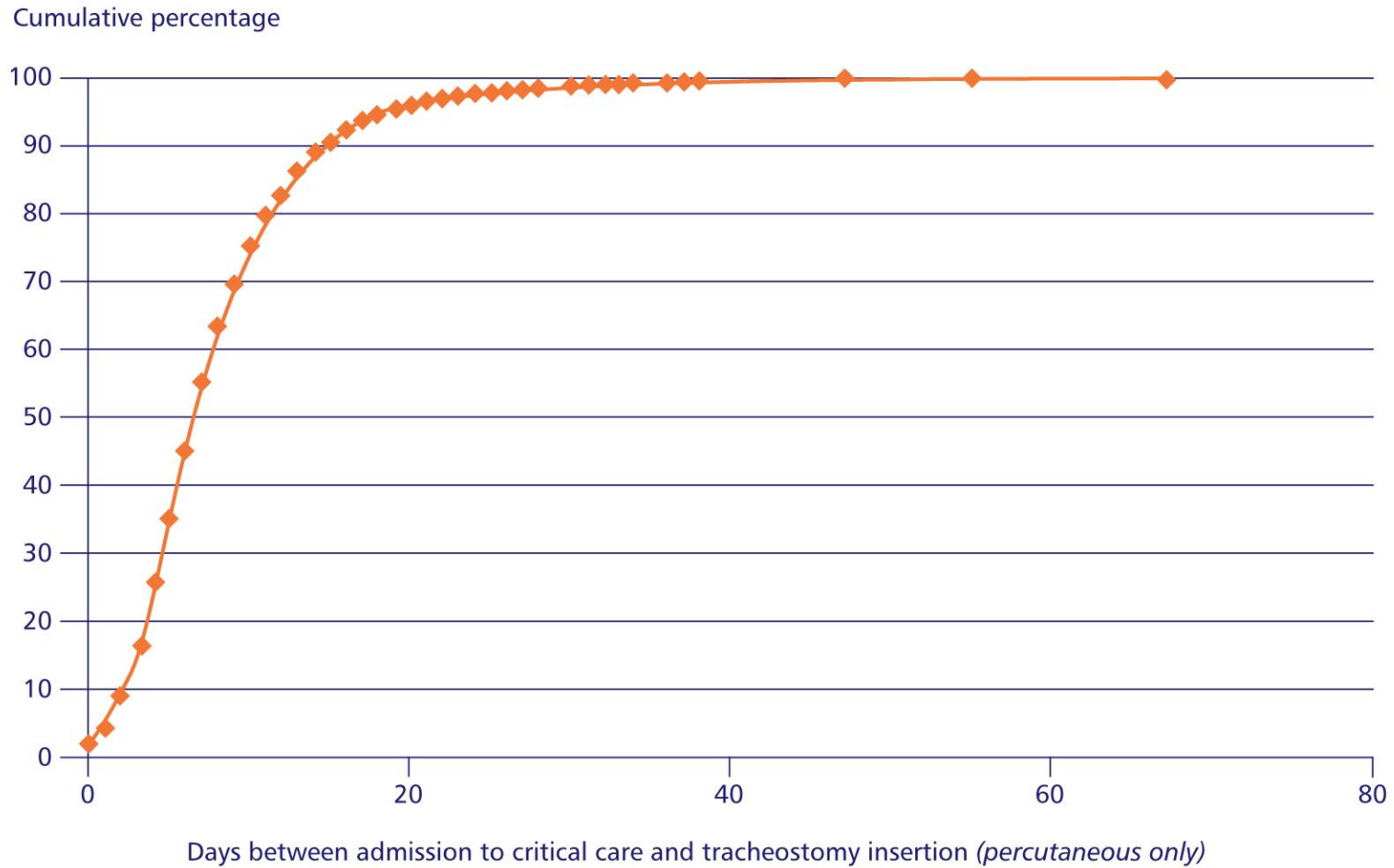


Figure 3.9 Days from the critical care unit admission to insertion

Grade of clinician

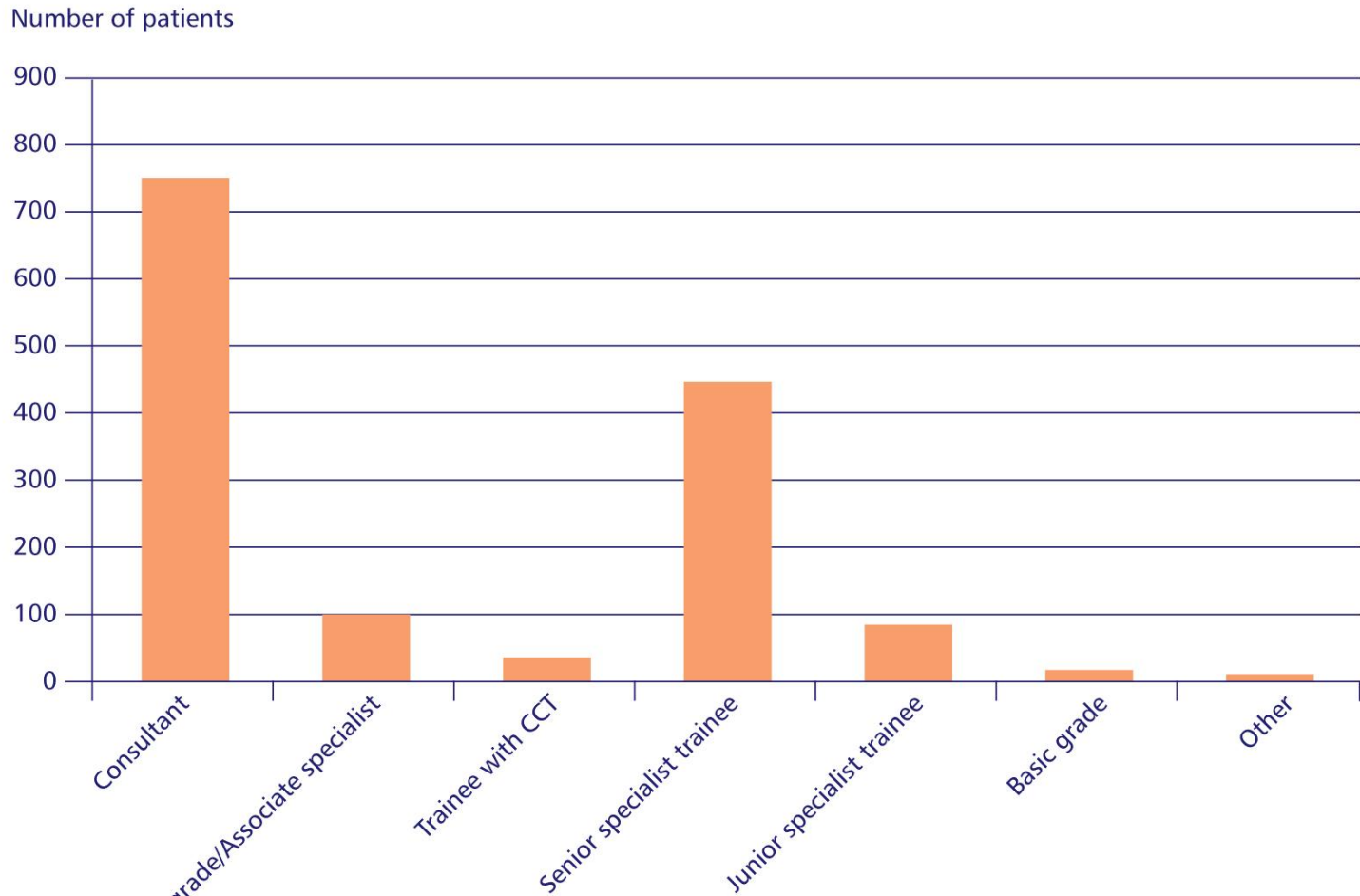


Figure 3.10 Grade of doctor performing tracheostomy

Grade of clinician

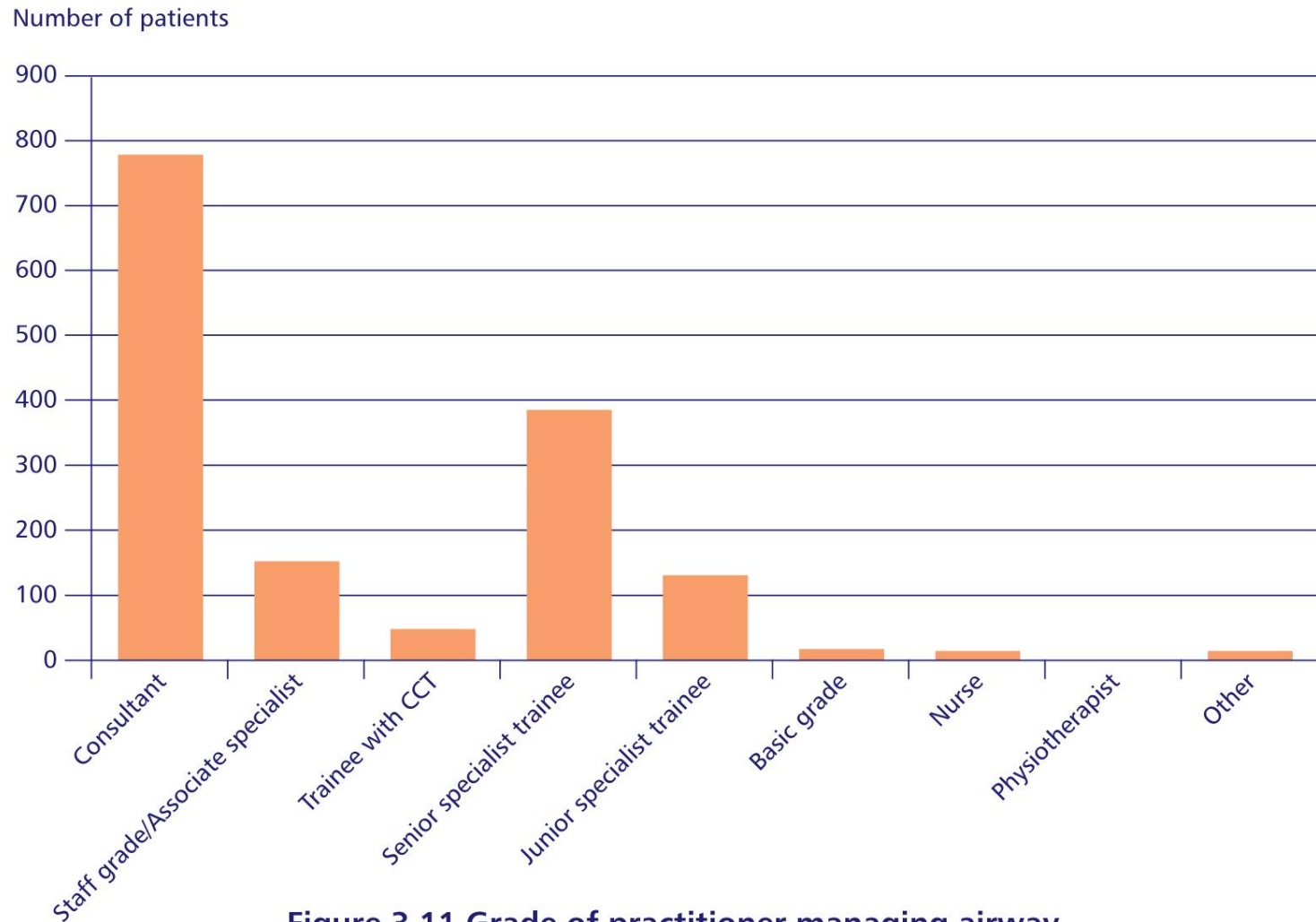


Figure 3.11 Grade of practitioner managing airway

Consent

- Consent form only completed in 728/1491 (48.8%) of patients undergoing a percutaneous tracheostomy insertion

Checklists

- Used in 239/1490 (16%) of percutaneous cases

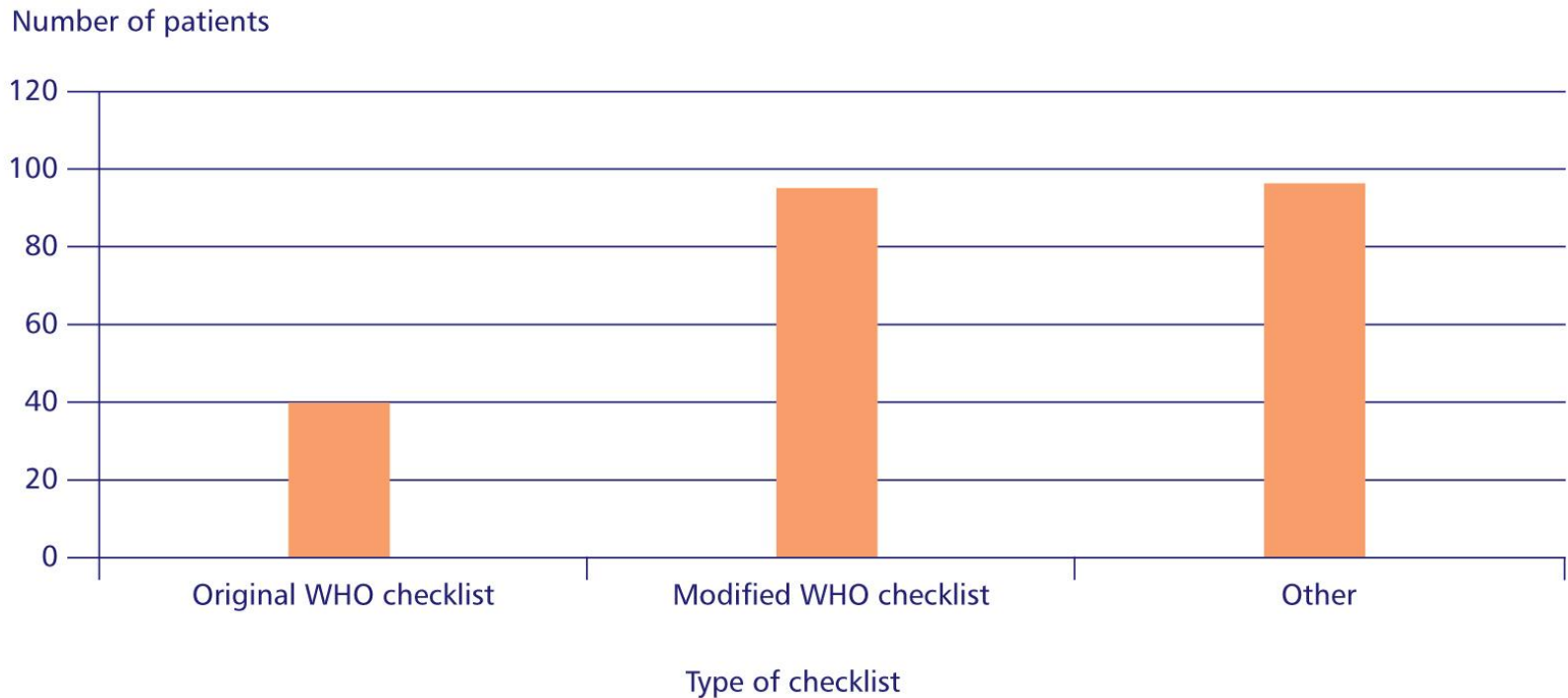


Figure 3.13 Type of checklist used

Type of tube

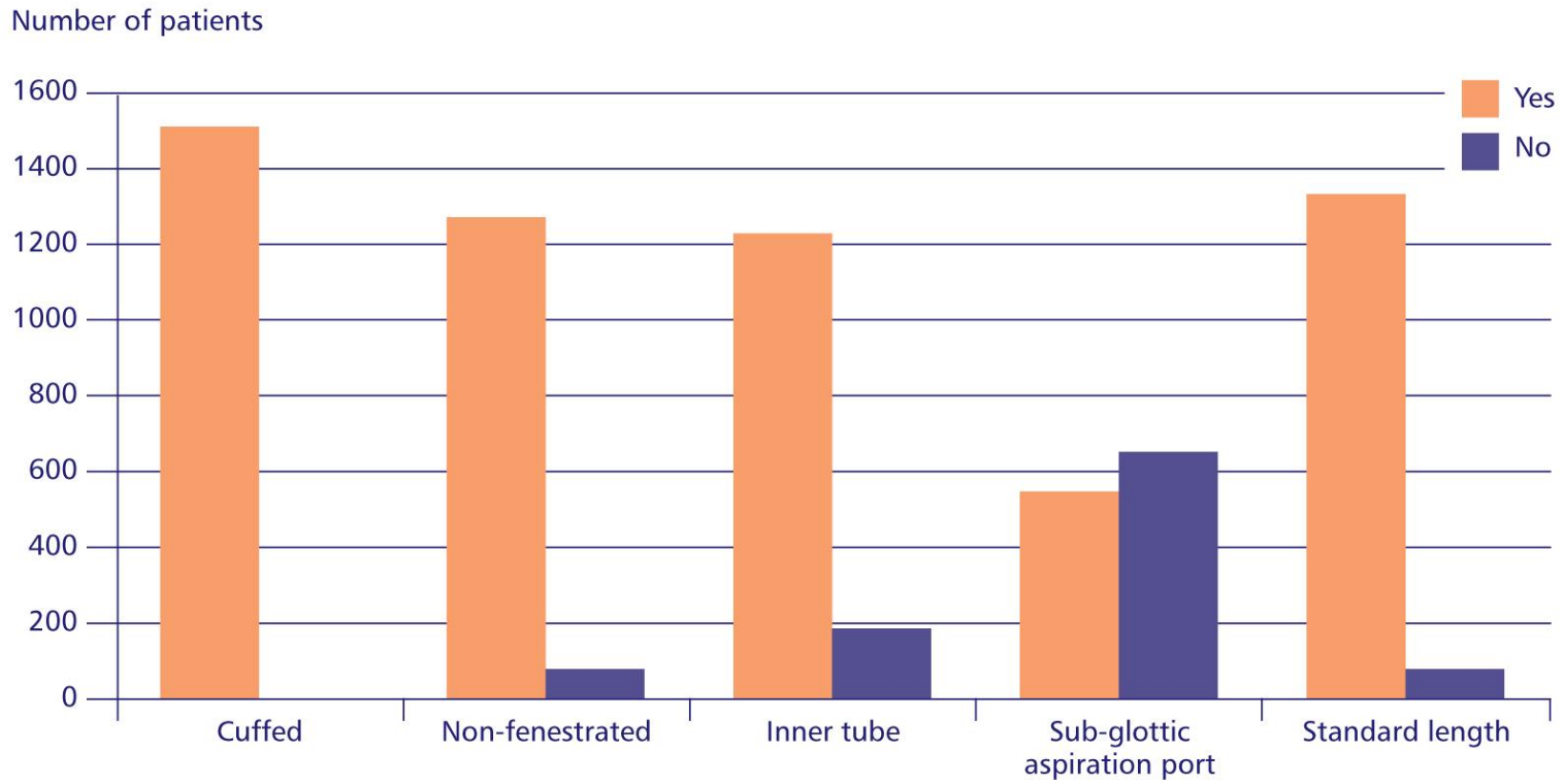


Figure 3.15 Types of tracheostomy tube

Size of tube

Number of patients

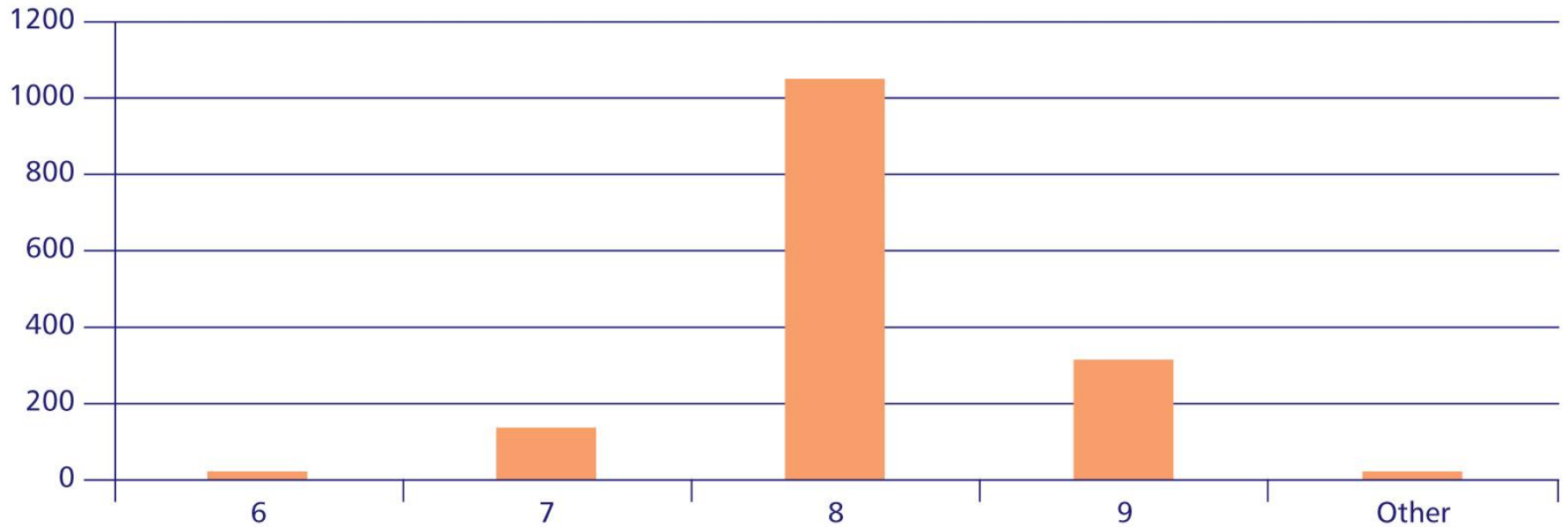


Figure 3.16 Size of tracheostomy tube used

How was the tube secured

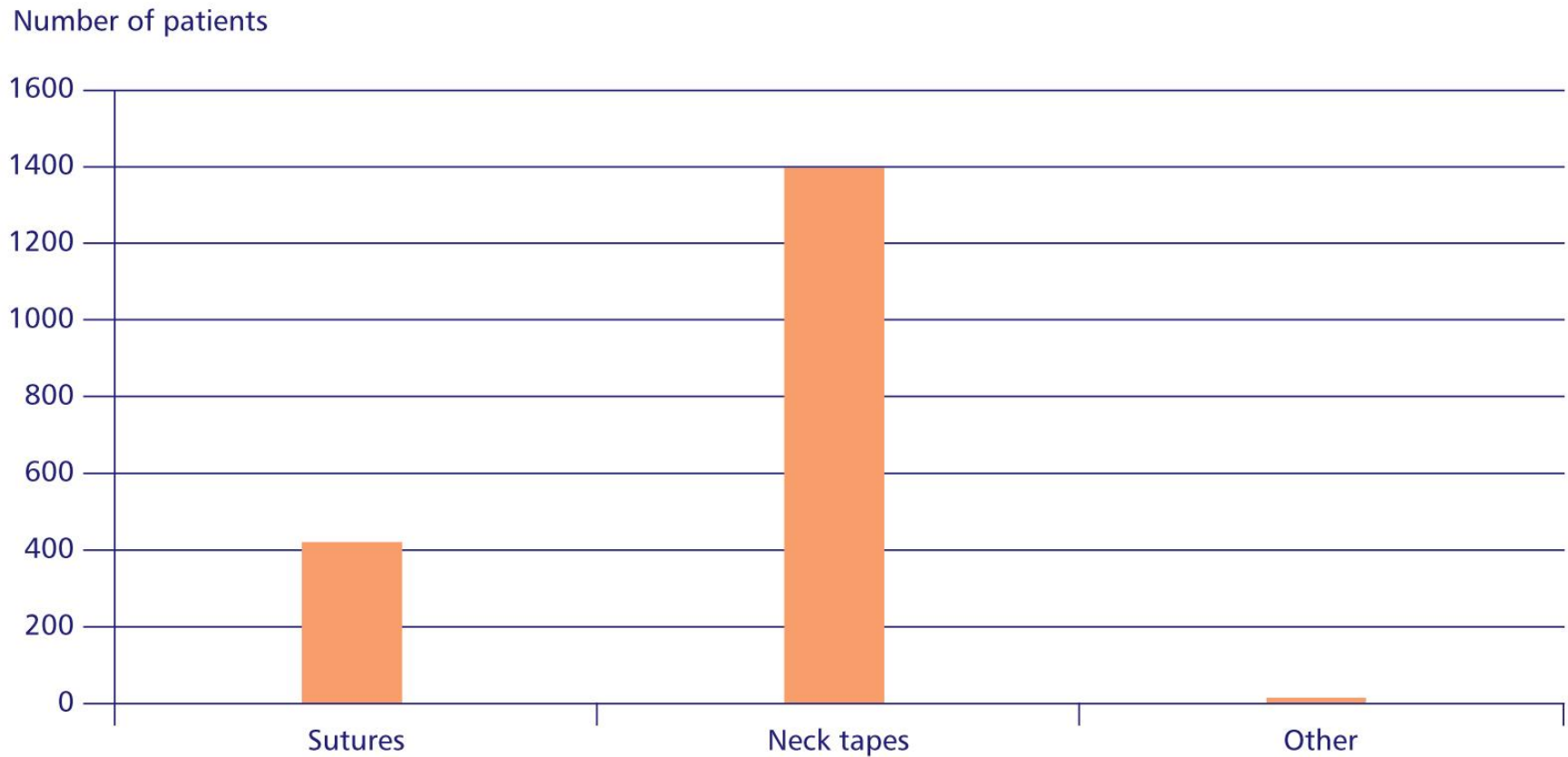


Figure 3.17 How the tracheostomy tube was secured (*Answers may be multiple*)

Capnography at insertion

Table 2.19 Availability of bedside capnography for intubation/tracheostomy insertion at all times

	n	%
Yes	286	91.7
No	20	6.4
Yes - other	6	1.9
Subtotal	312	
Not applicable	4	
Unknown	2	
Not answered	15	
Total	333	

Case study

An elderly obese patient with pneumonia underwent an attempted percutaneous tracheostomy. Bronchoscopy was performed and it was believed that the guidewire was identified within the tracheal lumen, however dilatation of the tract proved difficult and when the tube was inserted no CO₂ was detected on capnography. The procedure was abandoned and the patient transferred to theatre for an open approach. This proved difficult due to the haematoma and oedema created by the attempted percutaneous tracheostomy, which had created a false passage.

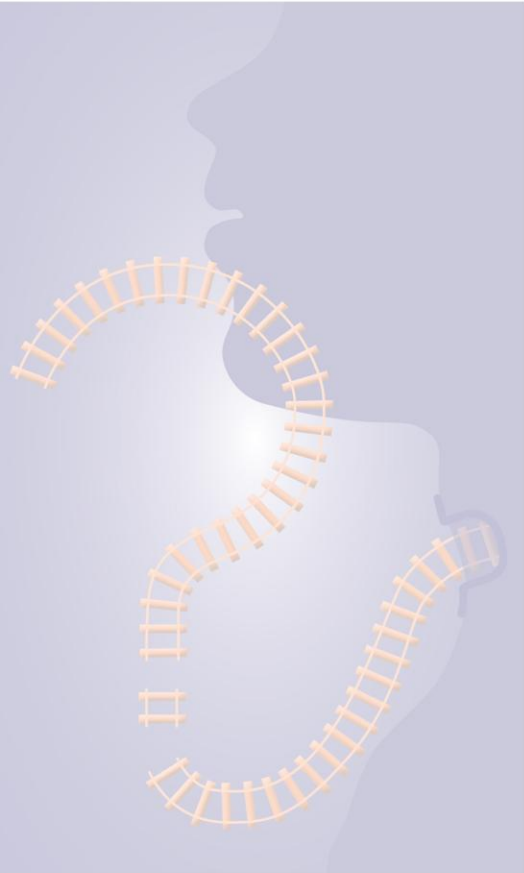
Advisors noted the importance careful pre-operative assessment and the value of capnography

Immediate complications

- 81/1482 (5.5%)

Table 3.13 Immediate complications

Haemorrhage - minor	Ventilation
Surgical emphysema	Desaturation
Malplacement of tube	Leaks
Loss of airway	Technical problems
Haemorrhage - severe	Procedure aborts
Tube occlusion	
Pneumothorax	



Surgical tracheostomy insertions

Indications for insertion

Table 3.14 Indications for insertion

	Surgical	%
	n	%
To facilitate the removal of pulmonary secretions	135	20.6
To protect the airway as the patient was at high risk of aspiration	89	13.6
Laryngectomy	33	5.0
To enable long term mechanical ventilation	88	13.4
To facilitate weaning from mechanical ventilation	360	55.0
Upper airway obstruction	147	22.4
Other	122	18.6
Subtotal	655	
Not answered	14	
Total	669	

Assessment of airway difficulty

- Recorded assessment of intubation difficulty in 318/488 (65.2%)

Table 3.18 Mallampati Scores

	n	%
I	83	28.1
II	96	32.5
III	66	22.4
IV	22	7.5
Other	28	9.5
Subtotal	295	
Unknown	15	
Not answered	8	
Total	318	

- Stridor noted in 86/596 (14.4%)
- Difficulty in intubation anticipated in 154/529 (29.1%)

Consent

- Form completed in 611/6387 (95.8%) patients
- 366/642 (57%) comatose or not awake

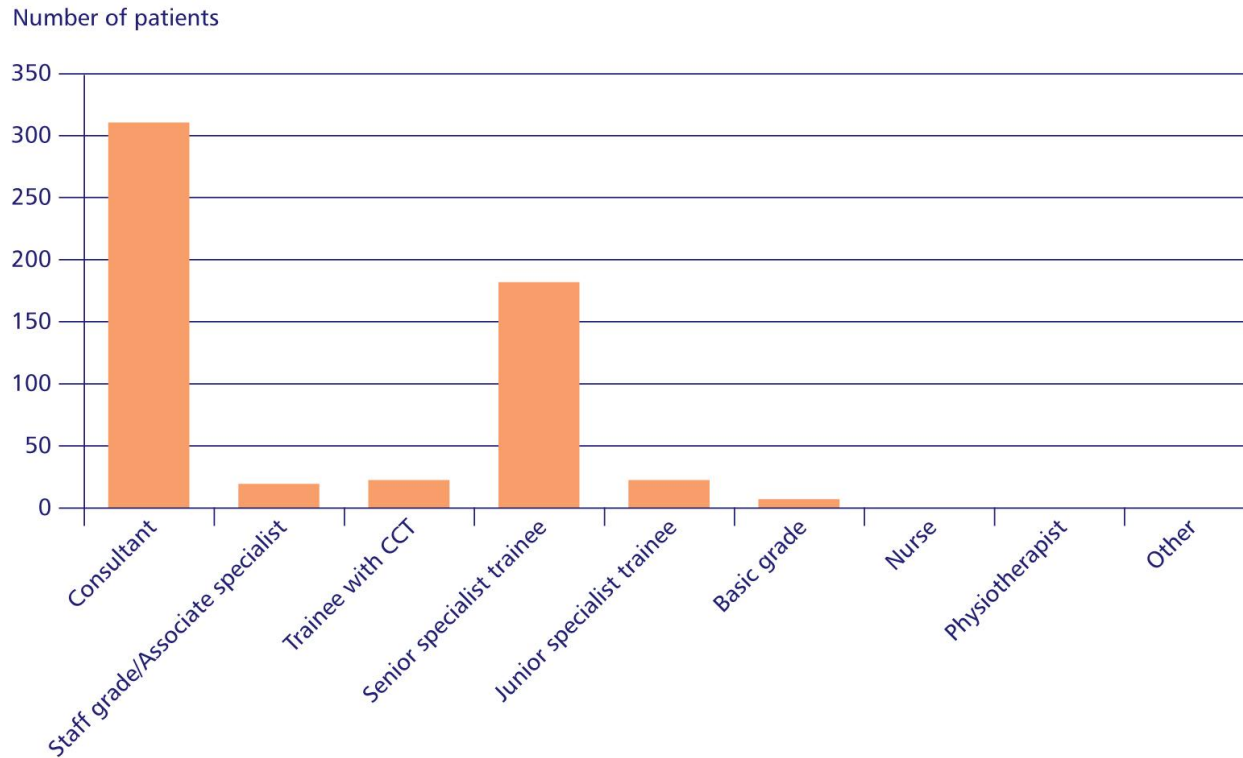


Figure 3.19 Grade of practitioner completing consent

Location of operation

Table 3.21 Location of operation

	n	%
Critical care	12	1.8
Head and neck specialist theatre	224	33.9
Emergency theatre	262	39.6
General theatre	131	19.8
Other	32	4.8
Subtotal	661	
Not answered	8	
Total	669	

Seniority of anaesthetic staff

- Consultant anaesthetist in 534/607 (88.0%)
- Senior trainee in 53/607 (8.7%)
- Trainee present in 361/467 (77.3%) consultant cases
- Where the advisors could determine this information from the case notes, of 96 cases anaesthetised by trainee, supervision appropriate in all but 5 cases.

Seniority of surgical staff

- Consultant surgeon 397/630 (47.1%)
- Senior trainee in 260/630 (41.3%)
- Trainee present in 229/274 (83.6%) consultant cases
- Where the advisors could determine this information from the case notes, supervision appropriate in 91/99

Type of tube used

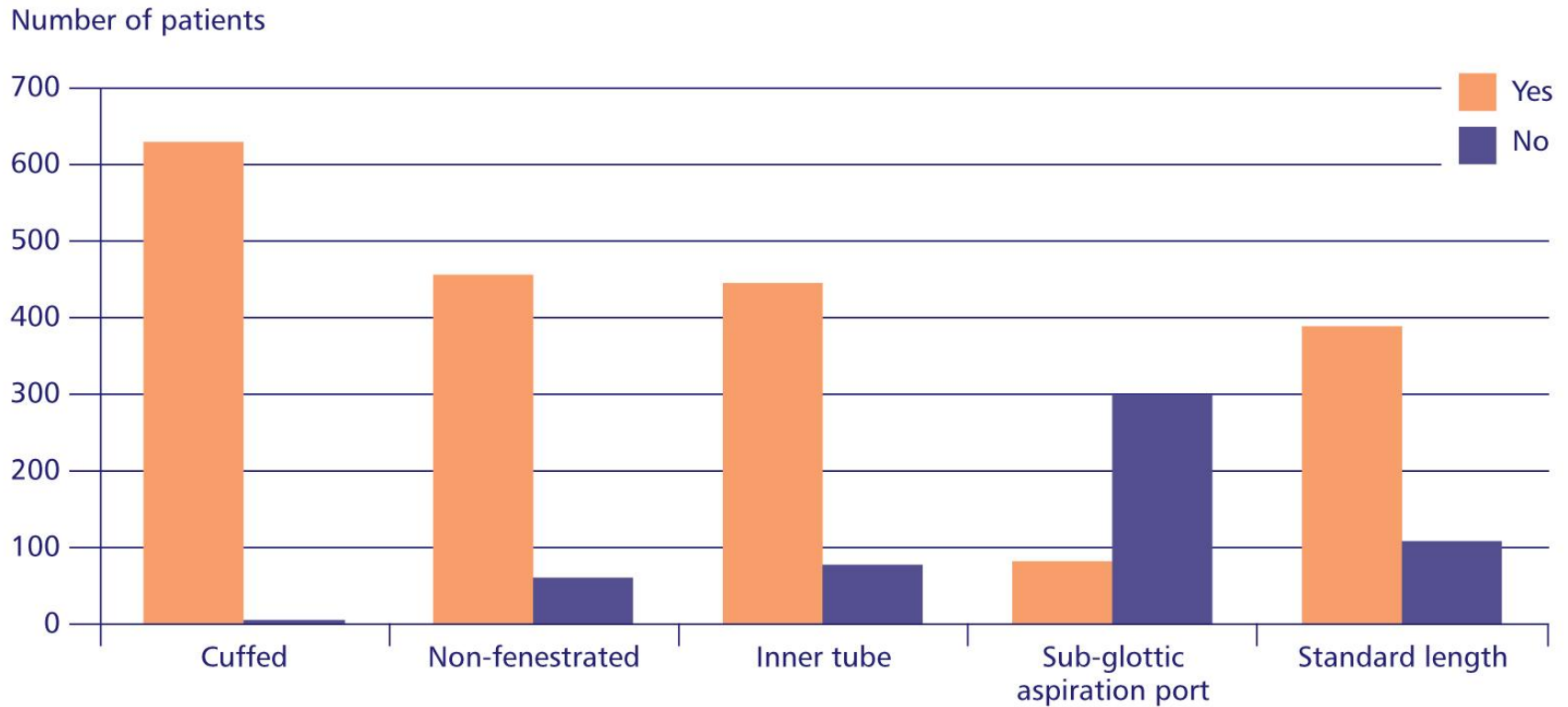


Figure 3.20 Type of tube used

How was the tube secured?

Table 3.25 Method of securing tube (*Answers may be multiple*)

	n	%
Sutures	602	93
Neck tapes	387	59.8
Other	4	0.6
Subtotal	647	
Unknown	6	
Not answered	16	
Total	669	

Overall assessment

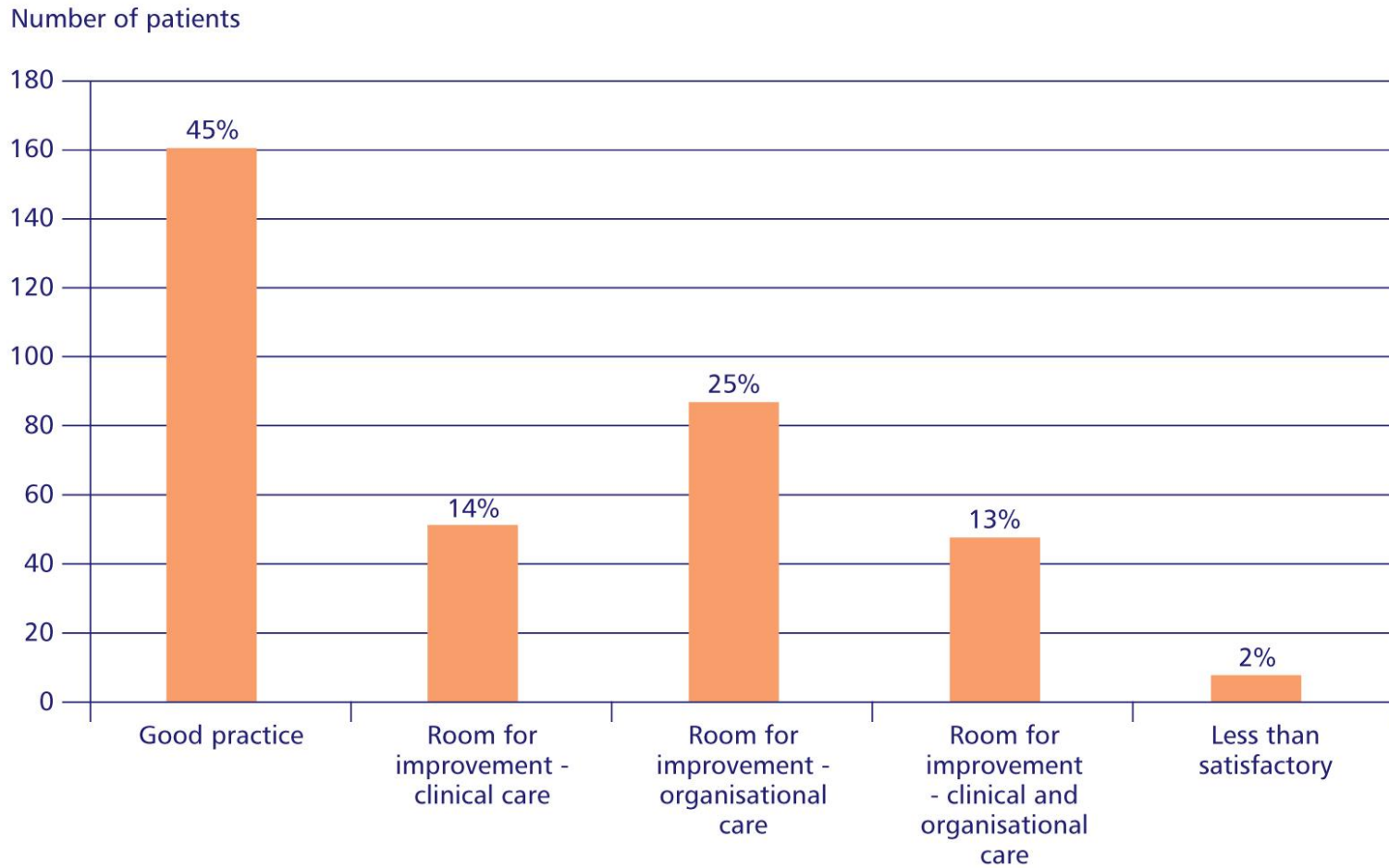


Figure 3.21 Overall assessment of care at the time of insertion

Area of care following insertion

Table 3.29 Immediate place of transfer after insertion

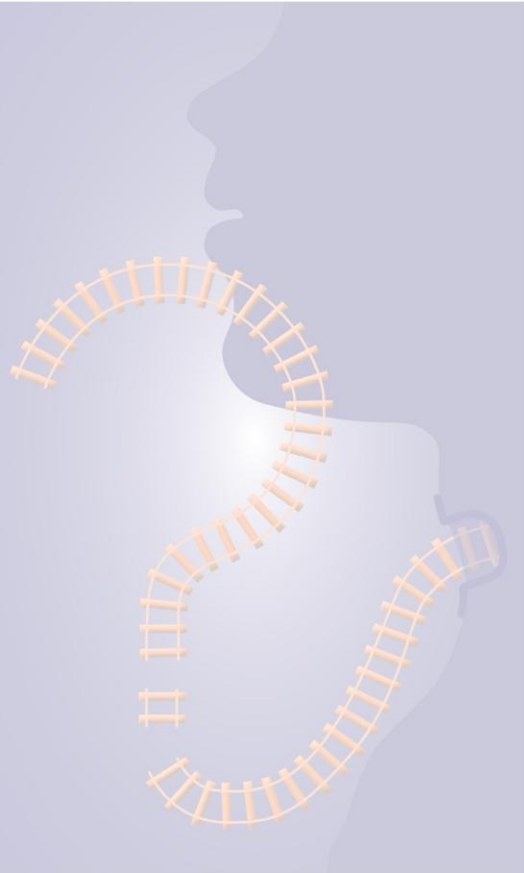
	n	%
Critical care	539	85.8
Specialist head and neck ward	69	11.0
General ward	8	1.3
NA - tracheostomy inserted on critical care	2	<1
NA - patient died during the procedure	1	<1
Other	9	1.4
Subtotal	628	
Not answered	41	
Total	669	

Key findings

- Consent taken in 48.4% of percutaneous v 95.8% of surgical tracheostomies
- Checklists used in only 16% of percutaneous tracheostomies
- Adjustable length tubes used in 10.1% of cases overall and 18.8% of obese patients
- 20/217 (9.2%) hospitals did not have immediate access to a difficult airway trolley in the critical care unit

Recommendations

- Consent forms and checklists should be used prior to tracheostomy wherever it is performed
- Tube size and length should be appropriate
- Confirmation of tube placement must be obtained using capnography and documented
- Appropriate positioning of the tube should be confirmed and documented using airway endoscopy
- Critical care units need a rapidly available difficult airway trolley



Tube care in the patient with a tracheostomy

Day of week of tube change on critical care

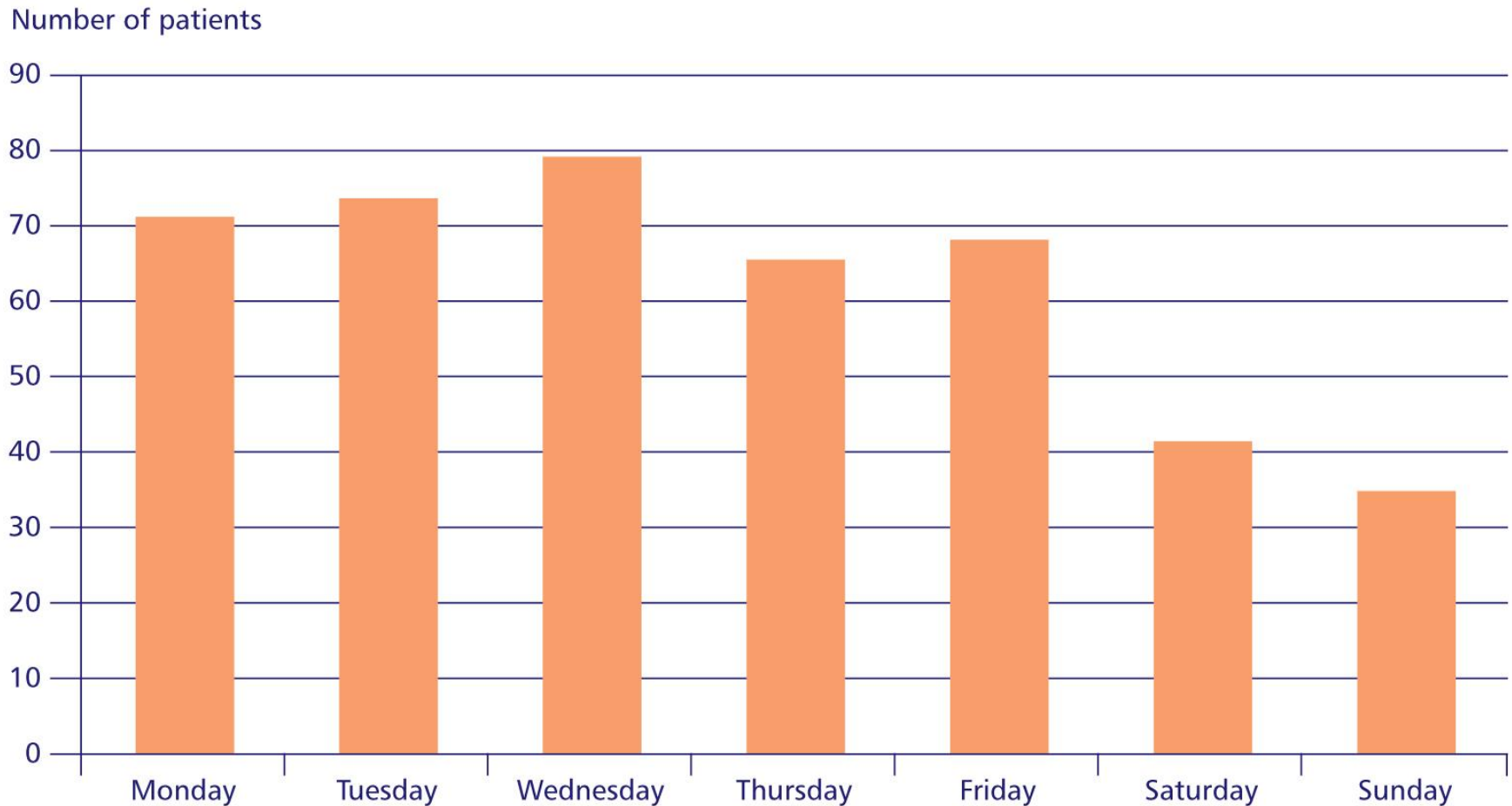


Figure 4.2 Day of week of first tube change in the critical care unit

First tube change in critical care

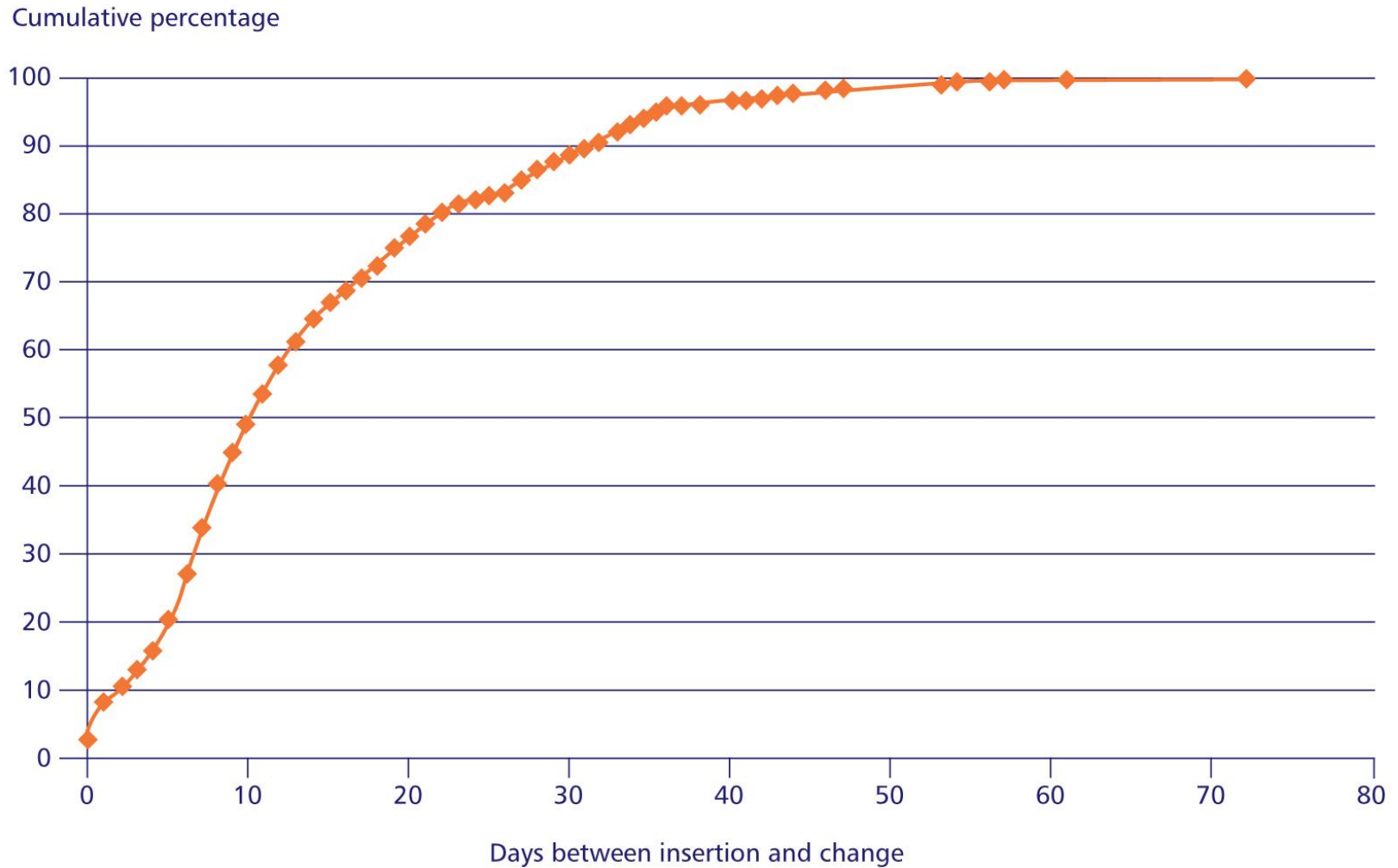


Figure 4.1 First tube change

Timing of first tube change on ward

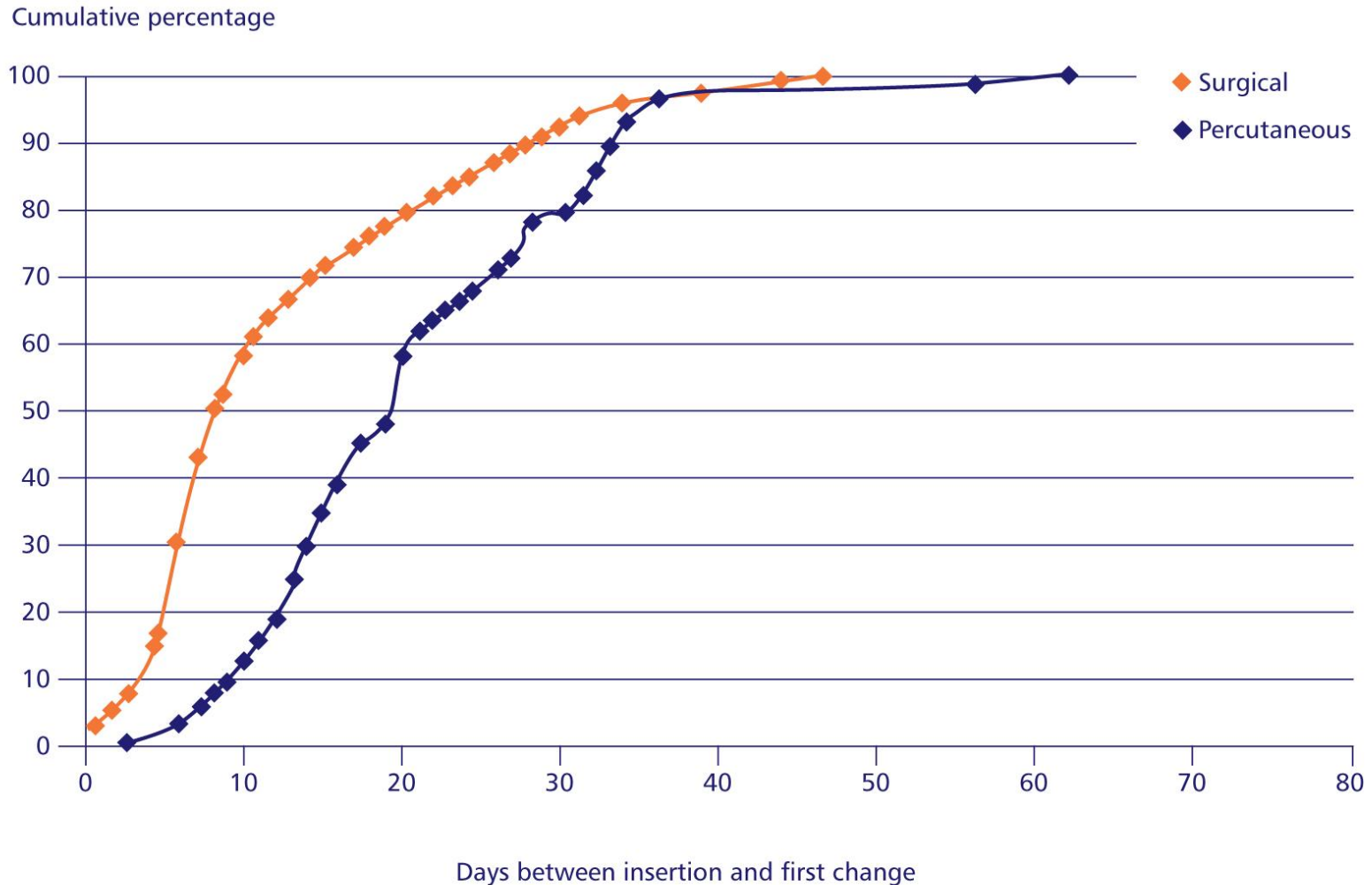


Figure 4.3 Days between insertion and first tube change on the ward

Early tube changes in critical care

Table 4.2 Planned vs. unplanned first tube changes in the critical care unit in the first 6 days post insertion

	Type of change				
	Planned	Unplanned	Subtotal	Not answered	Total
Day 0	1	9	10	0	10
Day 1	9	15	24	1	25
Day 2	2	6	8	2	10
Day 3	4	5	9	0	9
Day 4	9	3	12	0	12
Day 5	11	8	19	0	19
Day 6	17	11	28	0	28
Total	53	57	110	3	113

Time of first tube change

Table 4.3 Time of day vs. planned or unplanned first tube change critical care unit

Time of change	Type of change					Total
	Planned	Unplanned	Subtotal	Unknown	Not answered	
08:00 - 17:59	241	60	301	2	3	306
18:00 - 07:59	18	28	46	0	1	47
Subtotal	259	88	347	2	4	353
Not answered	68	18	86	15	58	159
Total	327	106	433	17	62	512

Case study

An elderly patient underwent emergency laparotomy for perforated duodenum and required post operative ventilation. A percutaneous tracheostomy was inserted by a surgeon and anaesthetist in theatre in a small DGH as the patient was obese and difficulties were anticipated. The patient suffered two episodes over the next 48 hours in which the tube was accidentally displaced. There was no documentation of how the tube was secured. Two weeks later the patient was successfully decannulated.

Advisors commented upon the potential risks of early accidental decannulation in these circumstances.

Type of tube used at first tube change

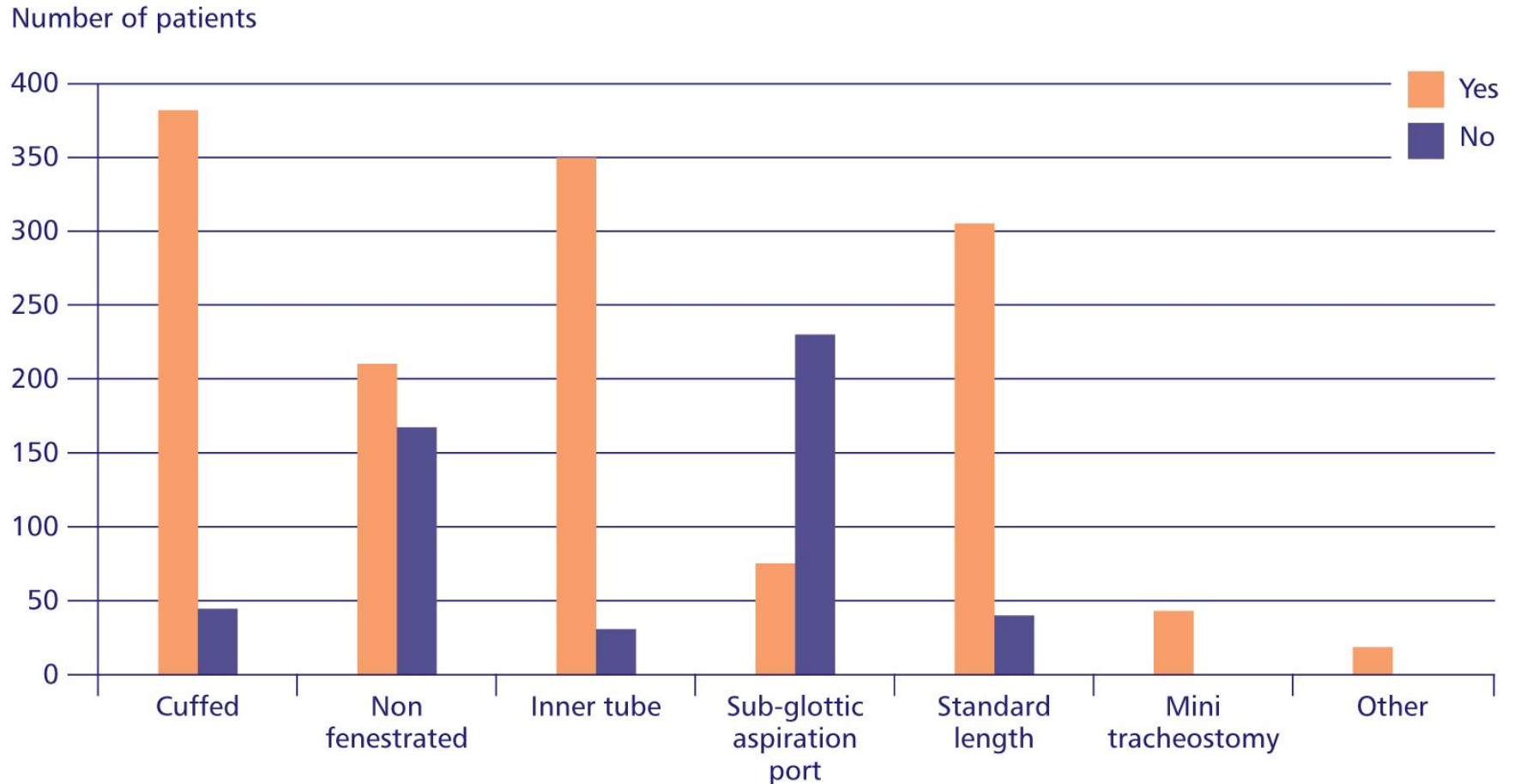


Figure 4.4 Types of tube inserted at first change in the critical care unit

BMI & type of tube used at first change

Table 4.9 Type of tube used at first change vs. BMI

	Tube used at first change					Total
	Standard length	Adjustable flange	Subtotal	Unknown	Not answered	
BMI <30	169	17	186	10	80	276
BMI ≥30	74	15	89	5	37	131
Subtotal	243	32	275	15	117	407
Not answered	37	5	42	2	23	67
Total	280	37	317	17	140	474

Case study

A middle aged patient developed post operative multi-organ failure after planned bariatric surgery. A percutaneous tracheostomy was performed in the intensive care unit to assist with weaning. At insertion there was no documented capnography and an 8mm standard tube was inserted. The patient required an early tube change within 24 hours due to an immediate cuff leak.

Advisors commented about the need for a very careful plan in such patients in whom insertion, tube positioning and ongoing care is likely to be particularly difficult.

Tube at discharge from critical care

Table 4.15 Tube type at discharge from the critical care unit

	n	%
Cuffed	551	95.0
Uncuffed	29	5.0
Subtotal	580	
Unknown	3	
Not answered	74	
Total	657	

Cuff pressure measurement on the ward

Table 4.16 Cuff pressure was measured on the ward

	n	%
Yes	309	74.6
No	105	25.4
Subtotal	414	
Unknown	35	
Not applicable - equipment not available	43	
Not applicable - cuffed tube not used	35	
Not answered	26	
Total	553	

Equipment & continuous inflation

Table 4.17 Equipment to measure pressure was available if the cuff was inflated continuously

	n	%
Yes	114	87.7
No	16	12.3
Total	130	

Equipment to measure pressure – ward

Table 2.11 Availability of equipment to measure cuff pressure

	Yes	No	Total
Specialist head and neck ward	41	6	47
Specialist ward - other	137	86	223
General ward	30	41	71
Other	25	30	55
Total	233	163	396

Bedside information

- Documentation of routine information on tracheostomy tubes and ongoing care (including cuff pressure monitoring) was not always readily available as part of bedside observations in patients.

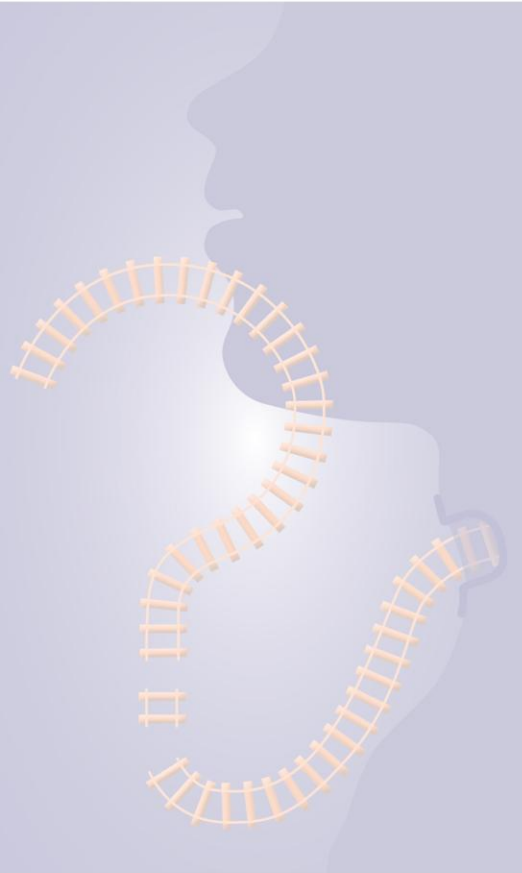
For example, in 178/396 (45%) of cases there was insufficient data for Advisors to make a decision about cuff pressure when clinical notes were reviewed

Key findings

- 27% (112/419) of first tubes changes in critical Care occurred less than 7 days after insertion
- 50.4% (57/113) tube changes in the first 7 days were unplanned
- Only 15/89 patients with a BMI of >30 had a tube in which length could be adjusted at first tube change
- 95% (551/580) of critical care patients were discharged with a cuffed tracheostomy tube still in place
- In just 53.3% (211/396) of case notes was information available about cuff pressure

Recommendations

- When changing tracheostomy tubes the correct size and length of tube should be carefully selected according to patient need, and with particular care in patients with a high BMI
- Unplanned tube changes pose additional risks and should be reported as critical incidents
- At critical care discharge there must be careful consideration as to whether a cuffed tube is required. If a cuff is required competences and equipment must be available to measure cuff pressure
- **Tracheostomy tube information as well as essential equipment should be readily available at the bedside ***



The multidisciplinary team and care of tracheostomy patients

Number of wards caring for patients

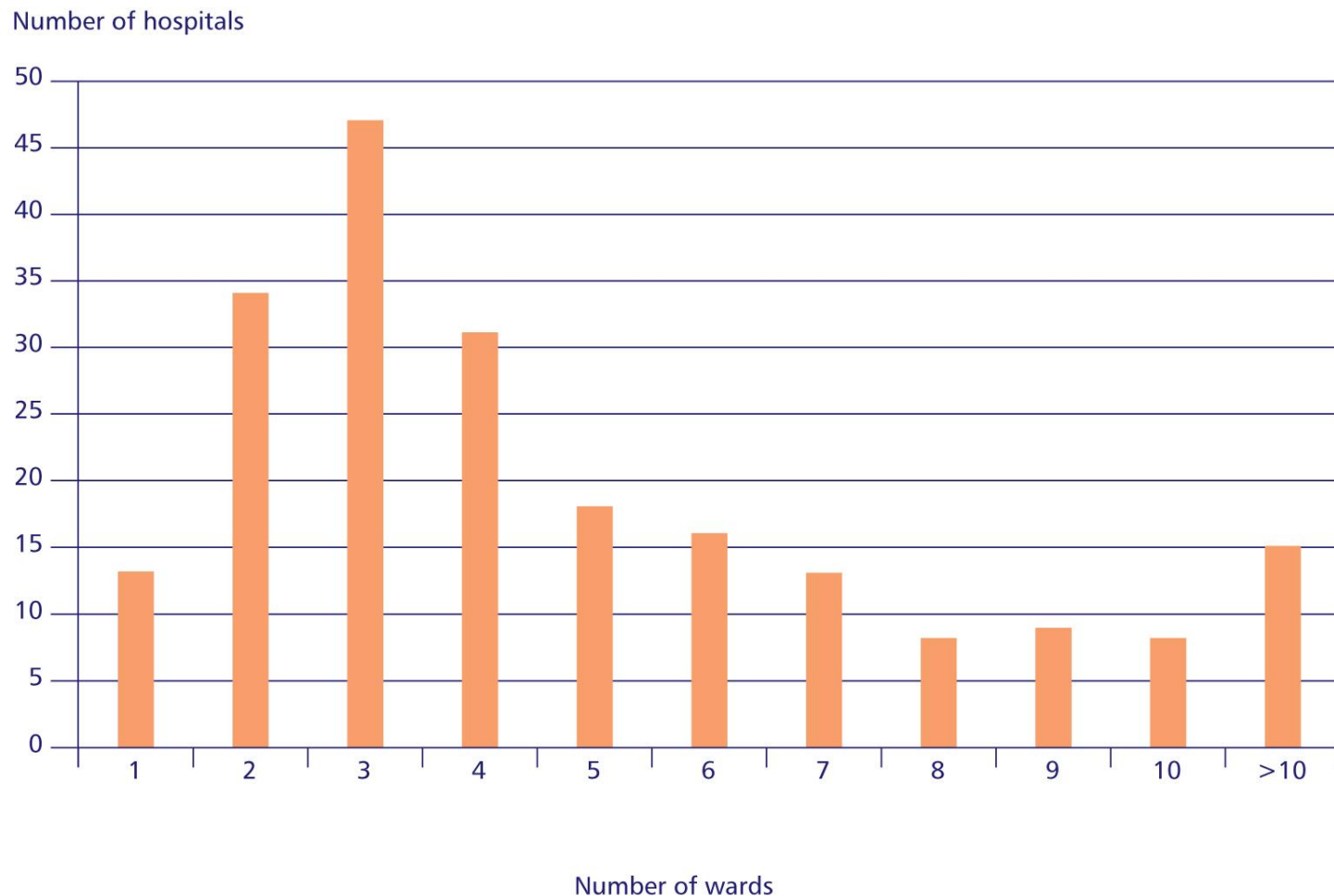


Figure 2.1 Number of wards where patients with tracheostomies may have been cared for (*hospital questionnaire*)

Hospital policy for tracheostomy care

Table 2.38 Approved policy for the management of tracheostomies

	n	%
Yes	172	79.3
No	45	20.7
Subtotal	217	
Not answered	2	
Total	219	

Tracheostomy leads

Table 2.13 Presence of trained leads for tracheostomy care

	Medically trained		Non-medically trained	
	n	%	n	%
Yes	75	34.4	112	51.1
No	143	65.6	107	48.9
Subtotal	218		219	
Not answered	1		0	
Total	219		219	

Clinical teams in the ward MDT

Table 5.6 Additional clinical teams participating in ward MDT in tracheostomy patients

	Yes		No		Subtotal	Unknown	Not available	Not answered
	n	%	n	%	n	n	n	n
Physiotherapy	243	88.0	33	12.0	276	11	6	25
Critical care outreach	93	42.7	125	57.3	218	12	33	55
Speech and language therapist	253	90.7	26	9.3	279	17	3	19
Dietetics	153	58.8	107	41.2	260	16	2	40
Head and neck specialist nurse	161	76.7	49	23.3	210	9	71	28

Discussion at the ward MDT

Table 5.4 Patient was discussed at an MDT post insertion (head and neck specialist vs. non head and neck specialist centres)

	Head and neck specialist hospital		Non head and neck specialist hospital	
	n	%	n	%
Yes	247	68.8	55	58.5
No	112	31.2	39	41.5
Subtotal	359		94	
Unknown	45		11	
Not answered	11		3	
Total	415		108	

Patients not discussed at a ward MDT

Table 5.5 Outcome of patients not discussed at a ward MDT

	n	%
Death	13	8.4
Decannulation	107	69.0
Discharge alive with the tracheostomy in situ	14	8.4
Alive and day 30 after insertion in theatre and transferred straight to ward	4	2.6
Alive and day 30 after leaving critical care	10	6.5
Alive and day 30 after insertion - location of insertion unknown	8	5.2
Subtotal	155	
Not answered	1	
Total	156	

Swallowing difficulty – ward patients

Table 5.12 Patient had ongoing swallowing difficulties

Type of tracheostomy	Swallowing difficulties							Total
	Yes		No		Subtotal	Unknown	Not answered	
	n	%	n	%				
Percutaneous	94	54.7	78	45.3	172	49	19	240
Surgical	115	48.5	122	51.5	237	25	23	285
Subtotal	209		200		409	74	42	525
Not answered	11		6		17	5	7	29
Total	220		206		426	79	49	554

Swallowing difficulty – advisor opinion

Table 5.15 Attention to patient's ability to swallow safely

	n	%
Yes	191	85.7
No	32	14.3
Subtotal	223	
Insufficient data	74	
Not applicable	77	
Not answered	22	
Total	396	

Multidisciplinary audit

Table 2.51 Regular multidisciplinary audit

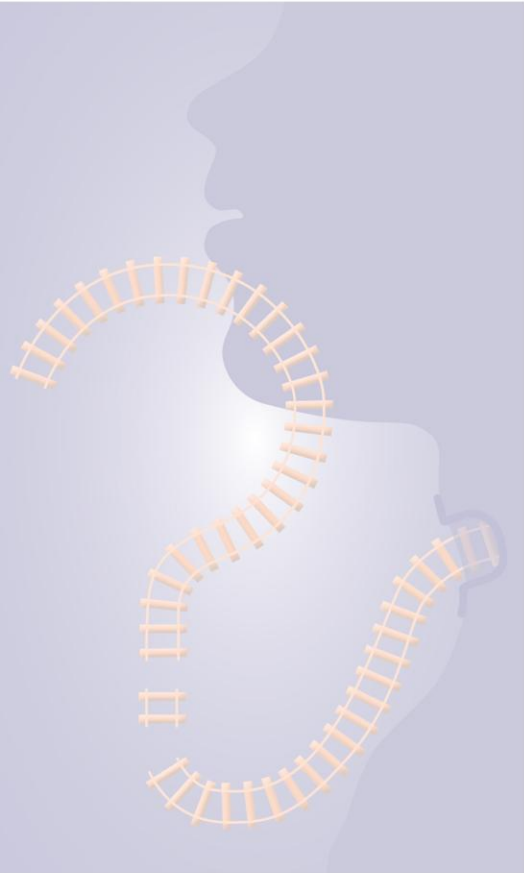
	n	%
Yes	46	21.2
No	171	78.8
Subtotal	217	
Not answered	2	
Total	219	

Key findings

- 67.1% (318/474) of ward patients with a tracheostomy were discussed at an MDT meeting
- Composition of the MDT on the ward varied with relatively poor representation from Dietetics and Critical care outreach (42.7% and 58.8% of teams respectively)
- Swallowing difficulty occurred in 51% (220/425) of ward patients with a tracheostomy
- 57% (96/168) of patients with swallowing difficulty on the ward had an early referral to speech and language therapy (SLT)
- 26.9% (456/1693) of patients on critical care had input from SLT

Recommendations

- **Multidisciplinary care pathways which provide continuity between critical care unit staff and ward clinicians, and which facilitate decannulation and discharge planning need to be established for all tracheostomy patients***
- Involvement of SLT in critical care units needs to be facilitated to provide high quality communication strategies particularly for more complex patients
- Swallowing difficulty in tracheostomy patients should be clearly recognised requiring referral to SLT
- Swallowing difficulty in tracheostomy patients should be the subject of ongoing study



Complications and adverse events

Complications in critical care

Table 6.2 Complications in the critical care unit (*Answers may be multiple referring to the numbers of complications not patients*).

	Complication		Recurrence
	n	%	n
Infection - respiratory	190	9.7	36
Bleeding - minor	92	4.7	13
Accidental decannulation/ displacement	80	4.1	12
Obstruction	45	2.3	7
Pneumothorax	35	1.8	6
Infection - local	34	1.7	5
Dysphagia	26	1.3	10
Bleeding major	25	1.3	6
Surgical emphysema	24	1.2	1
Aspiration	19	1.0	2
Pneumo-mediastinum	8	<1	0
Fistula formation - trache-oesophageal	5	<1	3
Infection - mediastinitis	4	<1	0
Tracheal damage - to tracheal ring/necrosis	2	<1	0

Number of complications per patient

Table 6.1 Number of patients with complications vs. number of complications per patient

	n	%
1	327	70.9
2	98	21.3
3	29	6.3
4	6	1.3
5	1	<1
Total	461	

Timing of complications in critical care

Table 6.3 Timing of complications in relation to insertion

	Before day 7	Day 7 or after	Subtotal	Not answered	Total
Surgical emphysema	15	4	19	5	24
Pneumo-mediastinum	2	3	5	3	8
Pneumothorax	19	11	30	5	35
Accidental decannulation/ displacement	32	39	71	9	80
Obstruction	19	21	40	5	45
Bleeding - minor	67	14	81	11	92
Bleeding - major	14	6	20	5	25
Infection - local	19	10	29	5	34
Infection - mediastinitis	1	0	1	3	4
Infection - respiratory	82	75	157	33	190
Aspiration	4	9	13	6	19
Fistula formation - tracheo- oesophageal	1	0	1	4	5
Tracheal damage - to tracheal ring/necrosis	1	1	2	0	2
Dysphagia	3	15	18	8	26

Major complications & consultant input

Table 6.6 Major complications in critical care patients with a tracheostomy

Complication	Complication		Consultant present in the first hour		
	n	%	Yes	No	Not answered
Major bleeding	25	1.3	18	3	4
Pneumothorax	35	1.8	26	1	8
Accidental decannulation/displacement	80	4.1	36	26	18
Obstruction	45	2.3	21	14	10

Case study

A middle aged patient with a high BMI sustained a high cervical fracture with a high thoracic sensory level due to spinal cord trauma. There were other injuries, to chest & face, and the patient underwent a difficult surgical tracheostomy insertion. At day 10 and during day time hours the tube was either blocked or displaced which resulted in a cardiac arrest responding to a short period of CPR and tube re-insertion. Management was complicated by lack of venous access at this point.

Advisors commented on the speed of onset of severe hypoxia and arrest in this patient which was ultimately very well managed by resident staff. Despite the potential for major harm as a result of this complication the patient was successfully decannulated about one month later.

Ward complications

Table 6.9 Complications on the ward (*Answers may be multiple*)

	Complication		Recurrence
	n	%	Yes
Infection - respiratory	82	14.8	14
Accidental decannulation/ displacement	35	6.3	3
Dysphagia	35	6.3	7
Bleeding - minor	19	3.4	4
Aspiration	18	3.2	3
Infection - local	17	3.1	1
Surgical emphysema	6	1.1	1
Obstruction	5	<1	1
Bleeding major	4	<1	1
Pneumothorax	3	<1	0
Pneumo-mediastinum	1	<1	0
Infection - mediastinitis	1	<1	0
Fistula formation - trache-oesophageal	1	<1	0

Long term effects – Advisor opinion

Table 6.11 The patient suffered serious long term effects from a clinically significant tracheostomy related complication (*Advisors' opinion*)

	n	%
Yes	12	4.1
No	281	95.9
Subtotal	293	
Insufficient data	24	
Not answered	79	
Total	396	

Training in blocked & displaced tubes

Table 6.13 Procedures for the management of blocked or displaced tubes

	Yes		No		Subtotal	Not answered
	n	%	n	%	n	n
Is there a procedure for the management of patients whose tracheostomy is blocked or displaced?	174	80.6	42	19.4	216	3

Table 6.14 Training in the management of blocked or displaced tubes

	n	%
Yes	124	72.1
No	48	27.9
Subtotal	172	
Not answered	2	
Total	174	

Resuscitation training

Table 2.44 Resuscitation policies and protocols

	Yes		No		Subtotal	Not answered
	n	%	n	%		
Resuscitation policy covering the patient with a tracheostomy but whose upper airway may still be patent	116	54.0	99	46.0	215	4
Resuscitation policy covering the patient who is totally reliant on breathing through the stoma in the neck, i.e. a laryngectomy stoma	97	45.3	117	54.7	214	5
Protocol for the management of neck breathers who present as an emergency	77	36.3	135	63.7	212	7

Bedside capnography – organisational data

Table 2.20 Continuous bedside capnography used at all times when ventilated

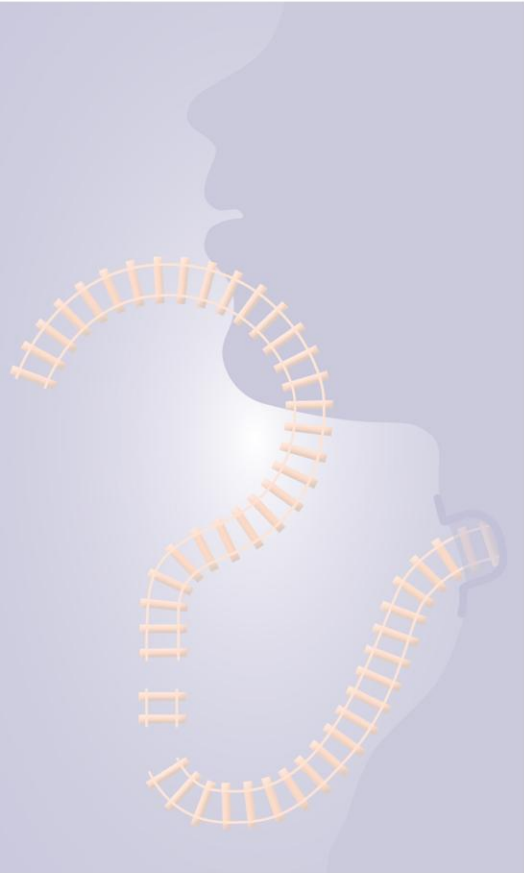
	n	%
Yes - for all beds	218	71.5
Yes - for some beds	23	7.5
Other	11	3.6
No	53	17.4
Subtotal	305	
Unknown	1	
NA	12	
Not answered	15	
Total	333	

Key findings

- 23.6% of Critical care patients and 31.3% of ward patients in this study experienced defined complications related to their tracheostomy
- The most serious complications involved tube displacement, obstruction, pneumothorax and major haemorrhage
- Accidental tube displacement was more common in ward based patients (6.3% vs. 4.1%)
- 80.6% (174/216) of hospitals had a policy for management of blocked and displaced tubes
- 27.9% (48/172) of hospitals did NOT provide training programme for management of blocked and displaced tubes
- 71.5% of units used continuous capnography when patients were ventilator dependent

Recommendations

- **Bedside staff caring for tracheostomy patients must be competent to recognise and manage common airway complications including tube obstruction or displacement ***
- Emergency action plans need to reflect the escalation policy for a difficult airway event in order to summon appropriate senior staff
- Training programmes in management of blocked and displaced tubes and difficult tube changes need to be delivered in accordance with existing national guidelines
- Core competences for the care of tracheostomy patients including resuscitation should be set out by Trusts using existing national resources
- Capnography must be available and used at each bed space whilst a patient is ventilator dependent



Outcomes in tracheostomy patients

Outcome on critical care

Table 7.1 Reasons for the critical care unit discharge questionnaire completion

	n	%
Decannulation	944	48.6
Discharge	657	33.8
Death	340	17.5
Subtotal	1941	
Not answered	15	
Total	1956	

Timing of decannulation on critical care

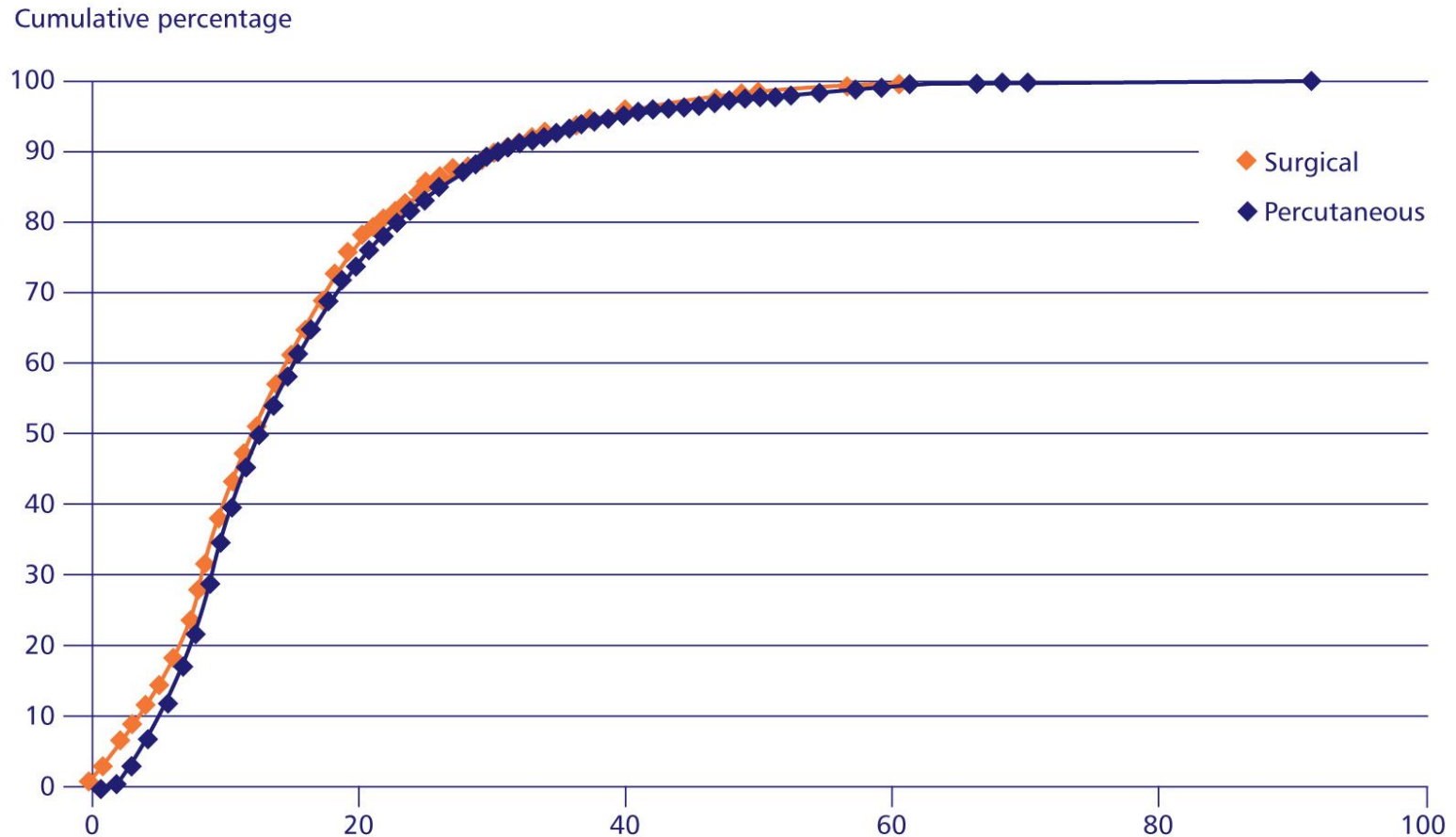


Figure 7.2 Days between insertion and decannulation in critical care

Early decannulation & trials of extubation

Table 7.5 Patients undergoing an early decannulation who underwent a trial of extubation prior to tracheostomy formation

	n	%
Yes	56	39.7
No	85	60.3
Subtotal	141	
Unknown	5	
Not applicable	10	
Total	156	

Airway assessment prior to decannulation

Table 7.7 Sufficiently careful airway assessment was made prior to decannulation (*Advisors' view*)

	n	%
Yes	122	79.7
No	31	20.3
Subtotal	153	
Insufficient data	70	
Not answered	9	
Total	232	

Case study

A middle aged patient was admitted from clinic with squamous cell carcinoma of the mouth and had a surgical tracheostomy under general anaesthetic prior to major head & neck resection and flap reconstruction. The patient was discharged to a surgical ward from critical care and decannulated very rapidly after a ward round decision by the registrar, a total of just 3 days after tracheostomy formation. No checks to confirm adequate cough, swallow etc. were performed.

Whilst the decannulation was successful, Advisors questioned why a simple bedside test of airway patency had not been performed first, and accompanied by basic documentation to explain the rationale for early decannulation.

Timing of critical care discharge

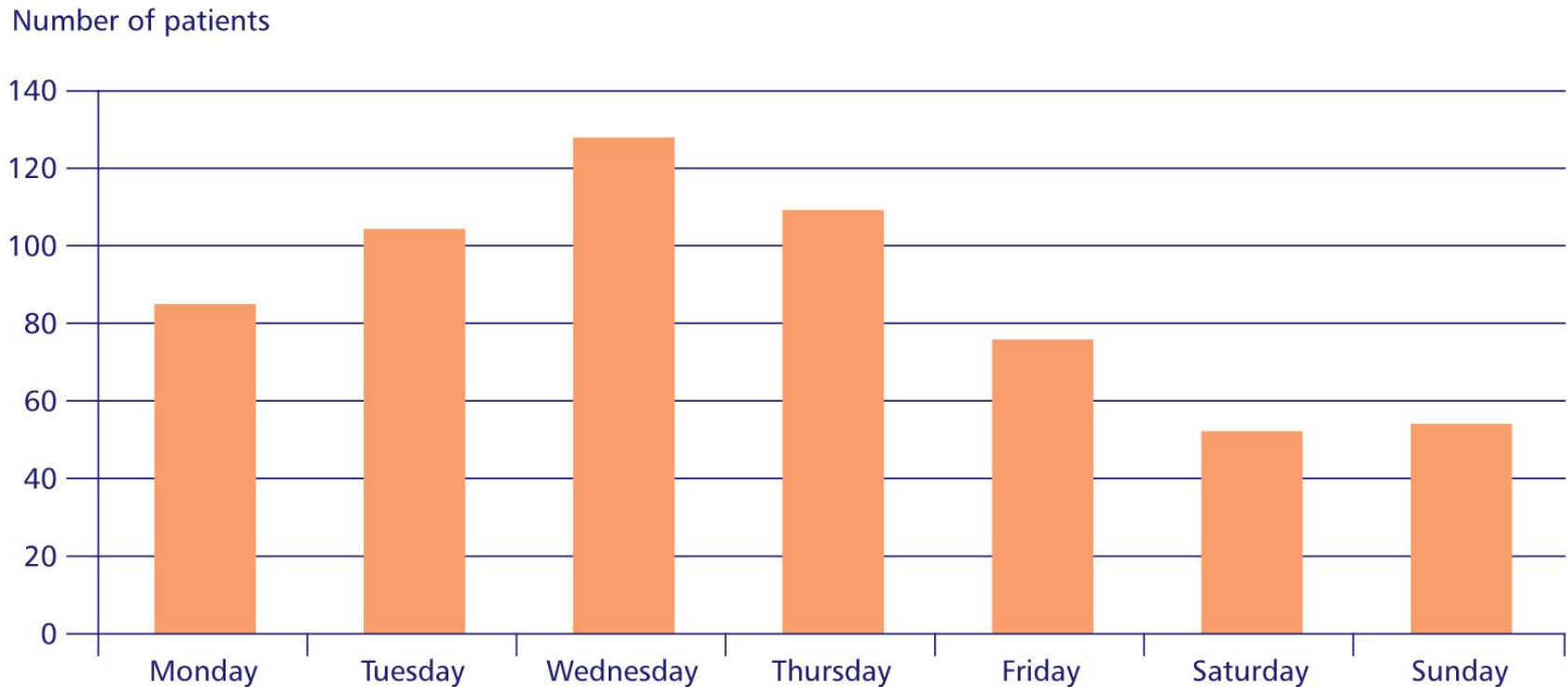


Figure 7.4 Critical care unit discharges with tracheostomy

Days between insertion & discharge

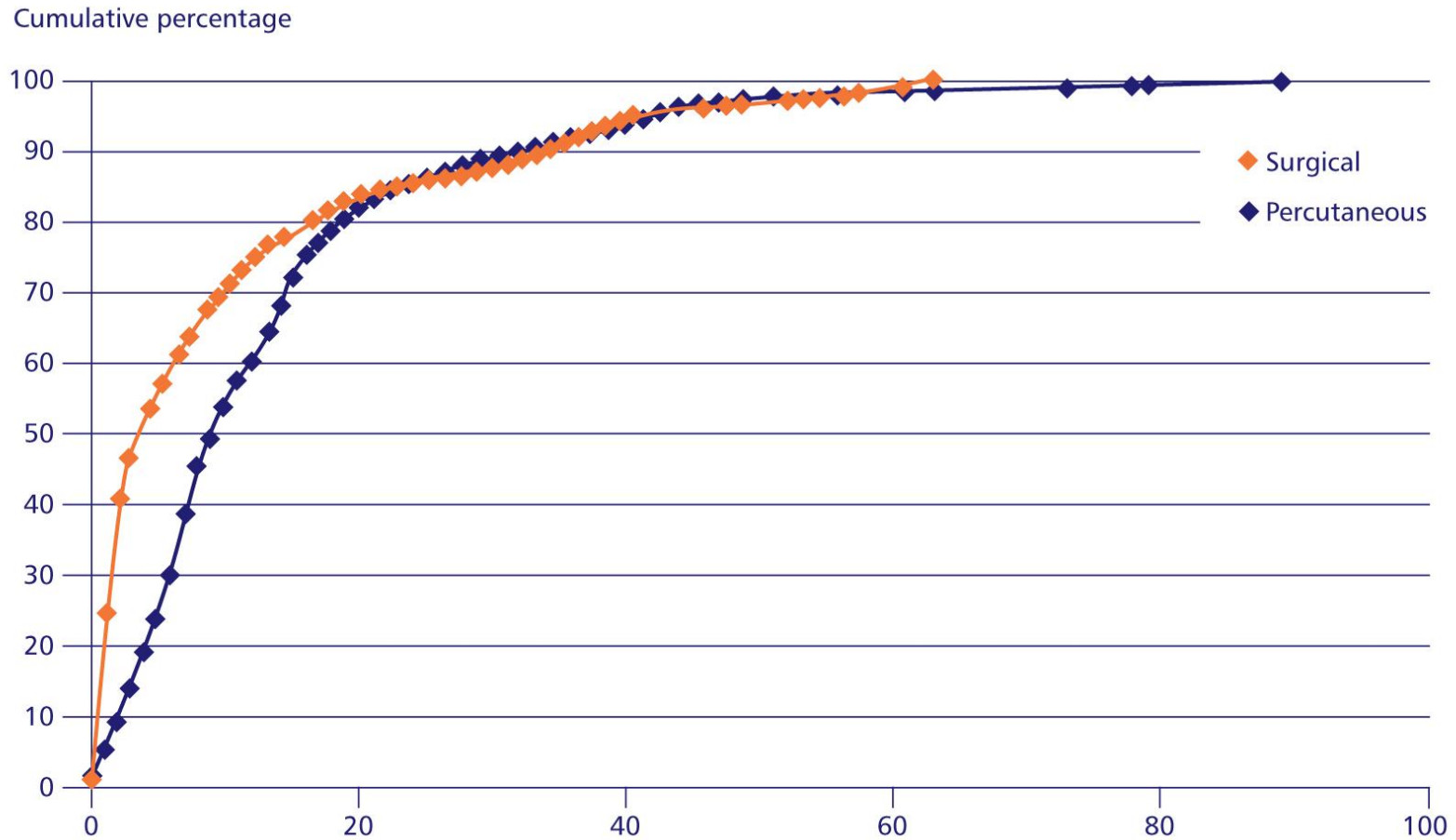


Figure 7.5 Days between tracheostomy insertion and discharge from the critical care unit

Location of care after critical care discharge

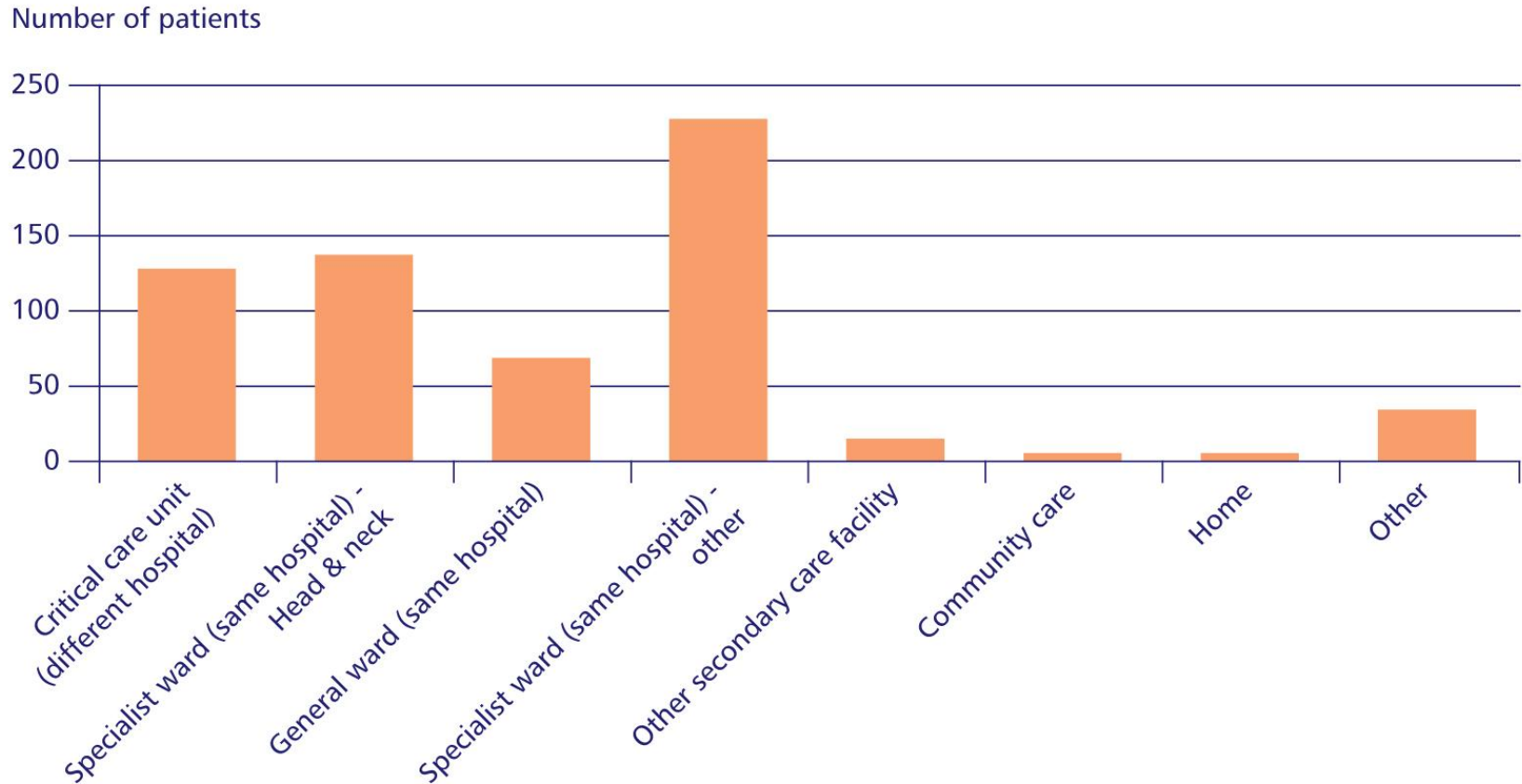


Figure 7.6 Location of tracheostomy patients after discharge from the critical care unit

Timing of critical care discharge

Table 7.9 Timing of discharge from the critical care unit

	n	%
08:00 - 17:59	346	68.8
18:00 - 07:59	157	31.2
Subtotal	503	
Not answered	154	
Total	657	

Discharge from critical care “out of hours”

Table 7.10 Destination after the critical care unit discharge

	n	%
Critical care unit (different hospital)	20	12.9
Specialist ward - head and neck (same hospital)	26	16.8
General ward (same hospital)	21	13.5
Specialist ward - other (same hospital)	74	47.7
Other secondary care facility	1	0.6
Other	13	8.4
Subtotal	155	
Not answered	2	
Total	157	

Information transfer

- 90.9% (541/595) of patients had a discharge summary provided when they left critical care
- 85% (460/541) of summaries did not provide several key pieces of information such as weaning plans and who had responsibility for tracheostomy decisions

Timing of ward admission

Table 7.13 Time of admission to ward

	n	%
08:00 - 17:59	219	57.0
18:00 - 07:59	165	43.0
Subtotal	384	
Unknown	126	
Not answered	43	
Total	553	

Outcome on the ward

Table 7.2 Summary of outcomes on the ward

	Type of tracheostomy insertion				Total
	Surgical	Percutaneous	Subtotal	Not answered	
Death	13	25	38	1	39
Decannulation	172	146	318	16	334
Discharge alive with the tracheostomy in situ	50	30	80	2	82
Alive and day 30 after insertion in theatre and transferred straight to ward	14	1	15	0	15
Alive and day 30 after leaving the critical care unit	18	28	46	2	48
Alive and day 30 after insertion - location of insertion unknown	13	10	23	5	28
Subtotal	280	240	520	26	546
Not answered	4	0	4	3	7
Total	284	240	524	29	553

Ward discharge with a tracheostomy

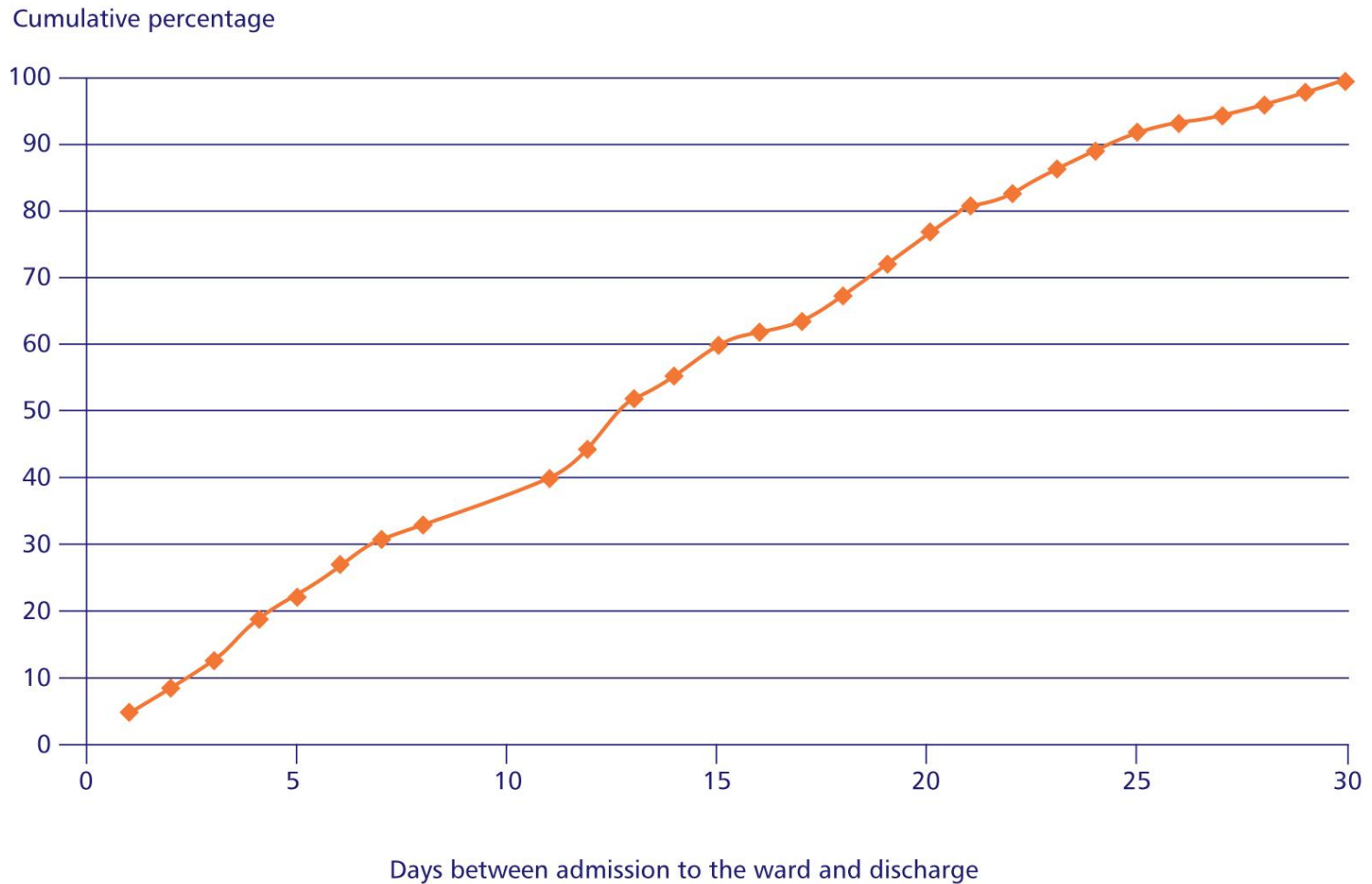


Figure 7.7 Discharge from ward with tracheostomy in place by day 30

Reasons for continued ward stay at day 30

Table 7.17 Reasons for patients with tracheostomy being still on ward at day 30 after insertion (*Answers may be multiple*)

	n
Ongoing need for secondary medical care	45
Difficulties in securing appropriate community care	14
Difficulties in finding a specialist rehabilitation unit	16
Other	9
Subtotal	84
Not answered	20

Case study

A young patient had a major stroke and needed airway support/protection. After initial intubation a percutaneous tracheostomy was performed on critical care to facilitate ongoing needs. Whilst the patient received good SLT & physiotherapy input on the ward to which they were discharged, there were several problems with humidification during the ward stay. Ultimately the patient was prepared for discharge to a nursing home and there was evidence of good levels of training of receiving staff.

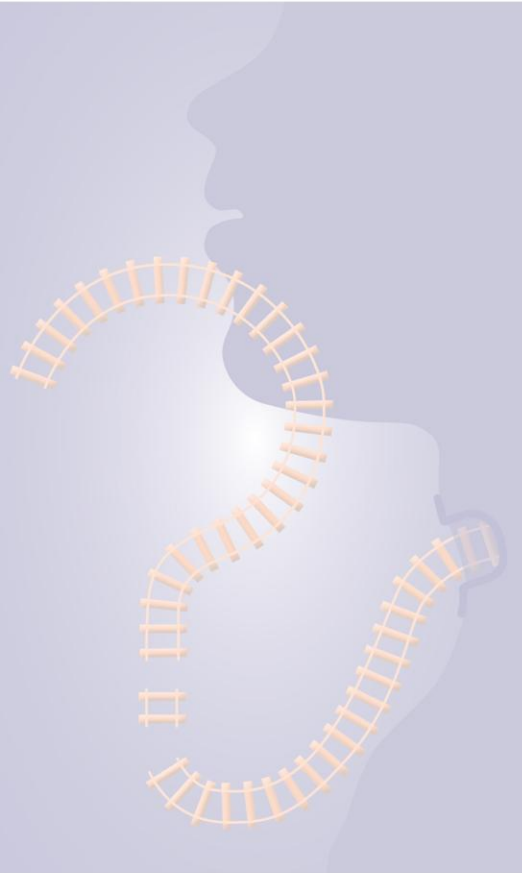
Advisors commented upon the general lack of provision for such training in many parts of the country which often caused major delays in hospital discharge.

Key findings

- 18% (161/910) underwent decannulation less than 7 days from Tracheostomy insertion in critical care, with 85/141 patients not having undergone a trial of extubation prior to tracheostomy formation
- 31% (157/503) of critical care discharges of tracheostomy patients and 43% (165/384) of ward admissions occurred after 18.00 and before 08.00
- 46 patients were discharged from critical care after 21.00 and before 06.00
- 90.9% (541/595) of patients had a discharge summary provided when they left critical care but 85% of summaries did not include key information about ongoing care of the tracheostomy

Recommendations

- If patients do not undergo a trial of extubation prior to tracheostomy formation the reason should be documented
- **Unplanned and night time discharge of a patient with a tracheostomy is not recommended, particularly in patients with newly formed tracheostomy or those recently weaned from respiratory support ***
- Wards accepting tracheostomy patients should be in a state of readiness in terms of equipment and competences
- Multidisciplinary agreement on minimum airway assessments prior to decannulation should be established
- Quality of discharge information should be improved and include key information about tracheostomy care



Overall assessment of care

Overall assessment of care – critical care

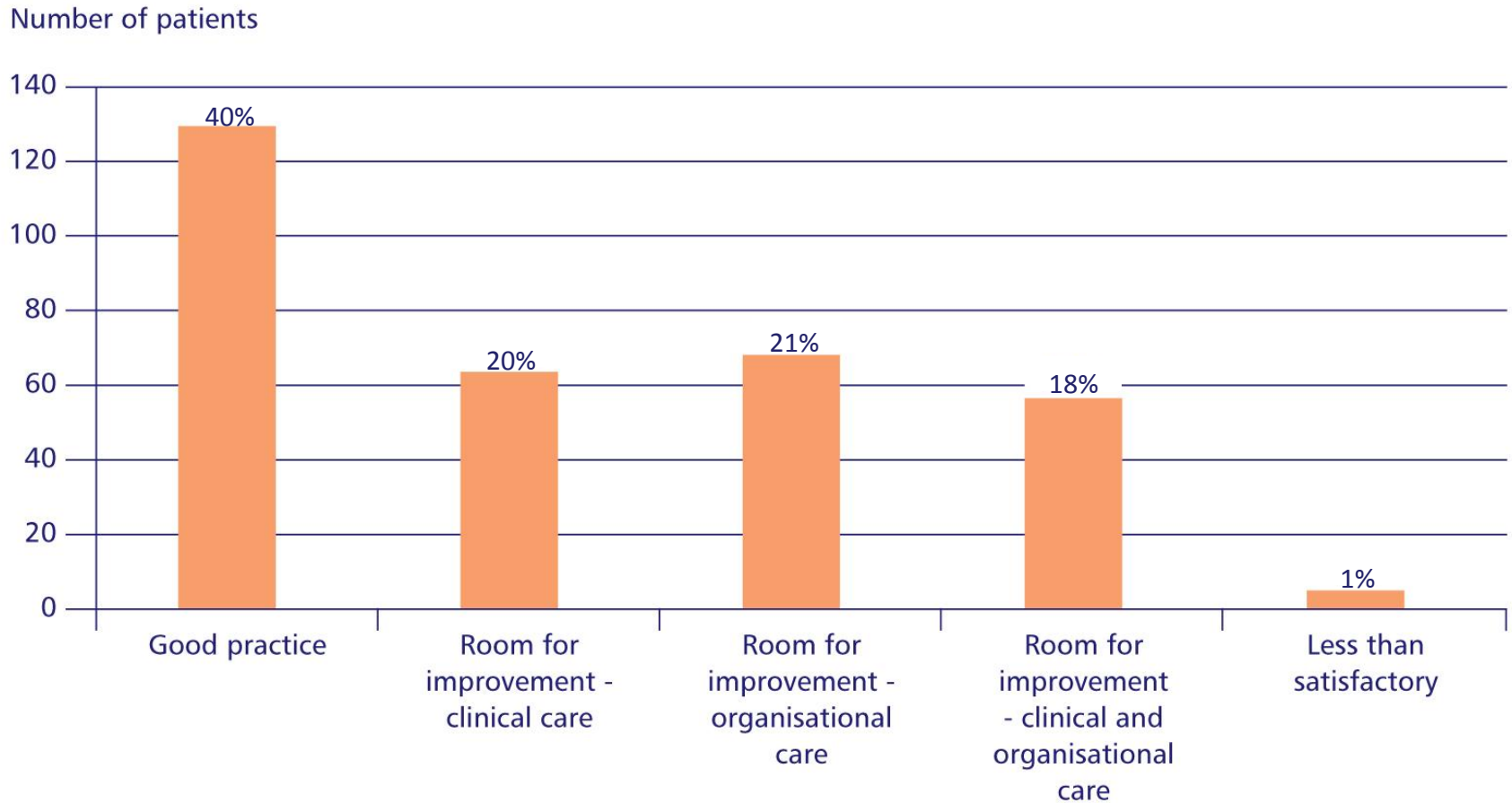


Figure 7.8 Overall assessment of care - critical care unit

Overall assessment of care – ward

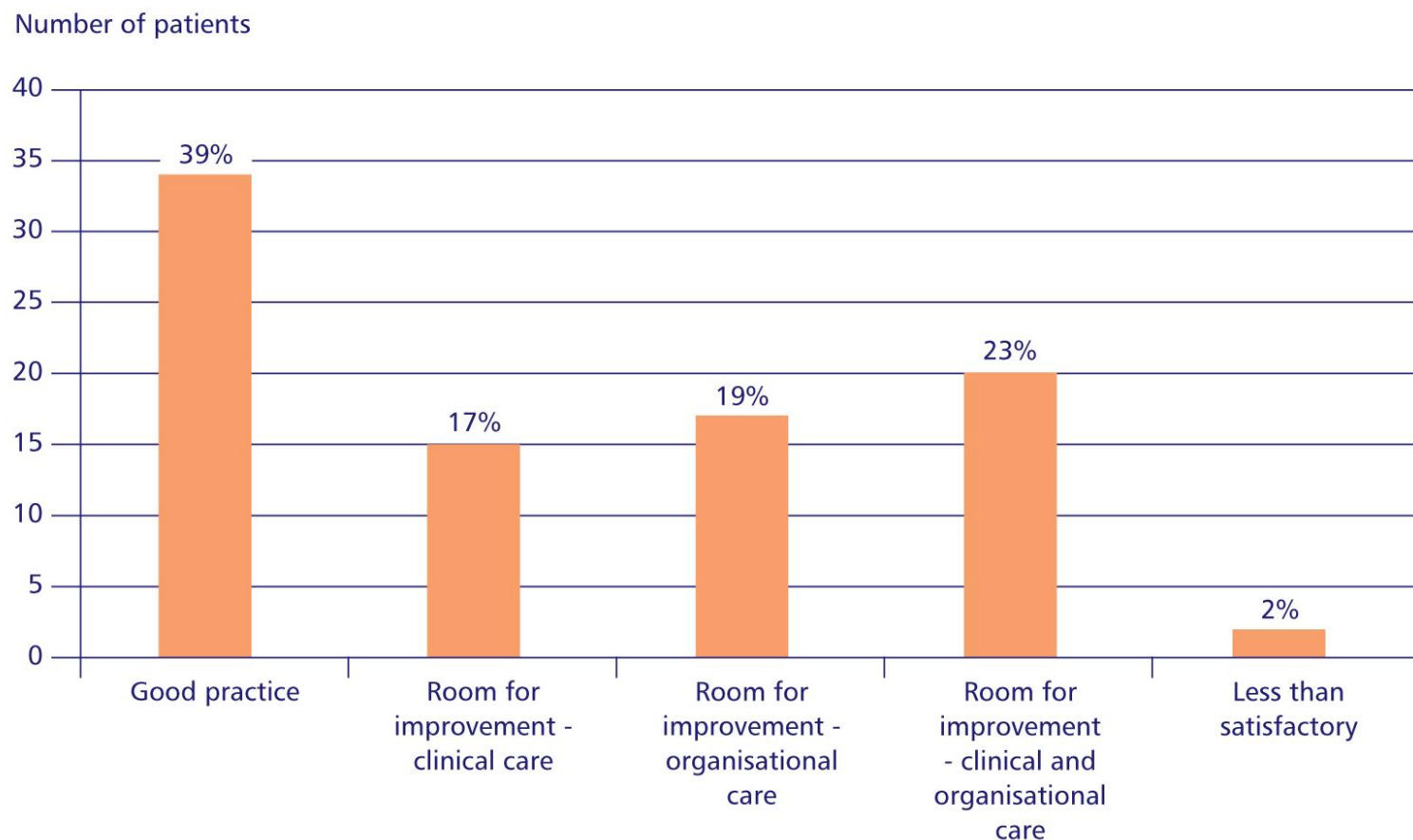


Figure 7.9 Overall assessment of care ward tracheostomy patients

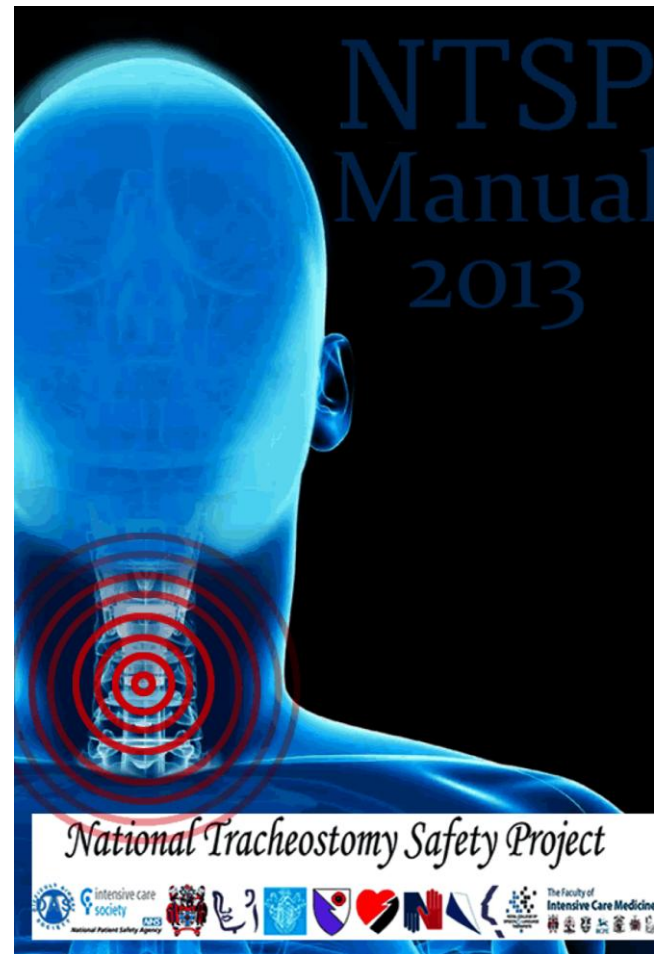
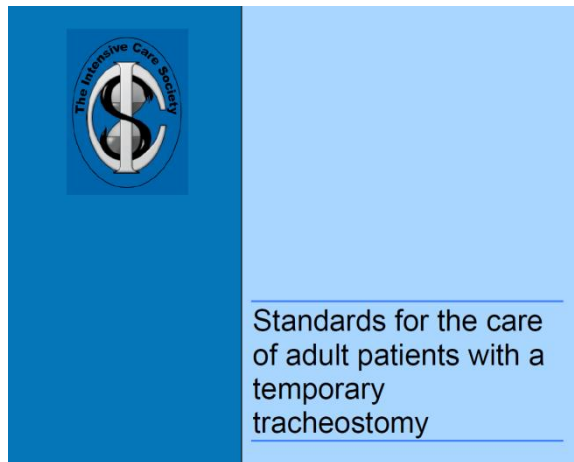
Principal recommendations

- Tracheostomy insertion should be recorded and coded as an operative procedure in all locations, and data collection should be as robust as in a theatre environment. This will facilitate planning and allow national review and audit
- The diameter and length of the tracheostomy tube should be appropriate for the size and anatomy of the individual patient and should generally contain an inner tube
- Training for bedside staff should include routine care as well as resuscitation procedures for tracheostomy patients. This should be supported by hospital wide guidance for tracheostomy care. Tube data as well as essential equipment should be clearly available at the bedside

Principal recommendations

- Multidisciplinary care pathways which provide continuity of care between Critical Care and ward clinicians, and facilitate decannulation and discharge planning need to be established for all tracheostomy patients
- Bedside staff caring for tracheostomy patients must be competent to recognise and manage common airway complications
- Unplanned and night time discharge of a patient with a tracheostomy is not recommended, particularly in patients with newly formed tracheostomy or those recently weaned from respiratory support

Key references



Summary

- Tracheostomy insertion is regarded as a relatively low risk procedure which can now be carried out at the bedside in many high risk patients
- Information on how many procedures are carried out percutaneously has been poor and not captured by existing data collection systems to date
- Whilst improving patient comfort the importance of meticulous ongoing care of the tracheostomy patient is recognised and bedside staff must have the competence and confidence to deal with common emergencies

Summary

- NCEPOD presents a study which encompasses the full care pathway in patients with a new tracheostomy in hospital, alongside an extensive review of organisational aspects of care
- The study reinforces recommendations made by other healthcare groups, and presents new information which can be used as a basis for discussion and future planning to improve patient outcomes

Thank you

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