

# 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+
  - 25<sup>th</sup> February – 12<sup>th</sup> 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

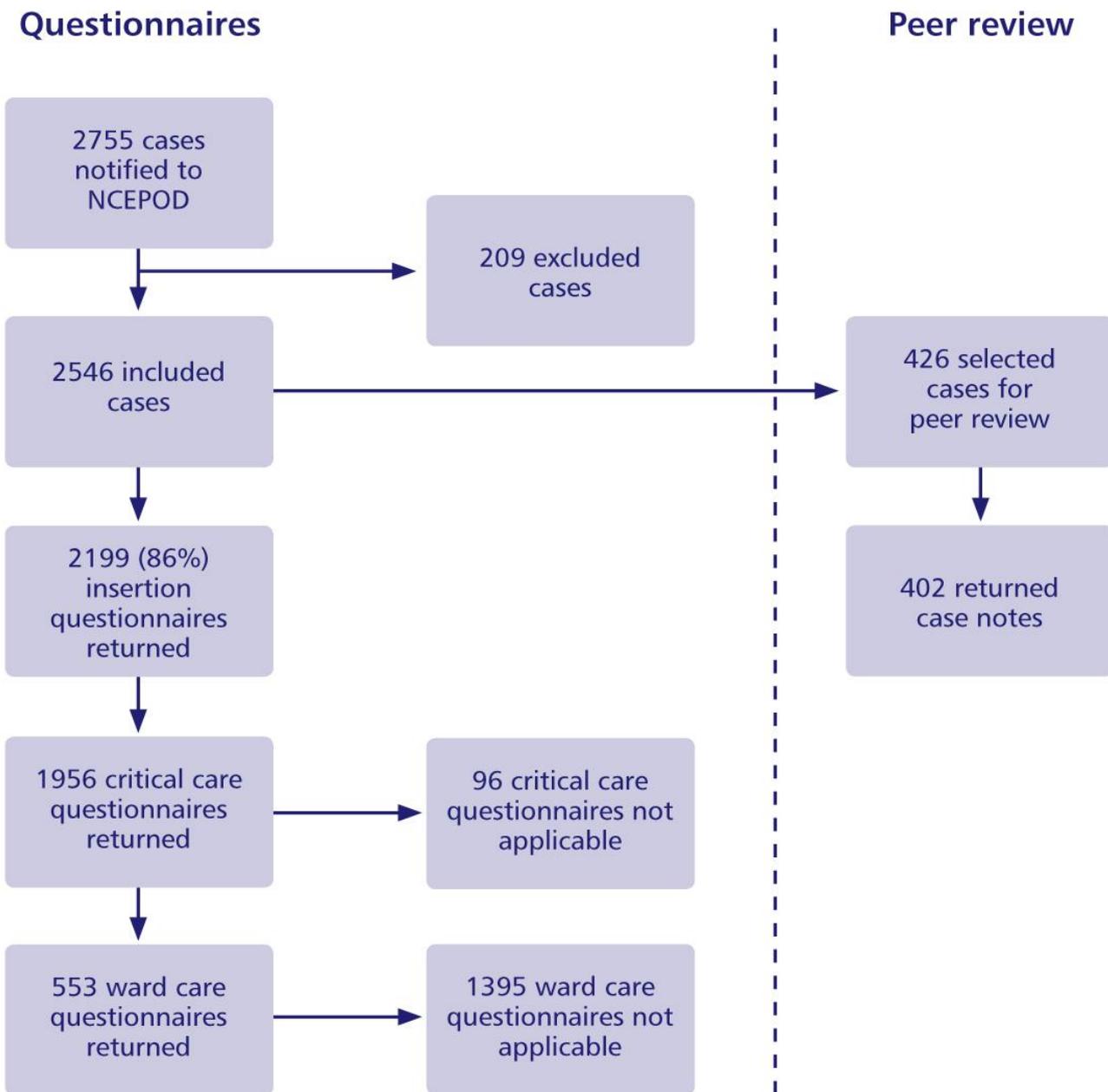


Figure 1.3 Data returns

# Patient overview

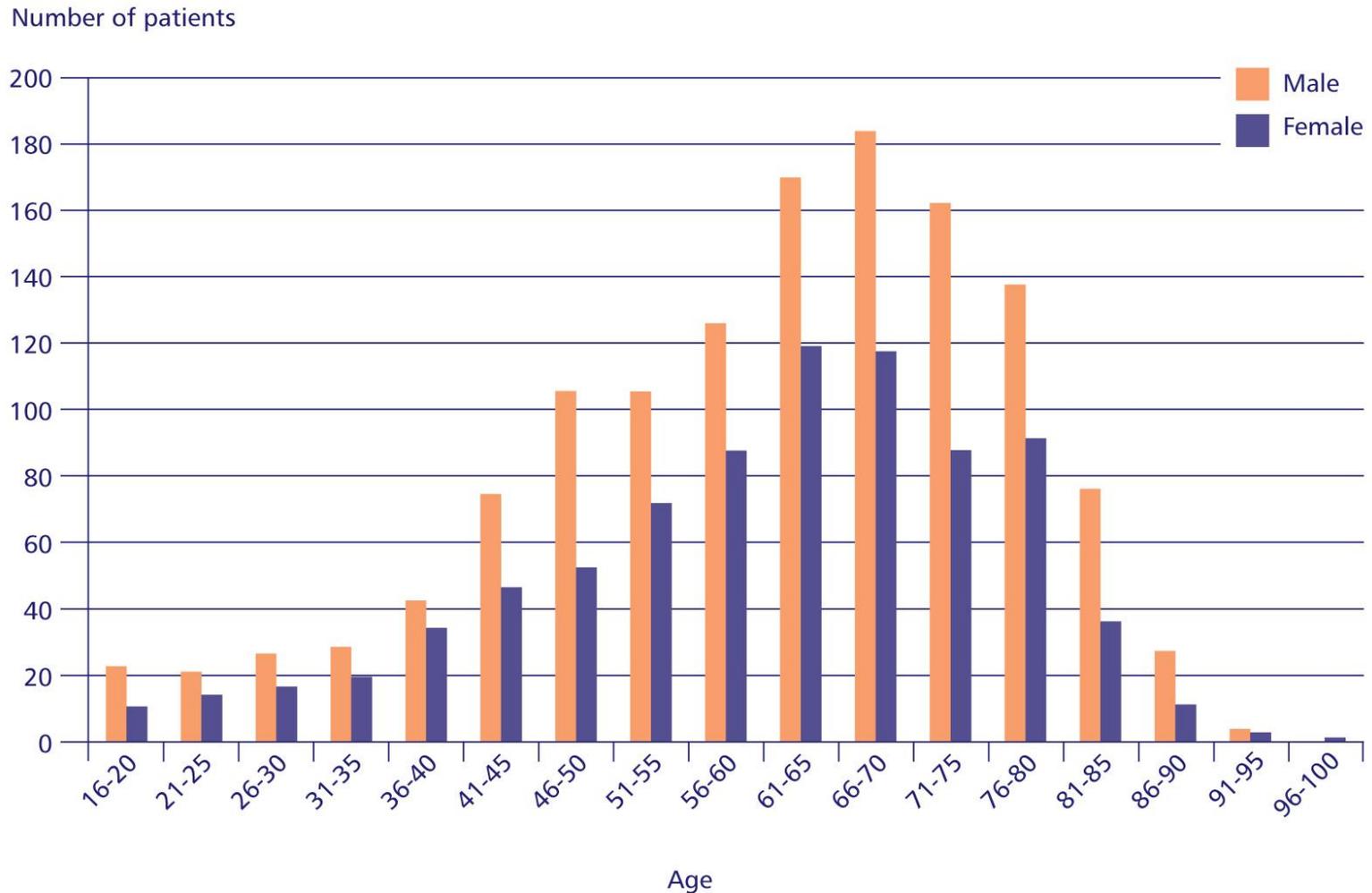


Figure 1.4 Age of patients included in the study

# Patient overview

**Table 1.1 Mode of insertion**

|              | n           | %    |
|--------------|-------------|------|
| Percutaneous | 1530        | 69.6 |
| Surgical     | 669         | 30.4 |
| <b>Total</b> | <b>2199</b> |      |

# Patient overview

Table 1.3 Principal diagnosis by gender

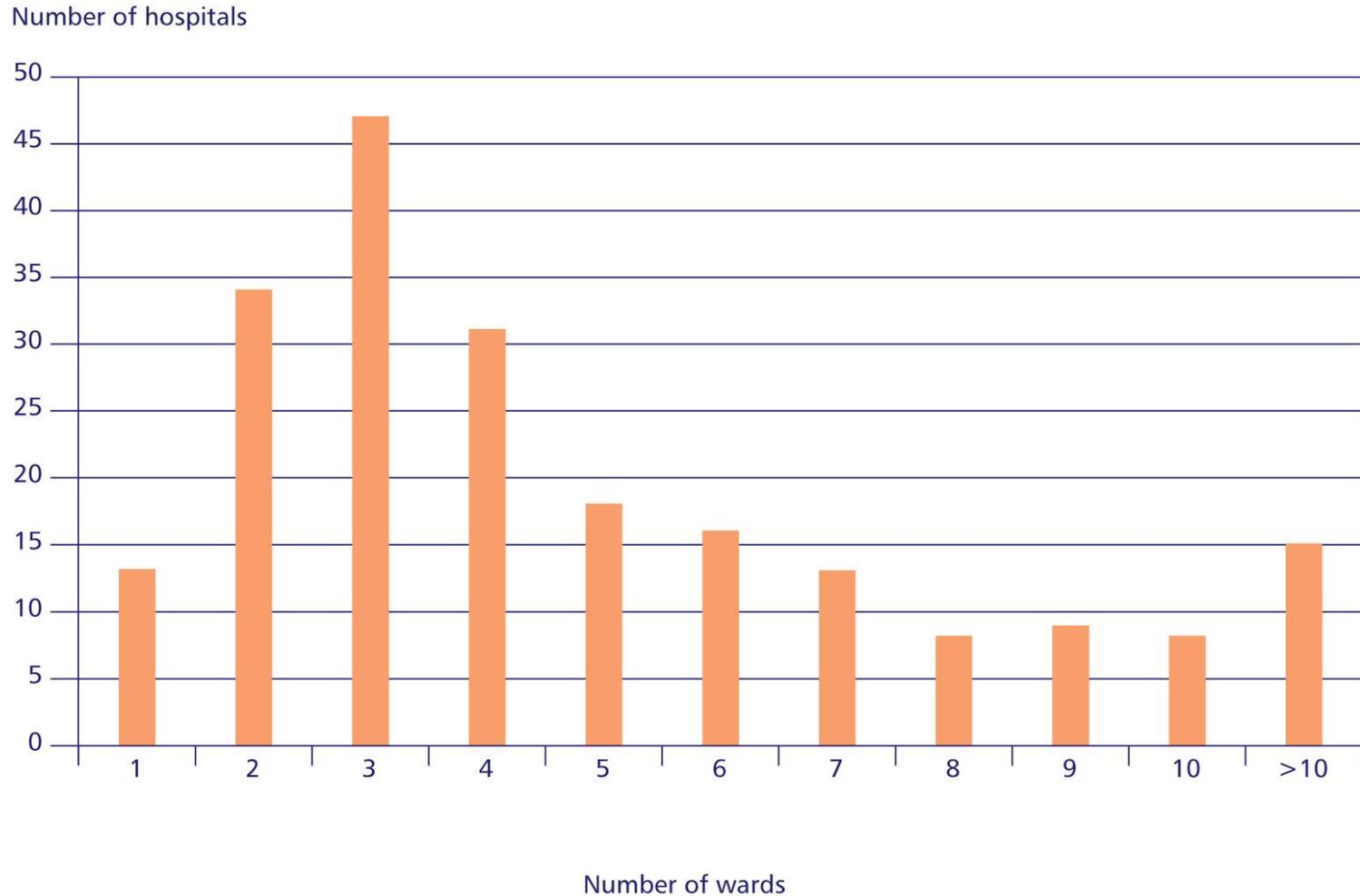
|                                | Male        |      | Female     |      | Not answered |
|--------------------------------|-------------|------|------------|------|--------------|
|                                | n           | %    | n          | %    | n            |
| Respiratory                    | 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            |
| <b>Subtotal</b>                | <b>1327</b> |      | <b>809</b> |      | <b>3</b>     |
| Not answered                   | 31          |      | 26         |      | 3            |
| <b>Grand total</b>             | <b>1358</b> |      | <b>835</b> |      | <b>6</b>     |

# 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              |
| <b>Total</b>                                 | <b>161</b>        | <b>194</b>         | <b>68</b>      |

# Organisation of care



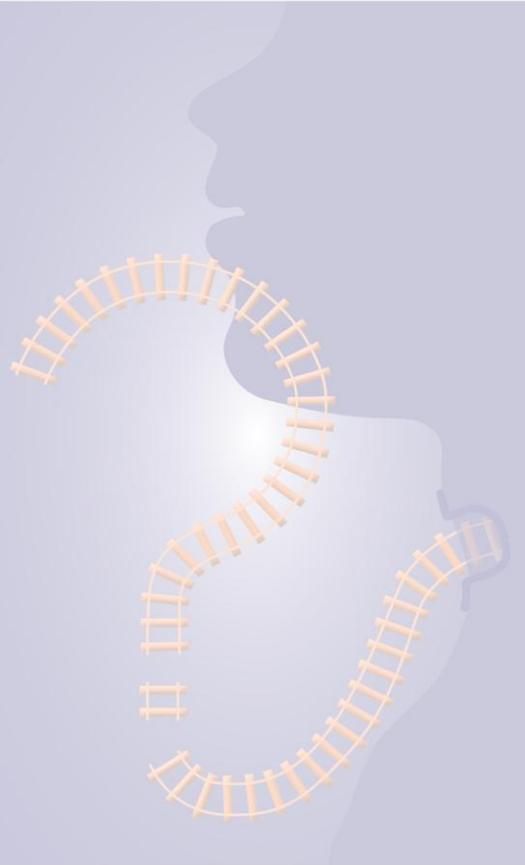
**Figure 2.1** Number of wards where patients with tracheostomies may have been cared for (*hospital questionnaire*)

# 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.



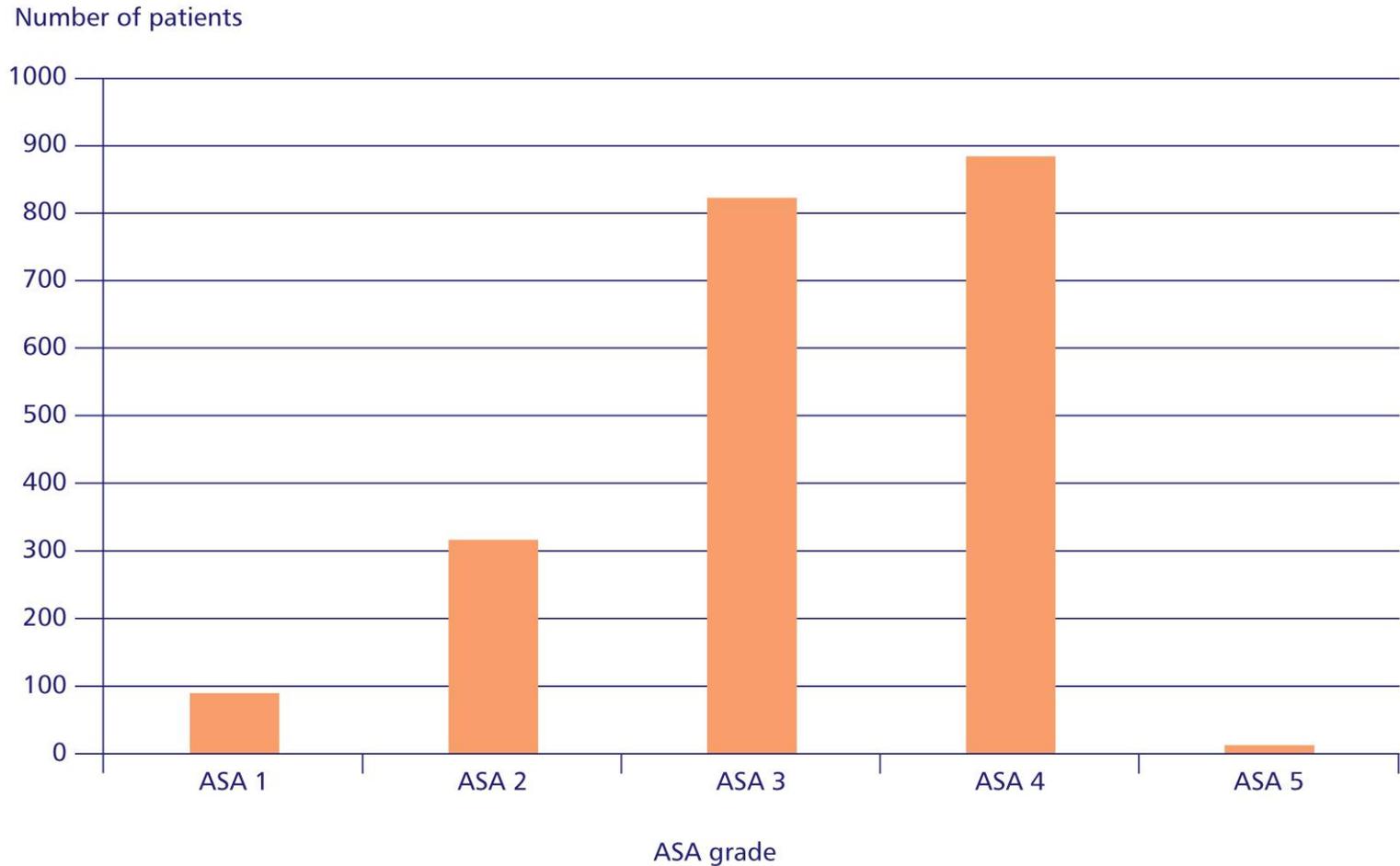
# The insertion of tracheostomies

# Urgency of admission

**Table 3.3 Classification of urgency of admission to hospital**

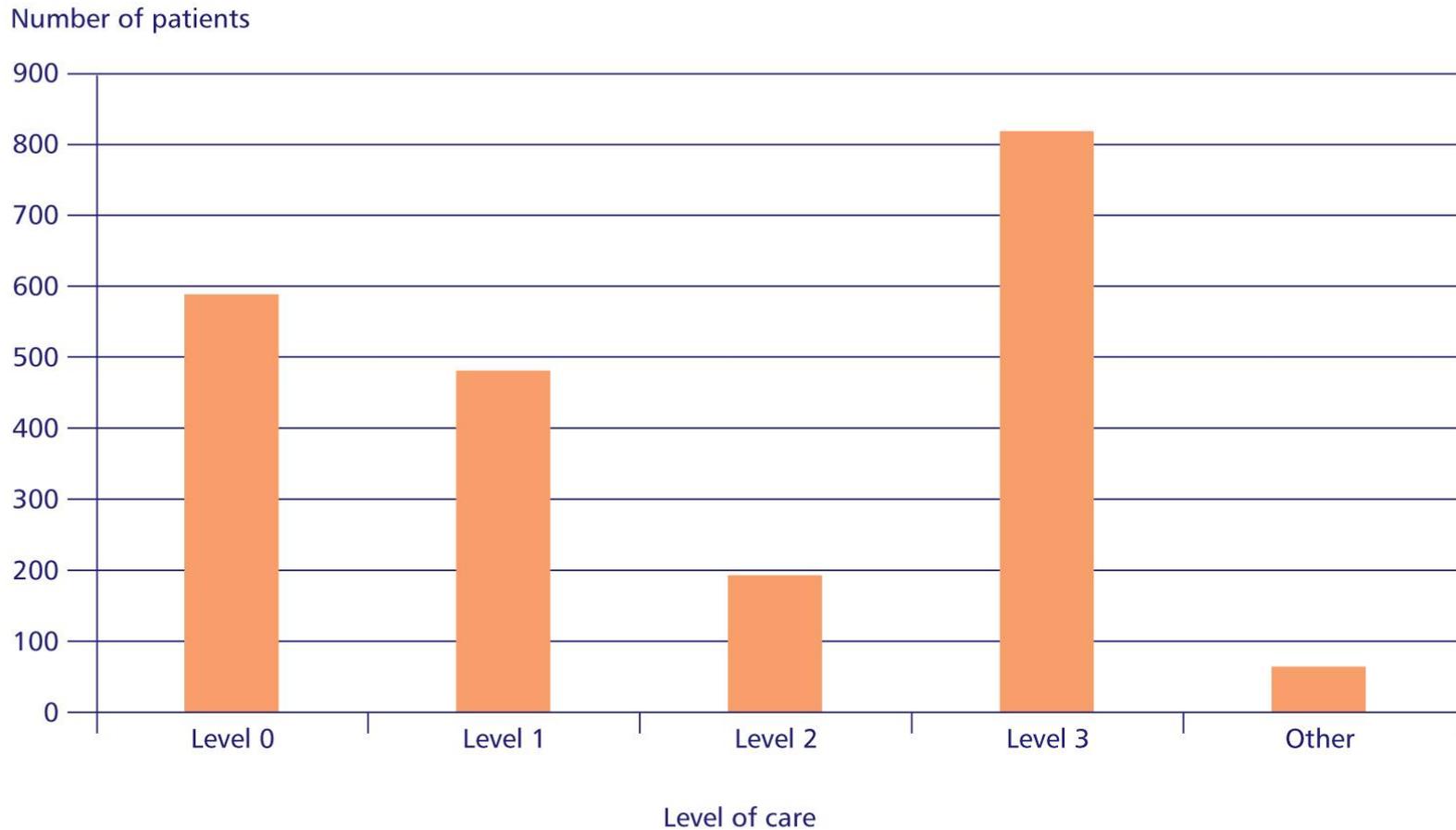
|                 | <b>n</b>    | <b>%</b> |
|-----------------|-------------|----------|
| Elective        | 406         | 18.8     |
| Emergency       | 1756        | 81.2     |
| <b>Subtotal</b> | <b>2162</b> |          |
| Not answered    | 37          |          |
| <b>Total</b>    | <b>2199</b> |          |

# ASA prior to insertion



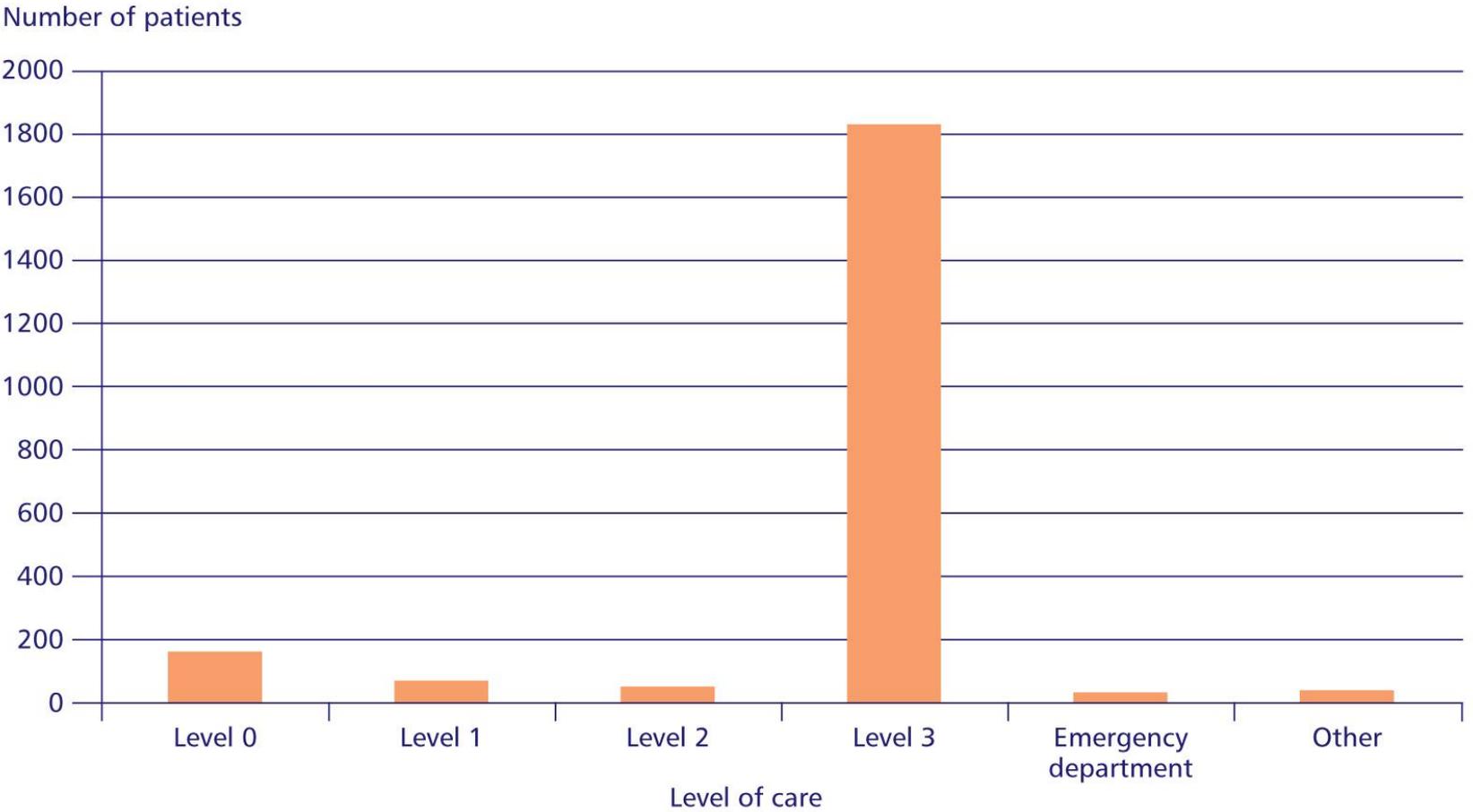
**Figure 3.1 ASA status**

# 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 |
| <b>Subtotal</b> | <b>1515</b>  |      | <b>647</b> |      |
| Not answered    | 15           |      | 22         |      |
| <b>Total</b>    | <b>1530</b>  |      | <b>669</b> |      |

# Urgency of procedure

Table 3.5 Urgency of procedure

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

# Day of insertion

Number of patients

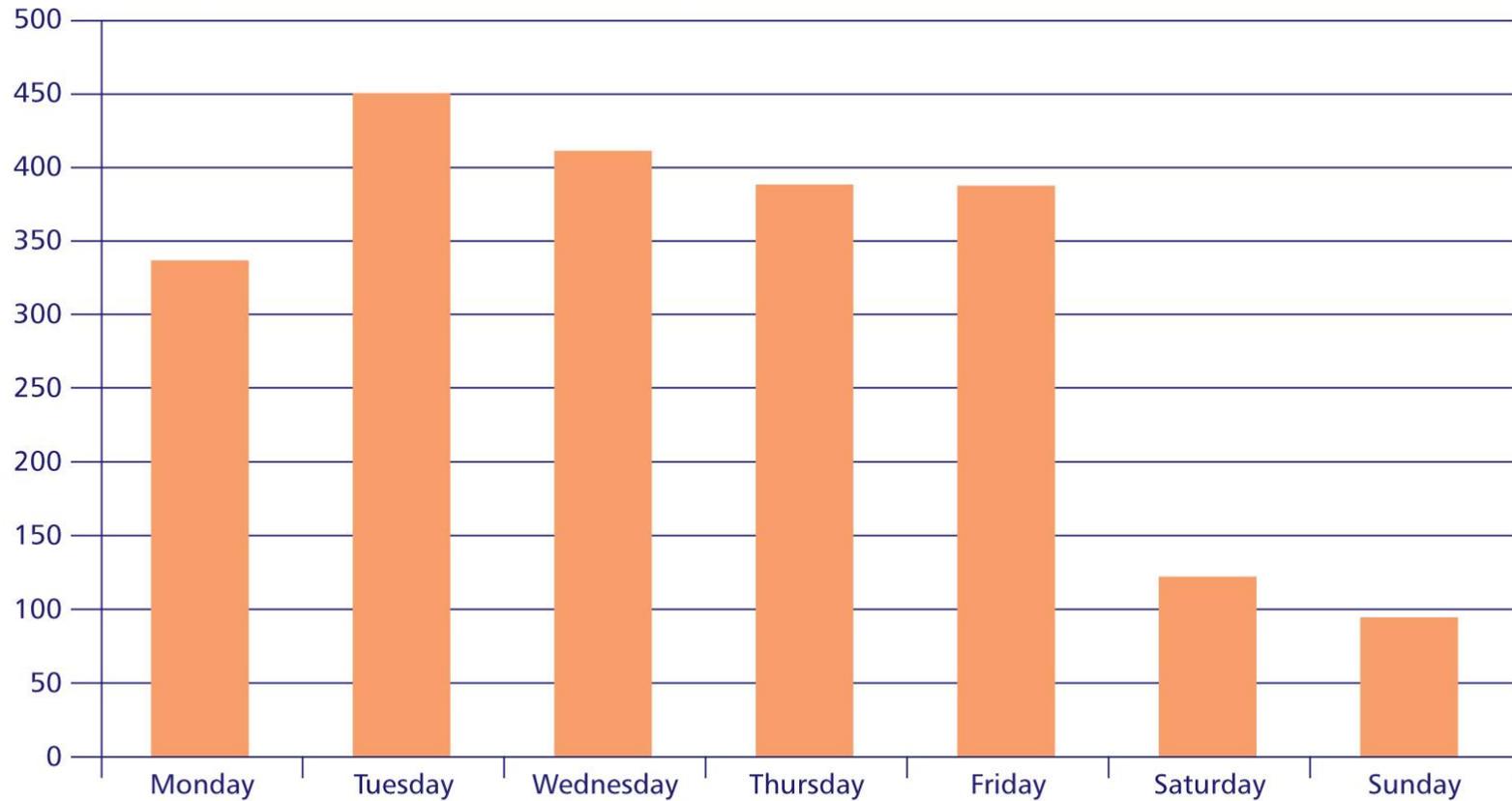
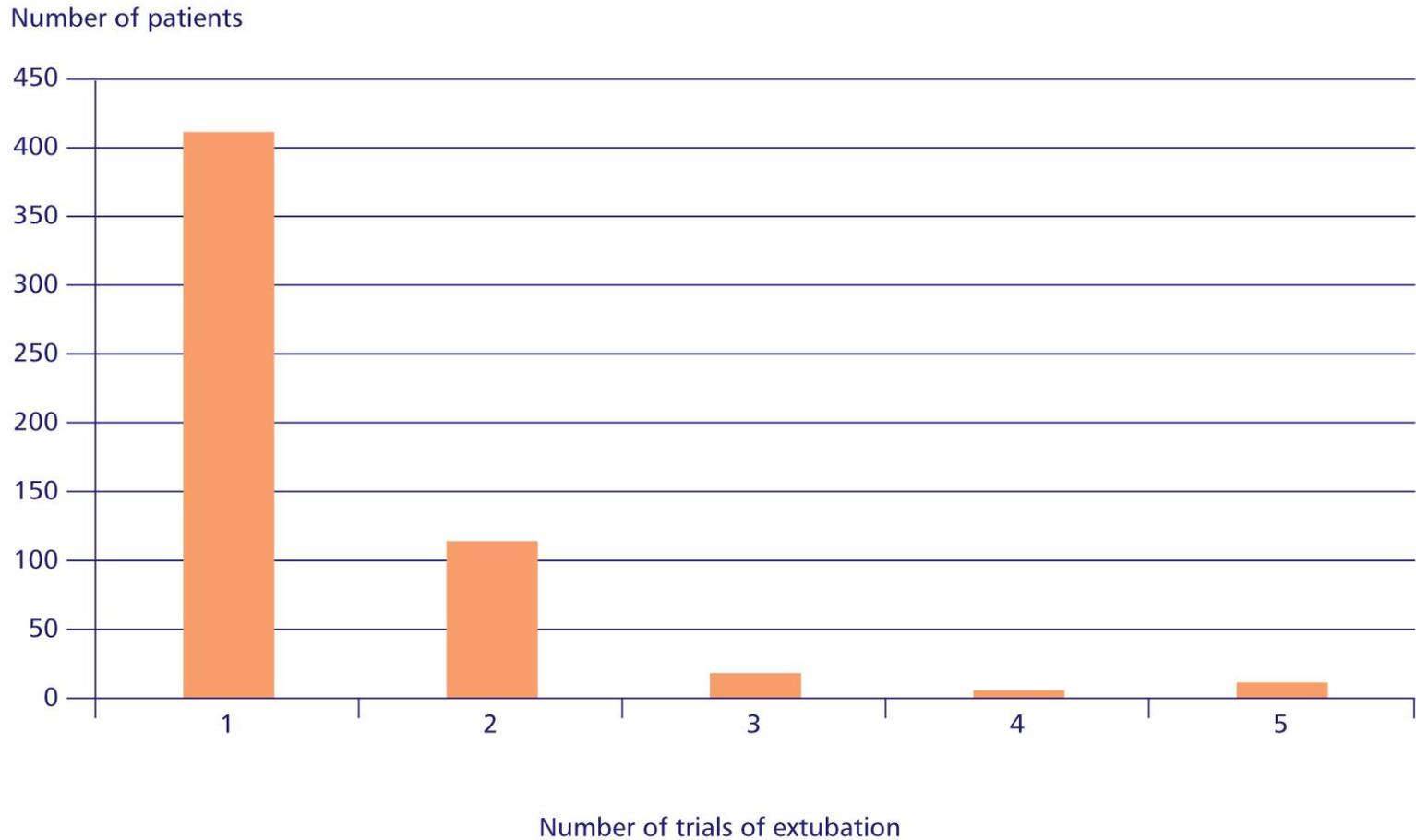


Figure 3.7 Day of insertion

# 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 |
| <b>Subtotal</b>   | <b>354</b> |      |
| Insufficient data | 32         |      |
| Not answered      | 10         |      |
| <b>Total</b>      | <b>396</b> |      |

# 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 |
| <b>Subtotal</b>   | <b>291</b> |      |
| Insufficient data | 82         |      |
| Not answered      | 23         |      |
| <b>Total</b>      | <b>396</b> |      |

# 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  |
| <b>Subtotal</b> | <b>217</b> |      |
| Not answered    | 1          |      |
| <b>Total</b>    | <b>218</b> |      |

# BMI

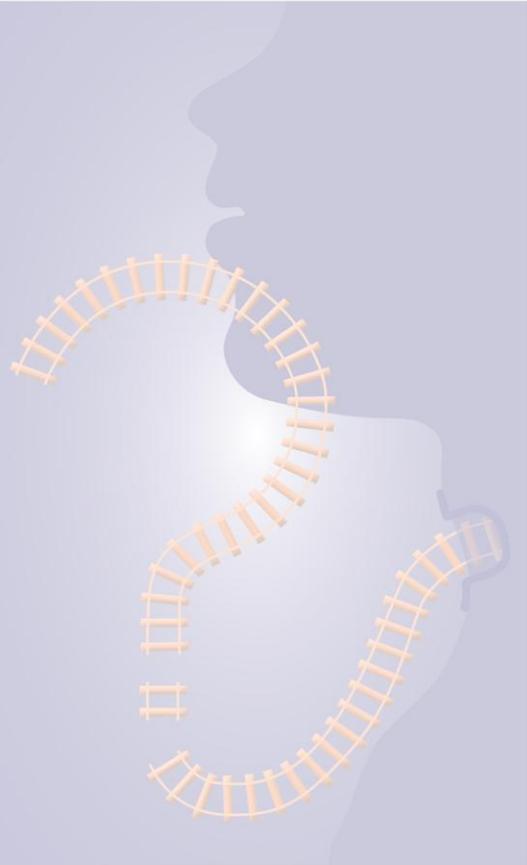
**Table 3.9 Classification of BMI where available**

|                | n           | %    |
|----------------|-------------|------|
| Underweight    | 80          | 4.2  |
| Normal         | 643         | 33.7 |
| Overweight     | 621         | 32.5 |
| Obese          | 474         | 24.8 |
| Morbidly obese | 92          | 4.8  |
| <b>Total</b>   | <b>1910</b> |      |

# Case study

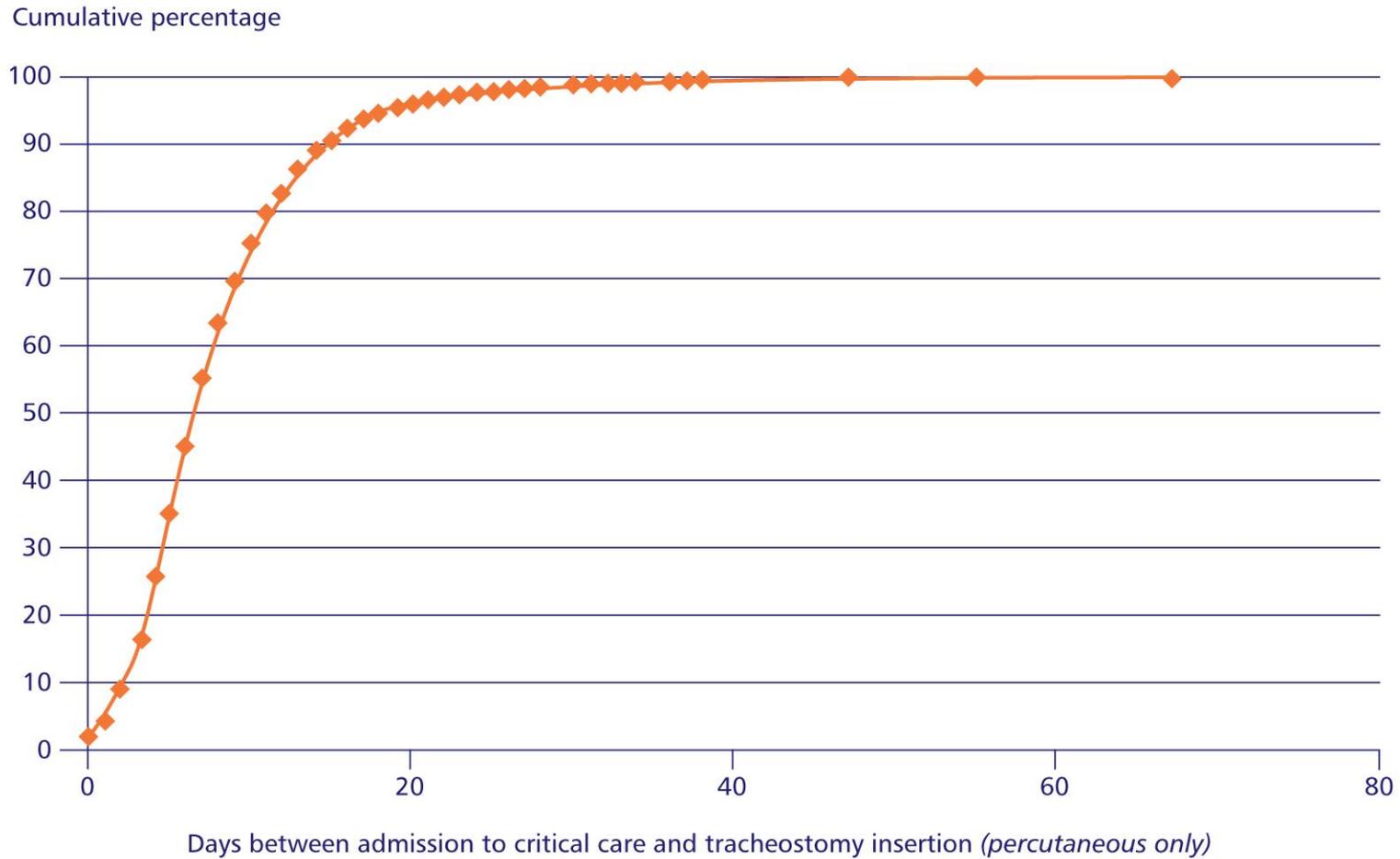
An elderly and obese patient with sepsis and peritonitis was transferred to ICU following a Hartman's procedure. A consultant intensivist inserted a standard length percutaneous tracheostomy tube after 6 days because of failure to wean. The following day the patient de-saturated and suffered a PEA cardiac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

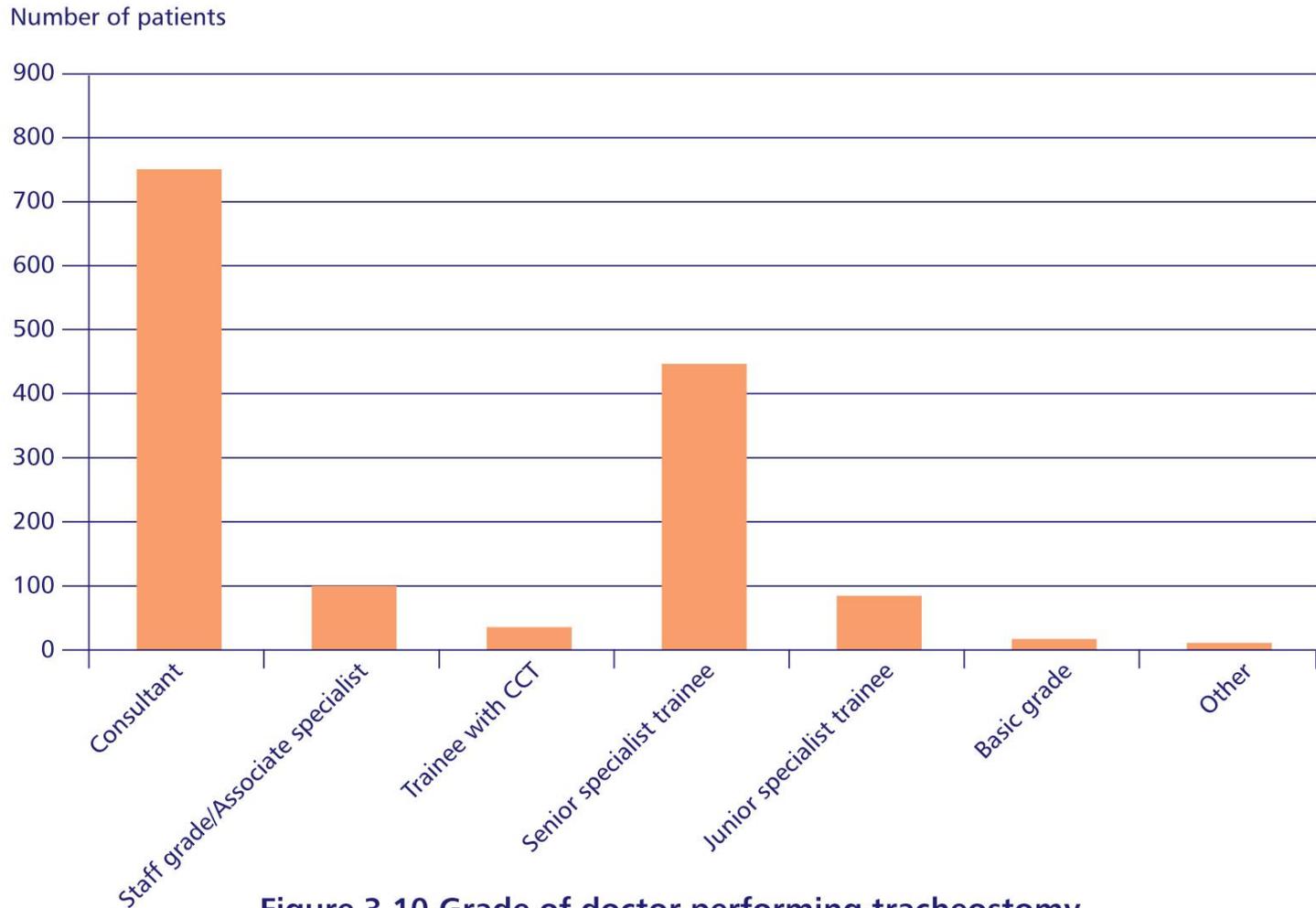


Figure 3.10 Grade of doctor performing tracheostomy

# Grade of clinician

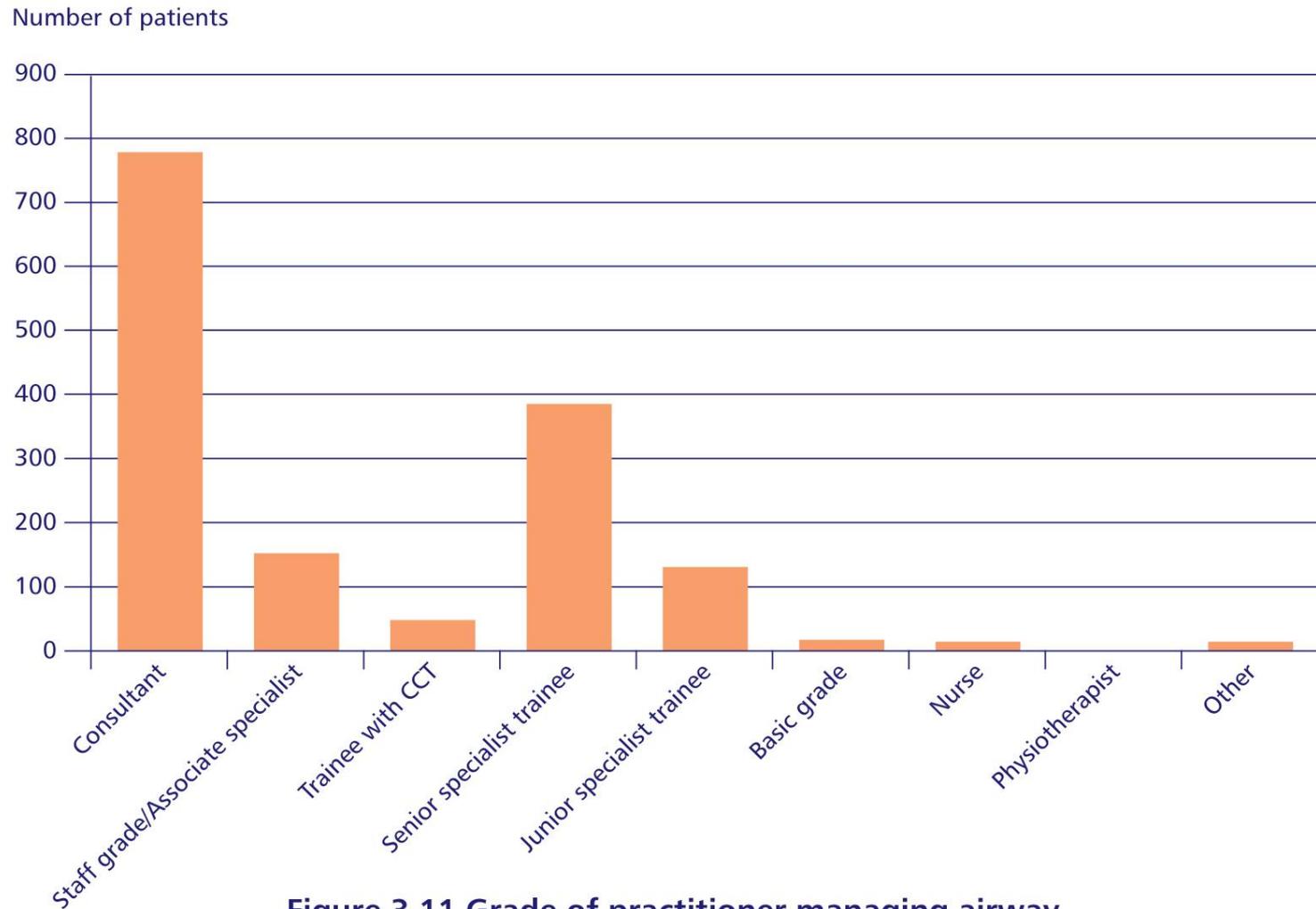


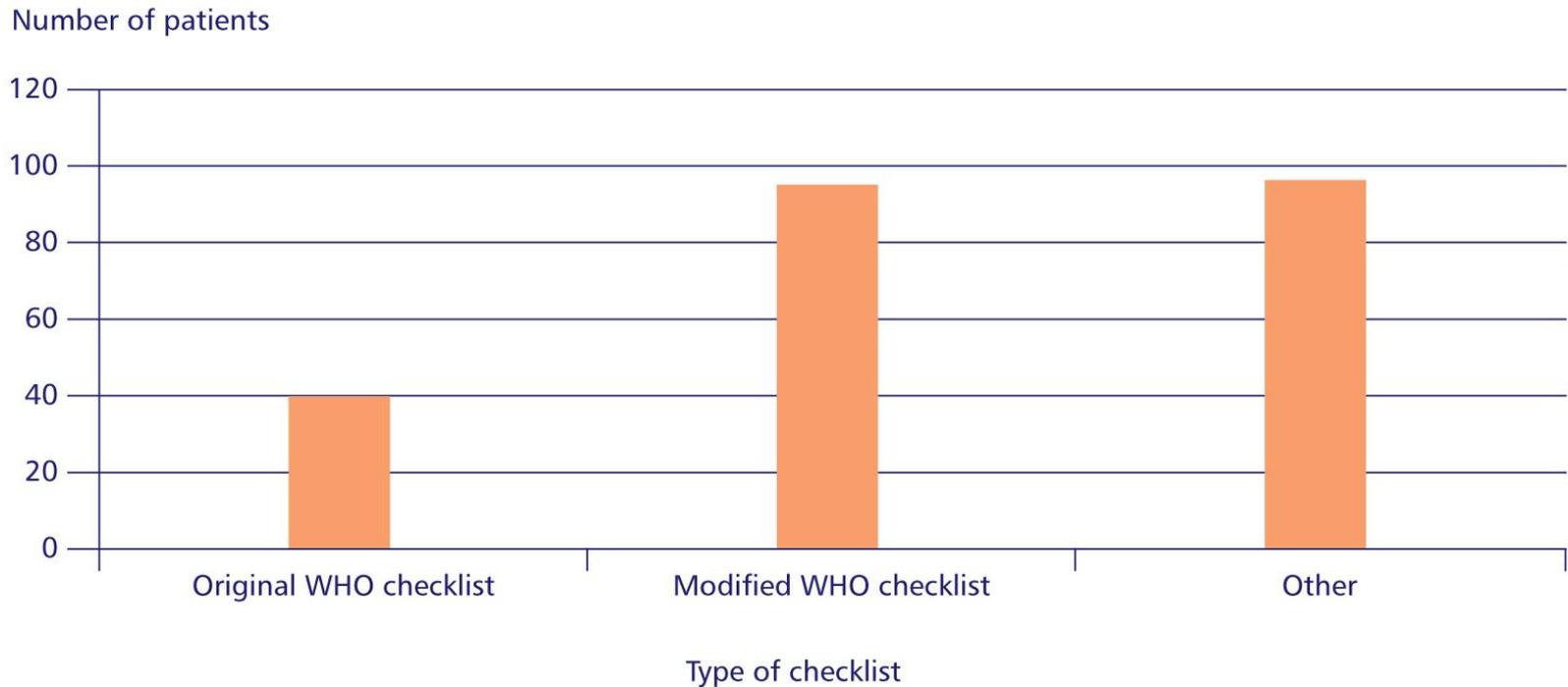
Figure 3.11 Grade of practitioner managing airway

# 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

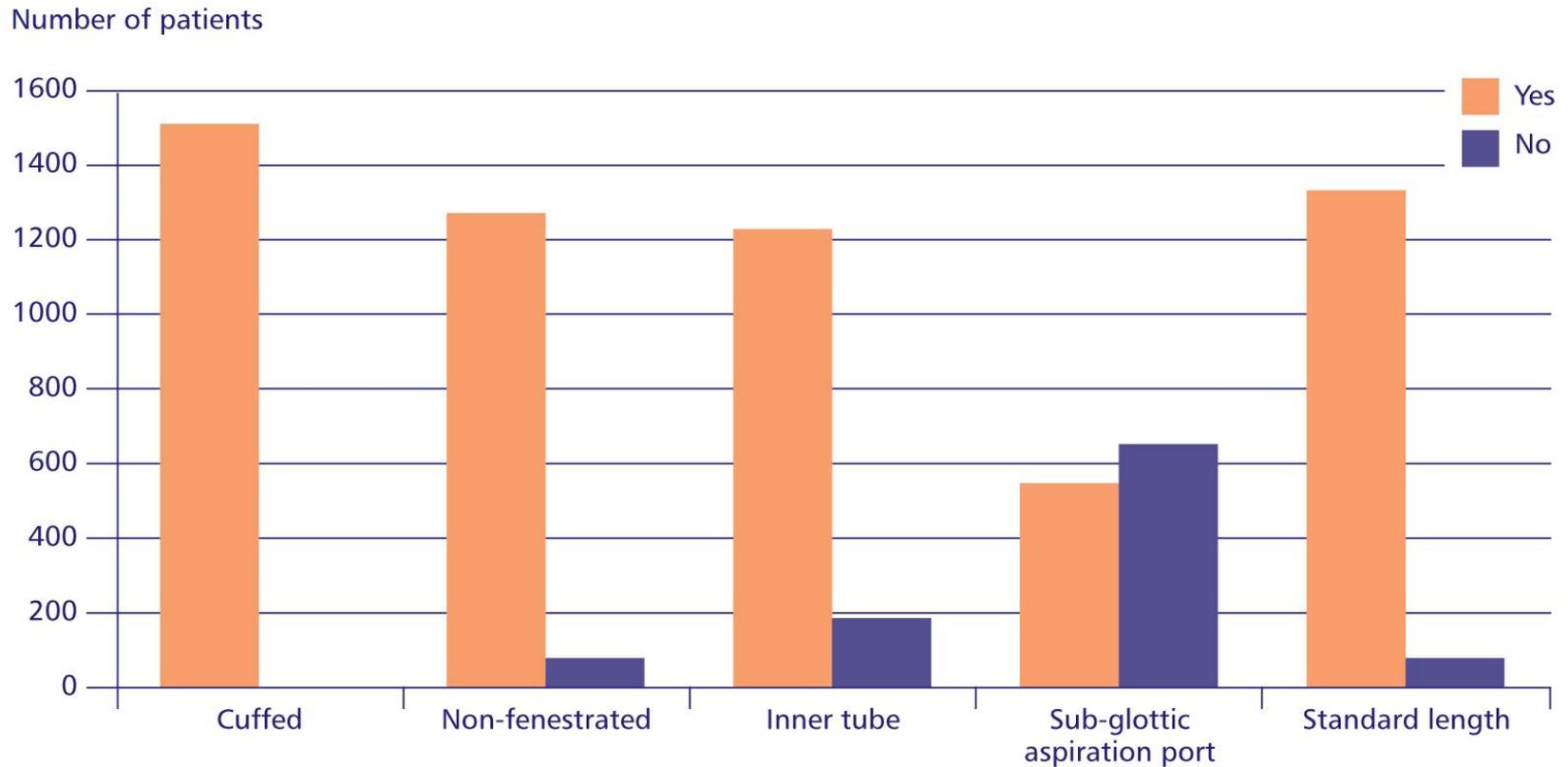


Figure 3.15 Types of tracheostomy tube

# Size of tube

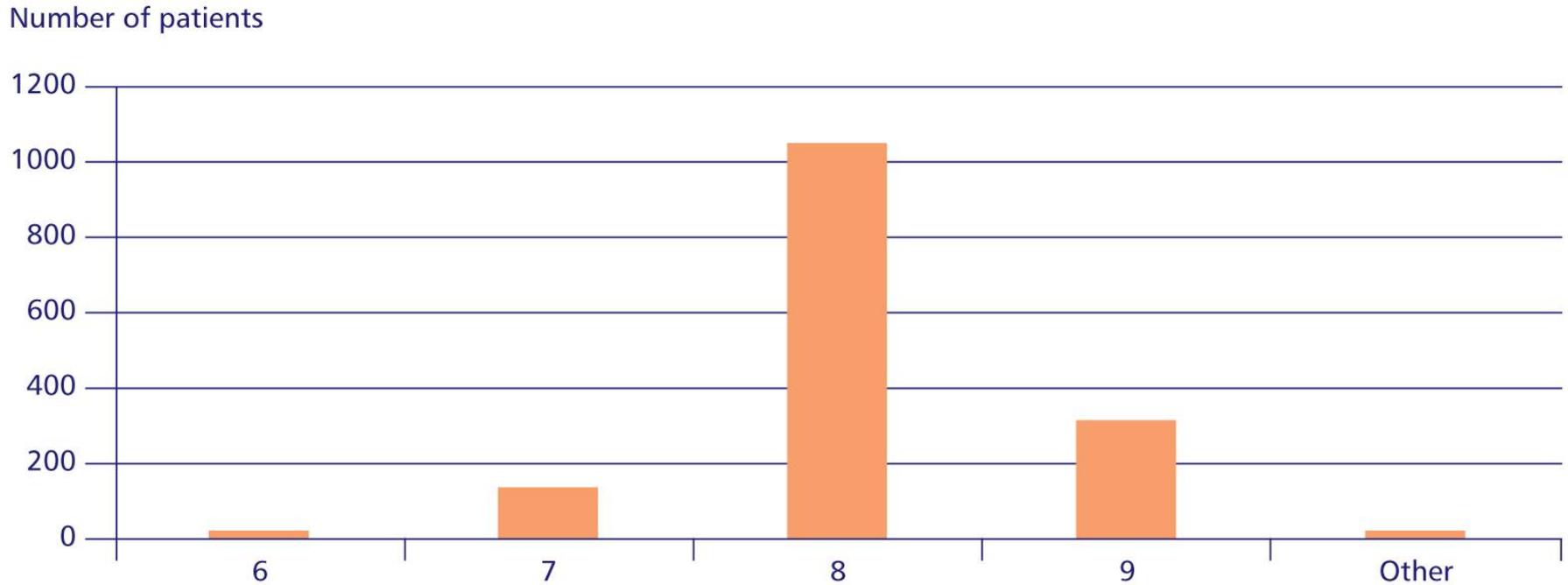
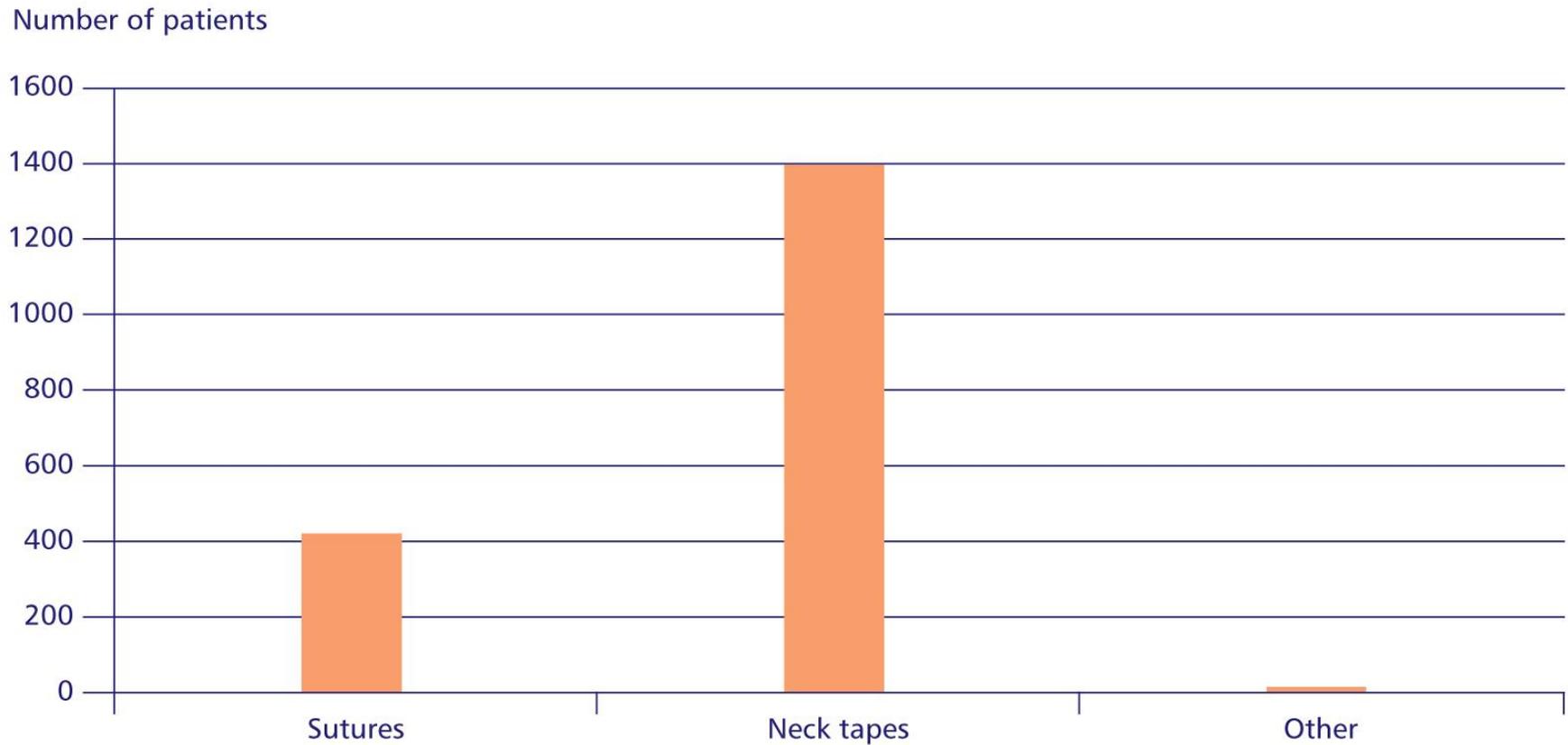


Figure 3.16 Size of tracheostomy tube used

# 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  |
| <b>Subtotal</b> | <b>312</b> |      |
| Not applicable  | 4          |      |
| Unknown         | 2          |      |
| Not answered    | 15         |      |
| <b>Total</b>    | <b>333</b> |      |

# 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 CO<sub>2</sub> 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.

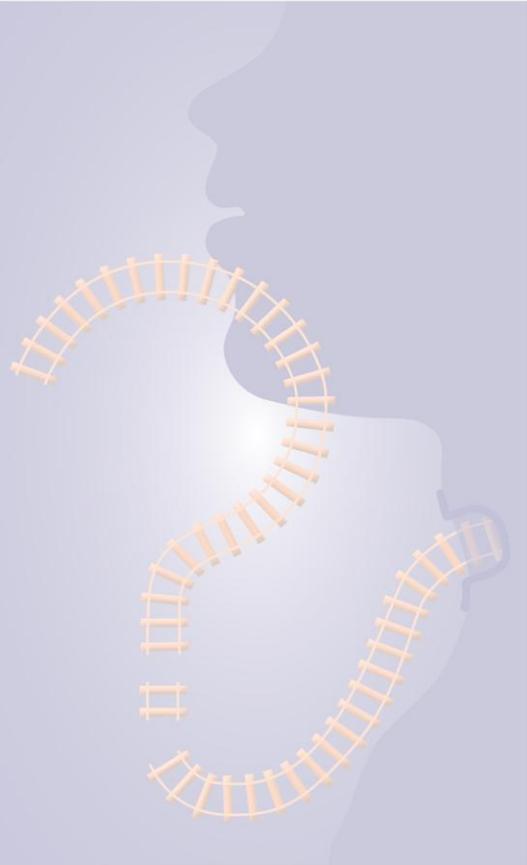
*Advisors noted the importance careful pre-operative assessment and the value of capnography*

# 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 |
| <b>Subtotal</b>   | <b>655</b> |      |
| Not answered  | 14         |      |
| <b>Total</b>  | <b>669</b> |      |

# 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  |
| <b>Subtotal</b> | <b>295</b> |      |
| Unknown         | 15         |      |
| Not answered    | 8          |      |
| <b>Total</b>    | <b>318</b> |      |

- 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

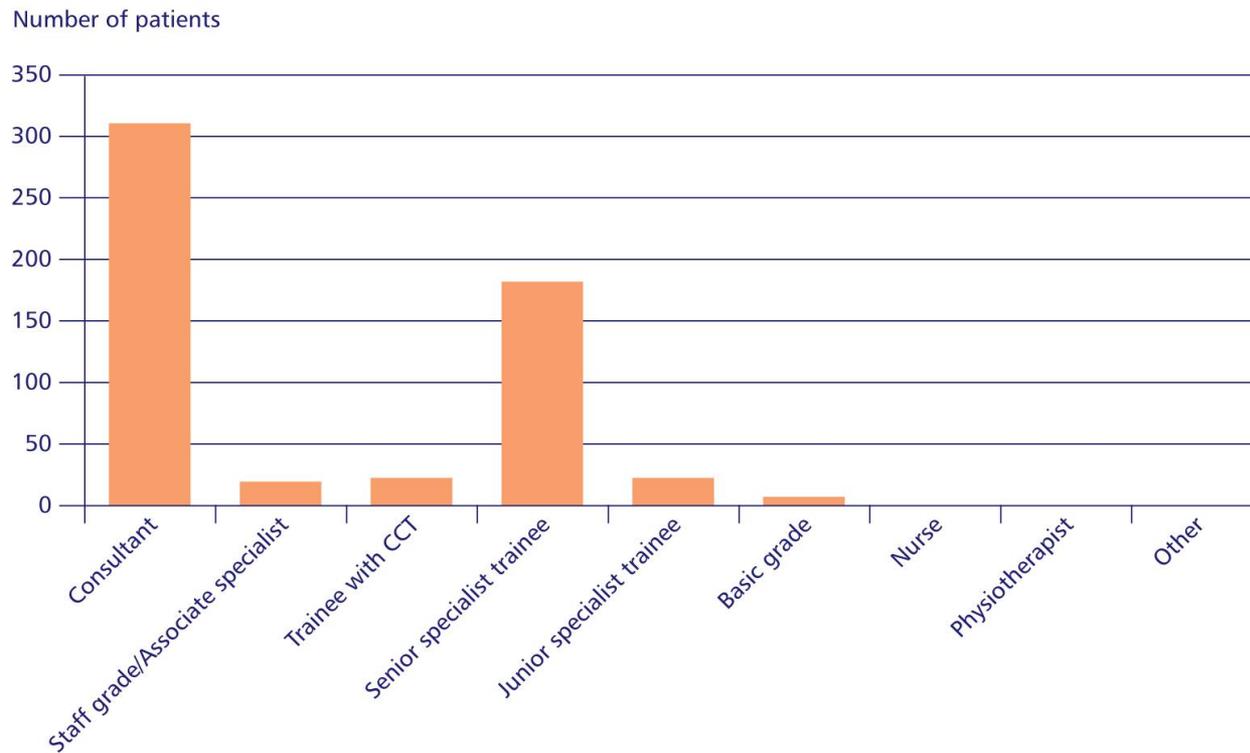


Figure 3.19 Grade of practitioner completing consent

# 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  |
| <b>Subtotal</b>                  | <b>661</b> |      |
| Not answered                     | 8          |      |
| <b>Total</b>                     | <b>669</b> |      |

# 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

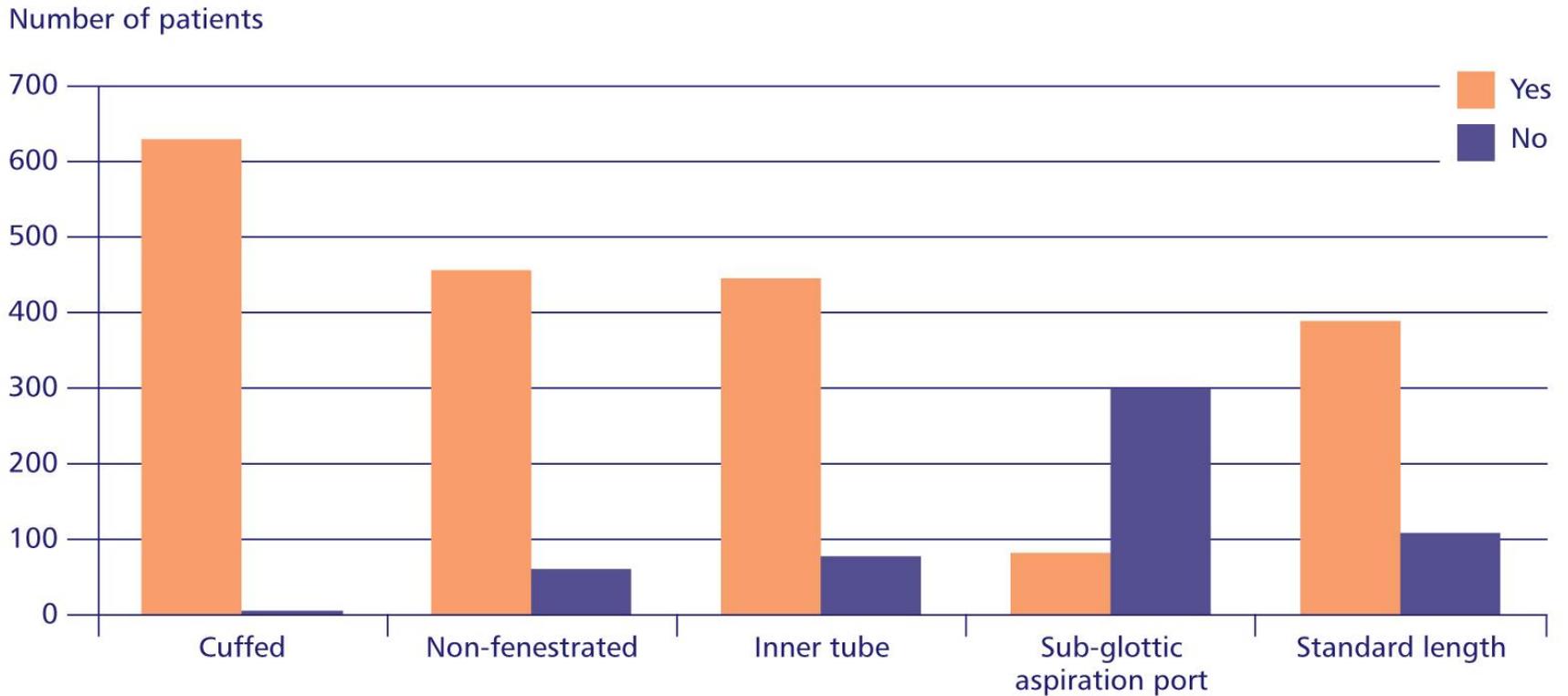


Figure 3.20 Type of tube used

# 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  |
| <b>Subtotal</b> | <b>647</b> |      |
| Unknown         | 6          |      |
| Not answered    | 16         |      |
| <b>Total</b>    | <b>669</b> |      |

# Overall assessment

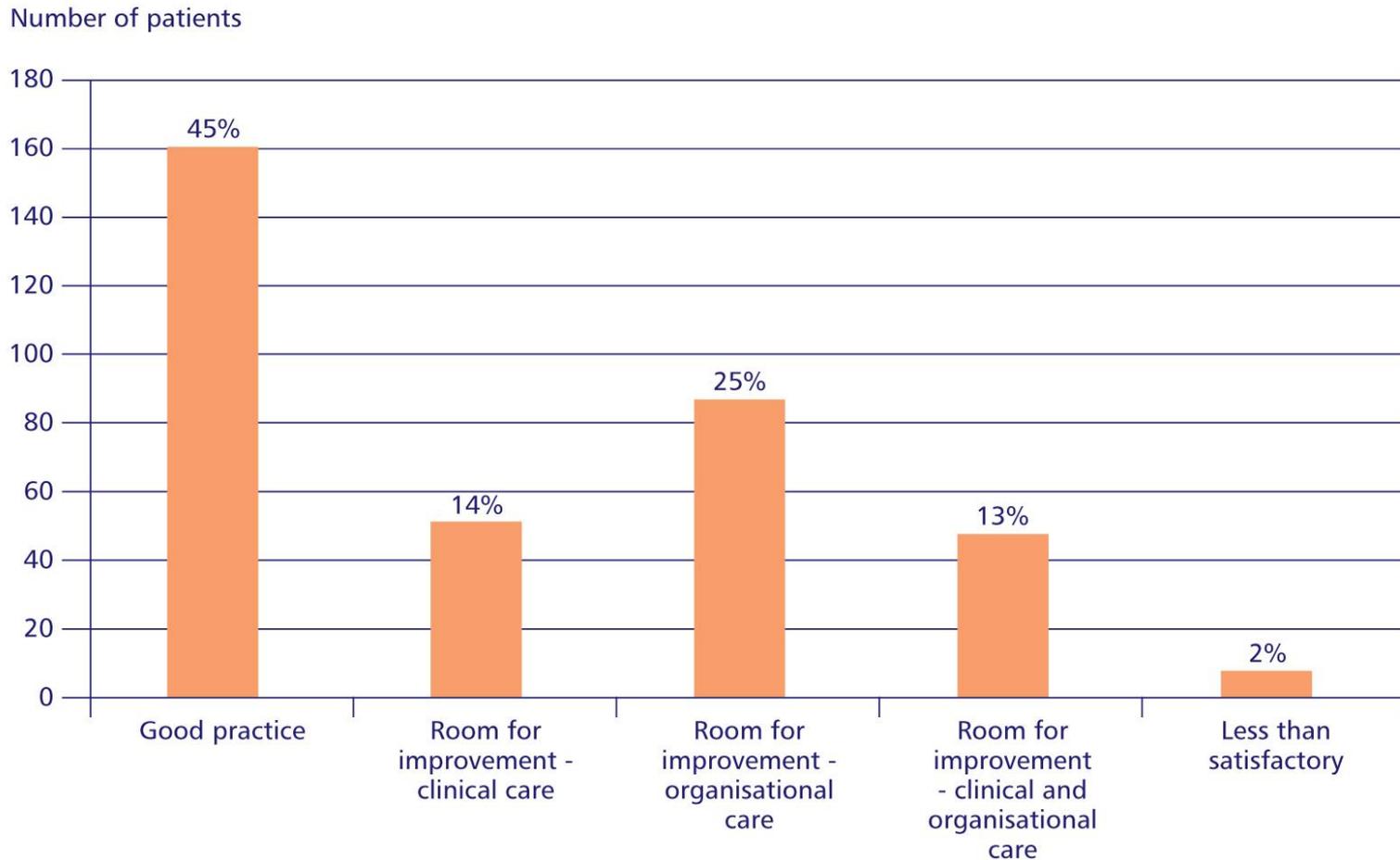


Figure 3.21 Overall assessment of care at the time of insertion

# Area of care following insertion

Table 3.29 Immediate place of transfer after insertion

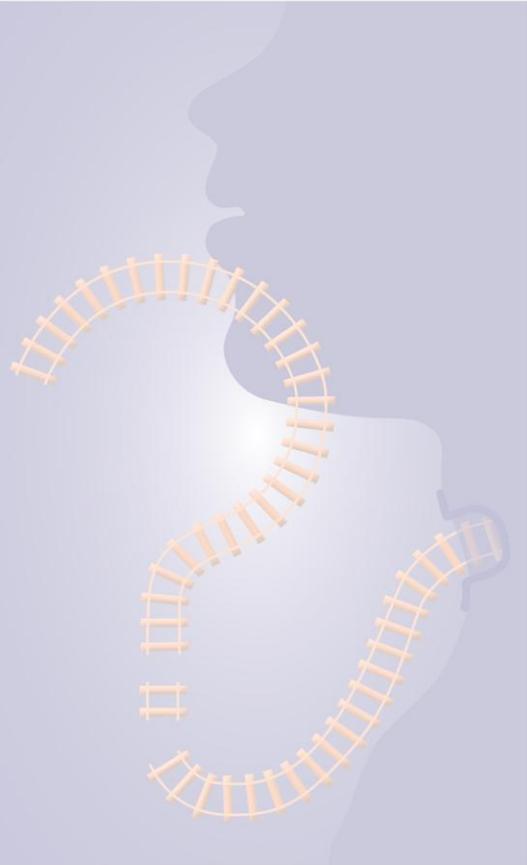
|   | n          | %    |
|---|------------|------|
| Critical care                               | 539        | 85.8 |
| Specialist head and neck ward               | 69         | 11.0 |
| General ward                                | 8          | 1.3  |
| NA - tracheostomy inserted on critical care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

# 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

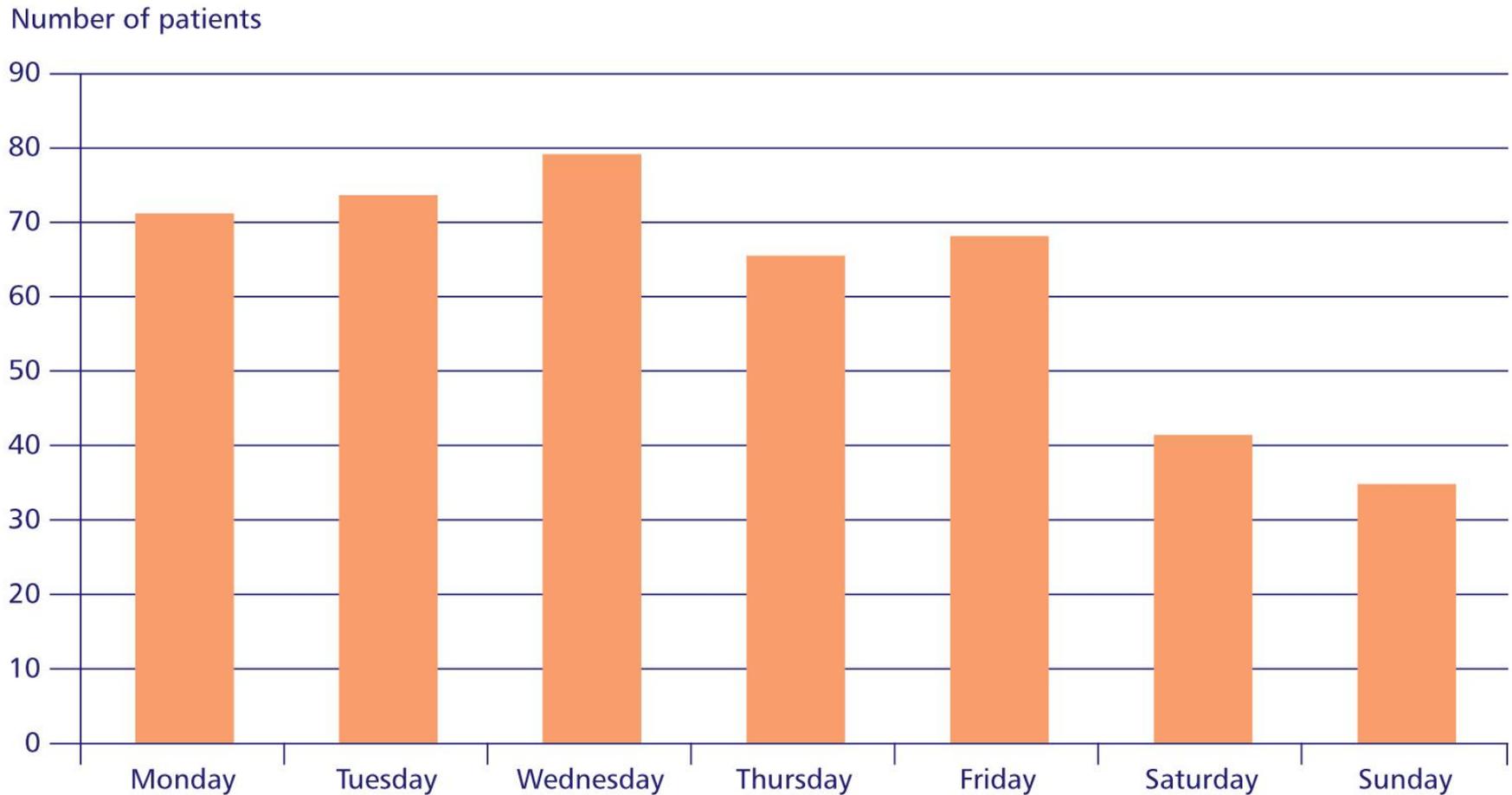
# Recommendations

- 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

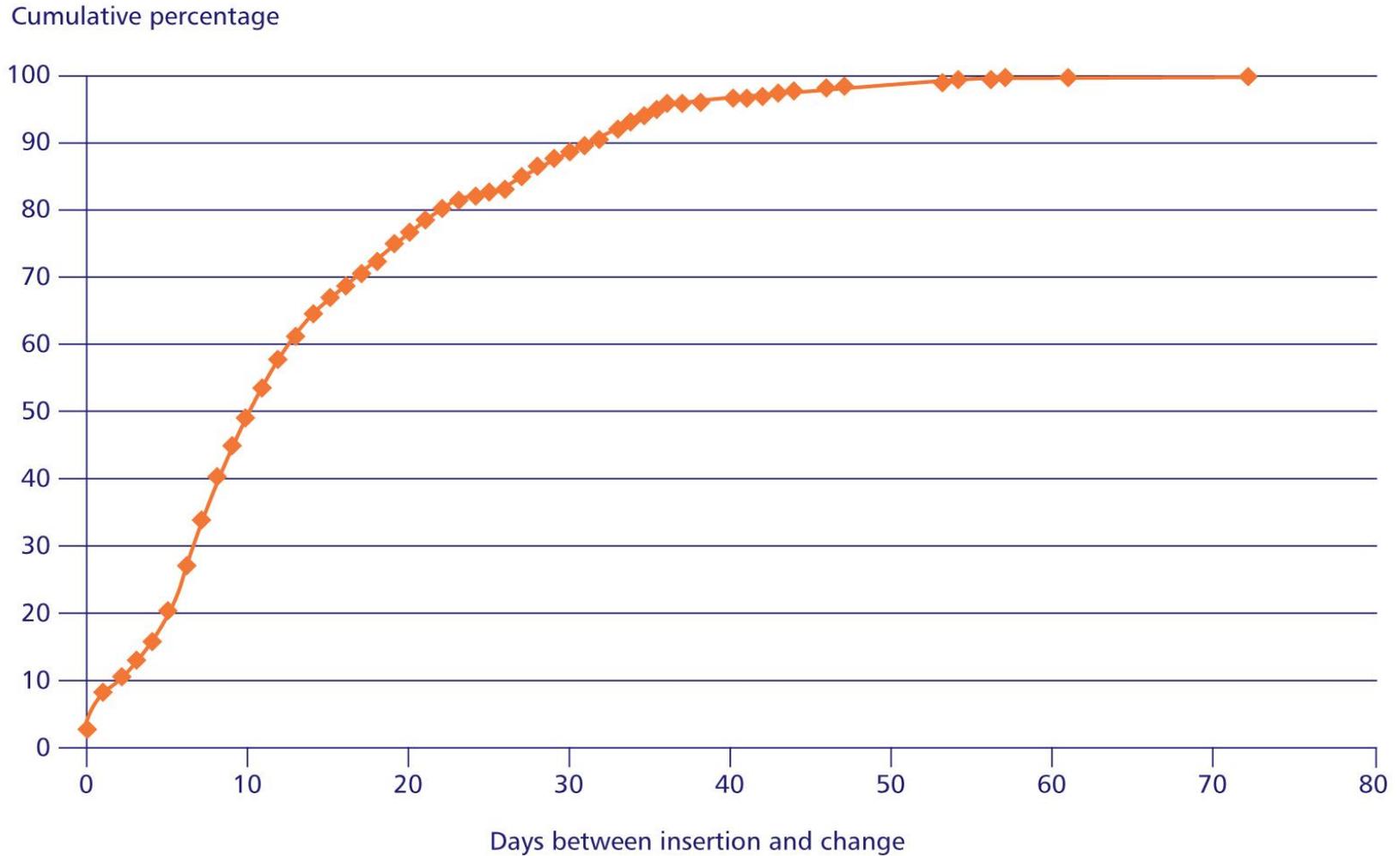


Figure 4.1 First tube change

# Timing of first tube change on ward

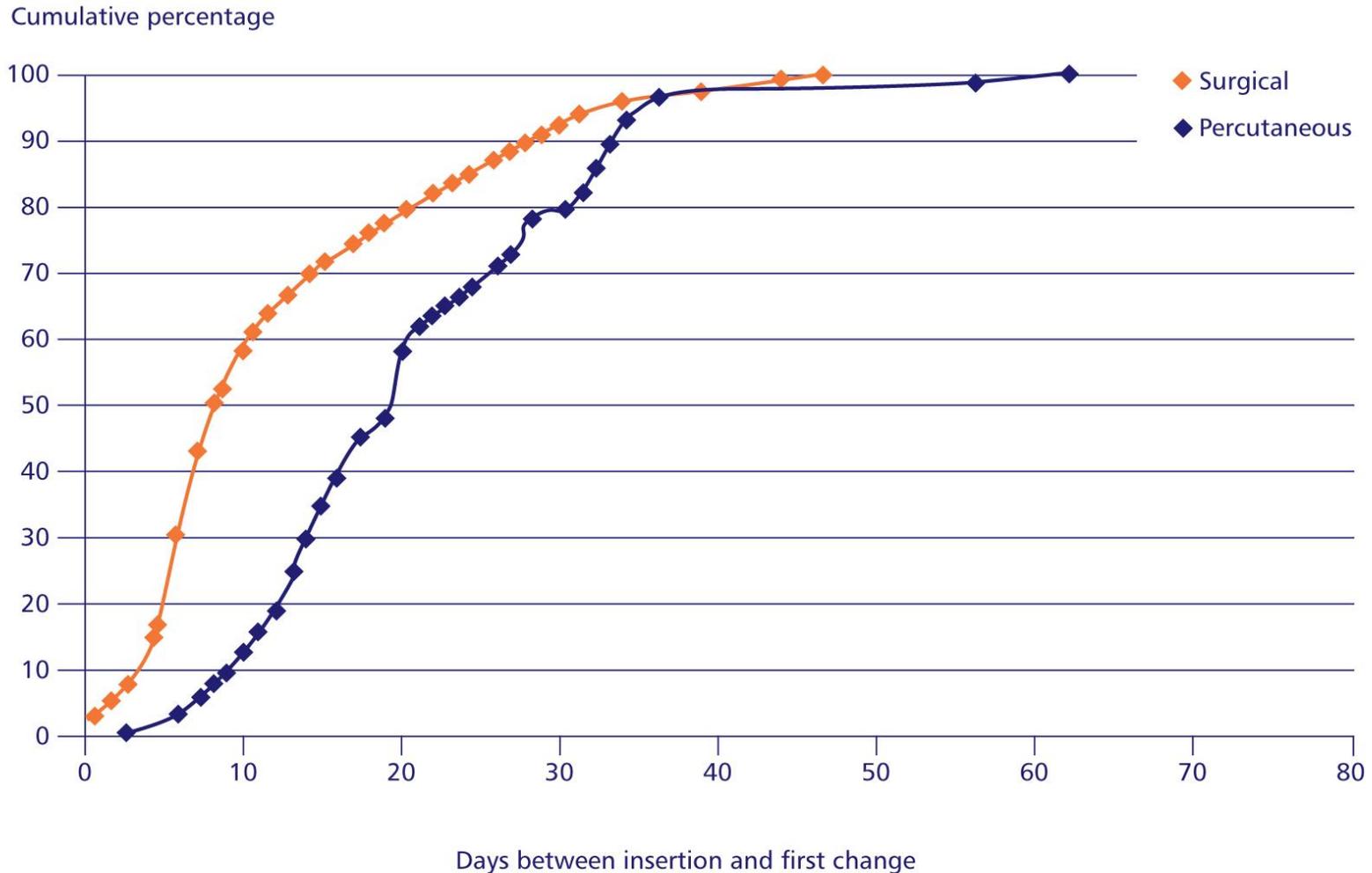


Figure 4.3 Days between insertion and first tube change on the ward

# 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         |
| <b>Total</b> | <b>53</b>      | <b>57</b> | <b>110</b> | <b>3</b>     | <b>113</b> |

# Time of first tube change

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

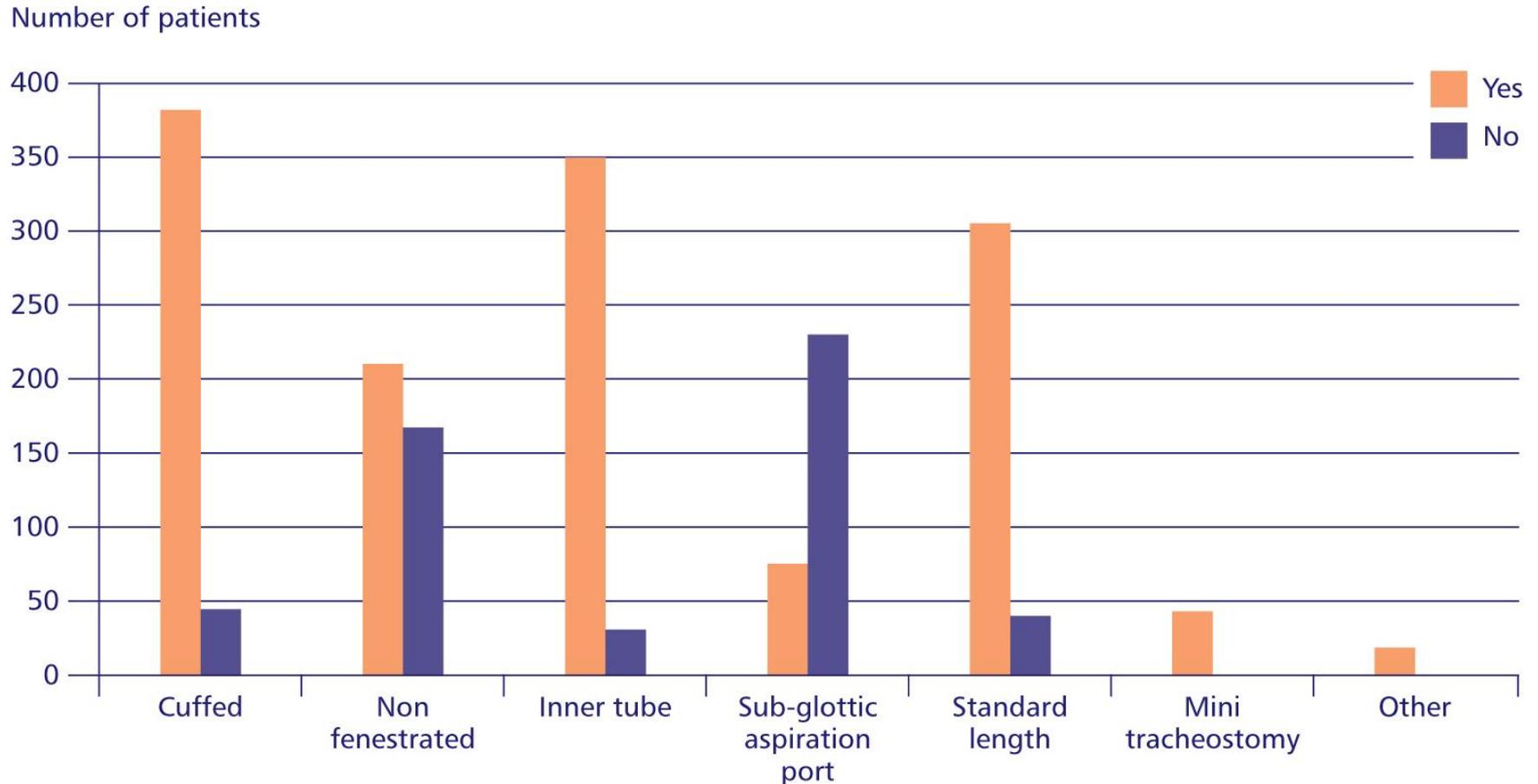
| Time of change  | Type of change |            |            |           |              | Total      |
|-----------------|----------------|------------|------------|-----------|--------------|------------|
|                 | Planned        | Unplanned  | Subtotal   | Unknown   | Not answered |     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

# 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        |
| <b>Subtotal</b> | <b>243</b>                | <b>32</b>         | <b>275</b> | <b>15</b> | <b>117</b>   | <b>407</b> |
| Not answered    | 37                        | 5                 | 42         | 2         | 23           | 67         |
| <b>Total</b>    | <b>280</b>                | <b>37</b>         | <b>317</b> | <b>17</b> | <b>140</b>   | <b>474</b> |

# 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**

|                 | <b>n</b>   | <b>%</b> |
|-----------------|------------|----------|
| Cuffed          | 551        | 95.0     |
| Uncuffed        | 29         | 5.0      |
| <b>Subtotal</b> | <b>580</b> |          |
| Unknown         | 3          |          |
| Not answered    | 74         |          |
| <b>Total</b>    | <b>657</b> |          |

# 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 |
| <b>Subtotal</b>                          | <b>414</b> |      |
| Unknown                                  | 35         |      |
| Not applicable - equipment not available | 43         |      |
| Not applicable - cuffed tube not used    | 35         |      |
| Not answered                             | 26         |      |
| <b>Total</b>                             | <b>553</b> |      |

# Equipment & continuous inflation

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

|              | <b>n</b>   | <b>%</b> |
|--------------|------------|----------|
| Yes          | 114        | 87.7     |
| No           | 16         | 12.3     |
| <b>Total</b> | <b>130</b> |          |

# Equipment to measure pressure – ward

**Table 2.11 Availability of equipment to measure cuff pressure**

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

# 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.

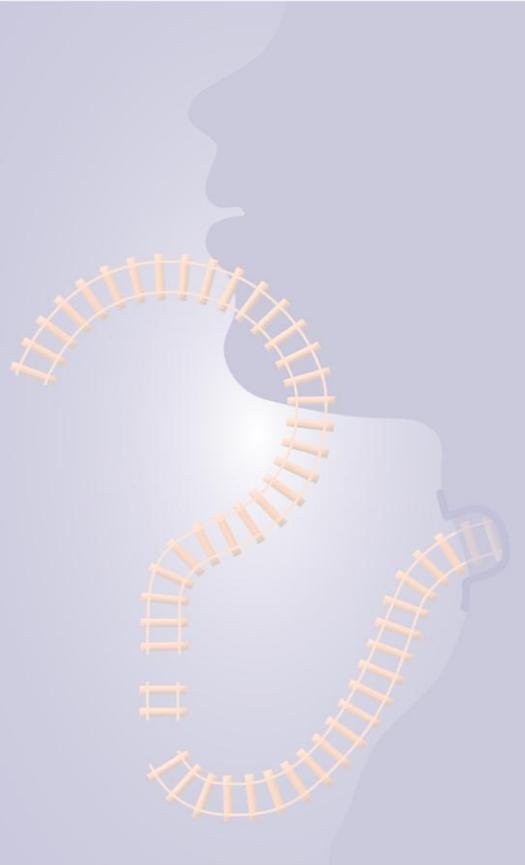
For example, in 178/396 (45%) of cases there was insufficient data for Advisors to make a decision about cuff pressure when clinical notes were reviewed

# 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

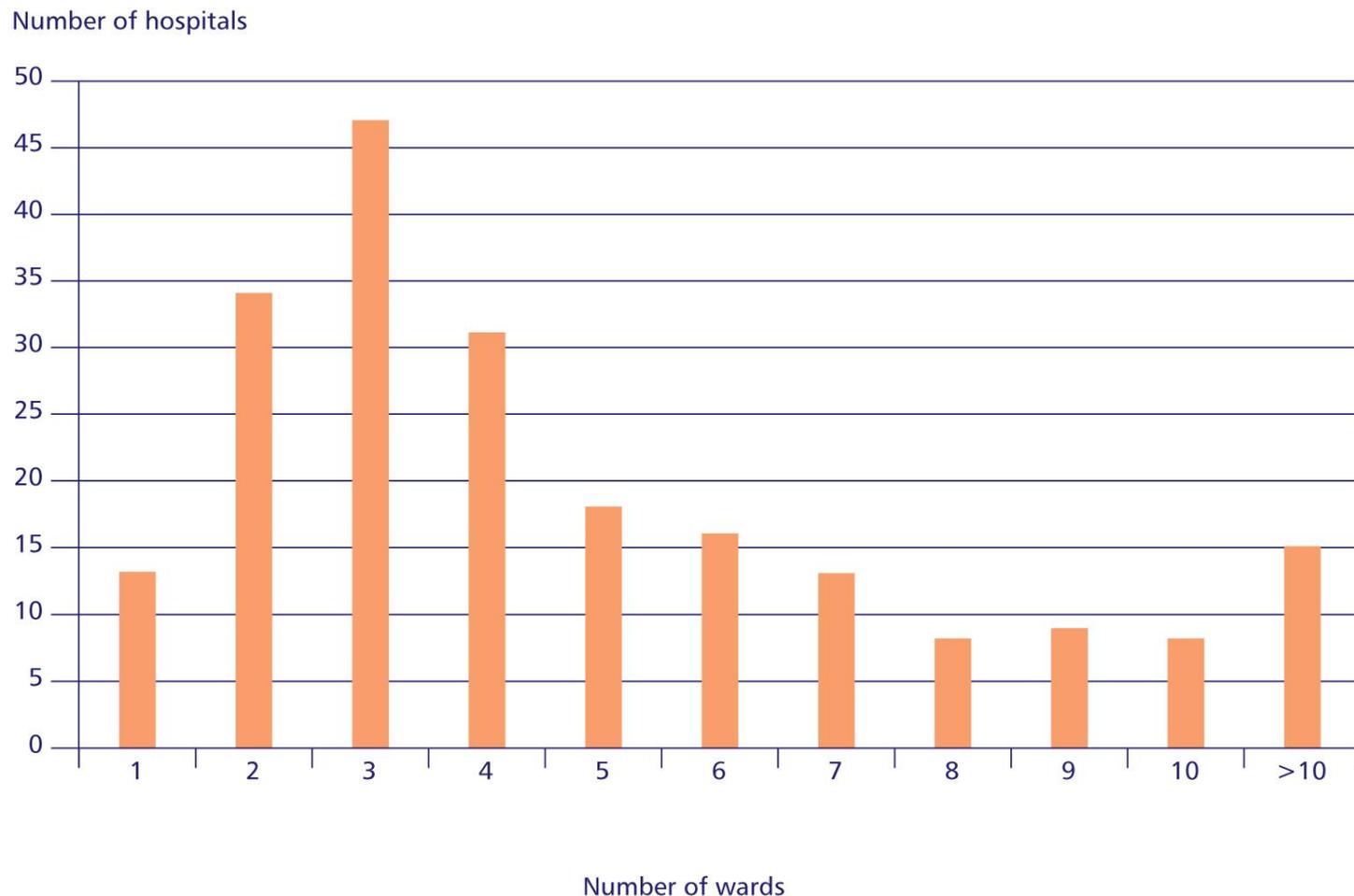
# Recommendations

- 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**

|                 | <b>n</b>   | <b>%</b> |
|-----------------|------------|----------|
| Yes             | 172        | 79.3     |
| No              | 45         | 20.7     |
| <b>Subtotal</b> | <b>217</b> |          |
| Not answered    | 2          |          |
| <b>Total</b>    | <b>219</b> |          |

# 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 |
| <b>Subtotal</b> | <b>218</b>        |      | <b>219</b>            |      |
| Not answered    | 1                 |      | 0                     |      |
| <b>Total</b>    | <b>219</b>        |      | <b>219</b>            |      |

# 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 |
| <b>Subtotal</b> | <b>359</b>                        |      | <b>94</b>                             |      |
| Unknown         | 45                                |      | 11                                    |      |
| Not answered    | 11                                |      | 3                                     |      |
| <b>Total</b>    | <b>415</b>                        |      | <b>108</b>                            |      |

# 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  |
| <b>Subtotal</b>  | <b>155</b> |      |
| Not answered   | 1          |      |
| <b>Total</b>   | <b>156</b> |      |

# 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        |
| <b>Subtotal</b>      | <b>209</b>              |      | <b>200</b> |      | <b>409</b> | <b>74</b> | <b>42</b>    | <b>525</b> |
| Not answered         | 11                      |      | 6          |      | 17         | 5         | 7            | 29         |
| <b>Total</b>         | <b>220</b>              |      | <b>206</b> |      | <b>426</b> | <b>79</b> | <b>49</b>    | <b>554</b> |

# Swallowing difficulty – advisor opinion

Table 5.15 Attention to patient's ability to swallow safely

|                   | n          | %    |
|-------------------|------------|------|
| Yes               | 191        | 85.7 |
| No                | 32         | 14.3 |
| <b>Subtotal</b>   | <b>223</b> |      |
| Insufficient data | 74         |      |
| Not applicable    | 77         |      |
| Not answered      | 22         |      |
| <b>Total</b>      | <b>396</b> |      |

# Multidisciplinary audit

**Table 2.51 Regular multidisciplinary audit**

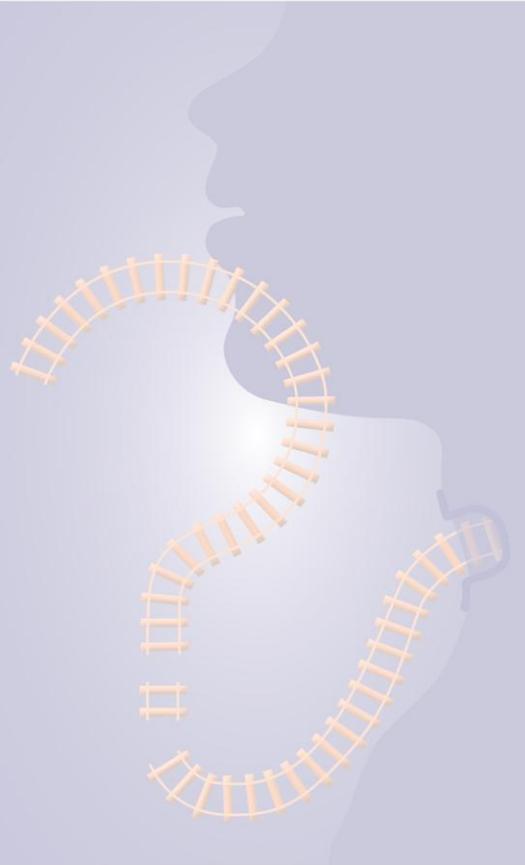
|                 | <b>n</b>   | <b>%</b> |
|-----------------|------------|----------|
| Yes             | 46         | 21.2     |
| No              | 171        | 78.8     |
| <b>Subtotal</b> | <b>217</b> |          |
| Not answered    | 2          |          |
| <b>Total</b>    | <b>219</b> |          |

# 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/<br>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 -<br>trache-oesophageal      | 5            | <1  | 3          |
| Infection -<br>mediastinitis                   | 4            | <1  | 0          |
| Tracheal damage - to<br>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   |
| <b>Total</b> | <b>461</b> |      |

# 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/<br>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-<br>oesophageal    | 1            | 0              | 1        | 4            | 5     |
| Tracheal damage - to tracheal<br>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/<br>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 |
| <b>Subtotal</b>   | <b>293</b> |      |
| Insufficient data | 24         |      |
| Not answered      | 79         |      |
| <b>Total</b>      | <b>396</b> |      |

# 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 |
| <b>Subtotal</b> | <b>172</b> |      |
| Not answered    | 2          |      |
| <b>Total</b>    | <b>174</b> |      |

# Resuscitation training

Table 2.44 Resuscitation policies and protocols

|  | Yes |      | No  |      | Subtotal | Not answered |
|--|-----|------|-----|------|----------|--------------|
|  | n   | %    | n   | %    | 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**

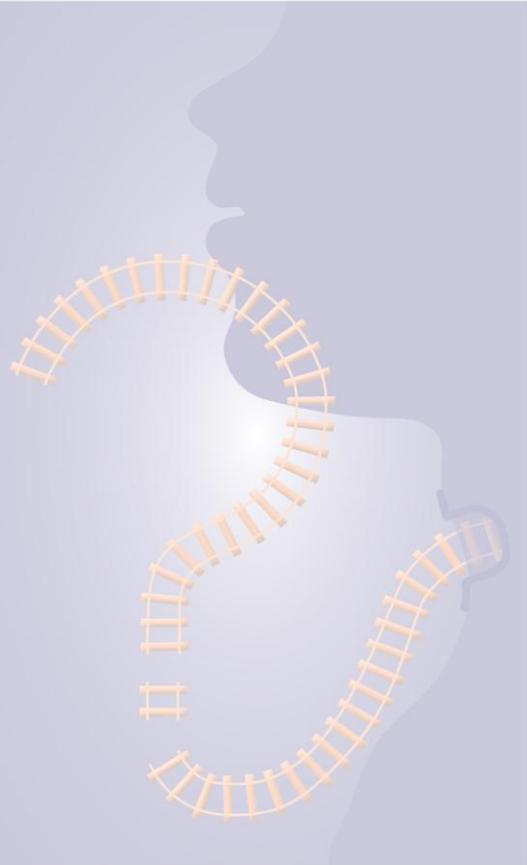
|                     | n          | %    |
|---------------------|------------|------|
| Yes - for all beds  | 218        | 71.5 |
| Yes - for some beds | 23         | 7.5  |
| Other               | 11         | 3.6  |
| No                  | 53         | 17.4 |
| <b>Subtotal</b>     | <b>305</b> |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

# 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 |
| <b>Subtotal</b> | <b>1941</b> |      |
| Not answered    | 15          |      |
| <b>Total</b>    | <b>1956</b> |      |

# Timing of decannulation on critical care

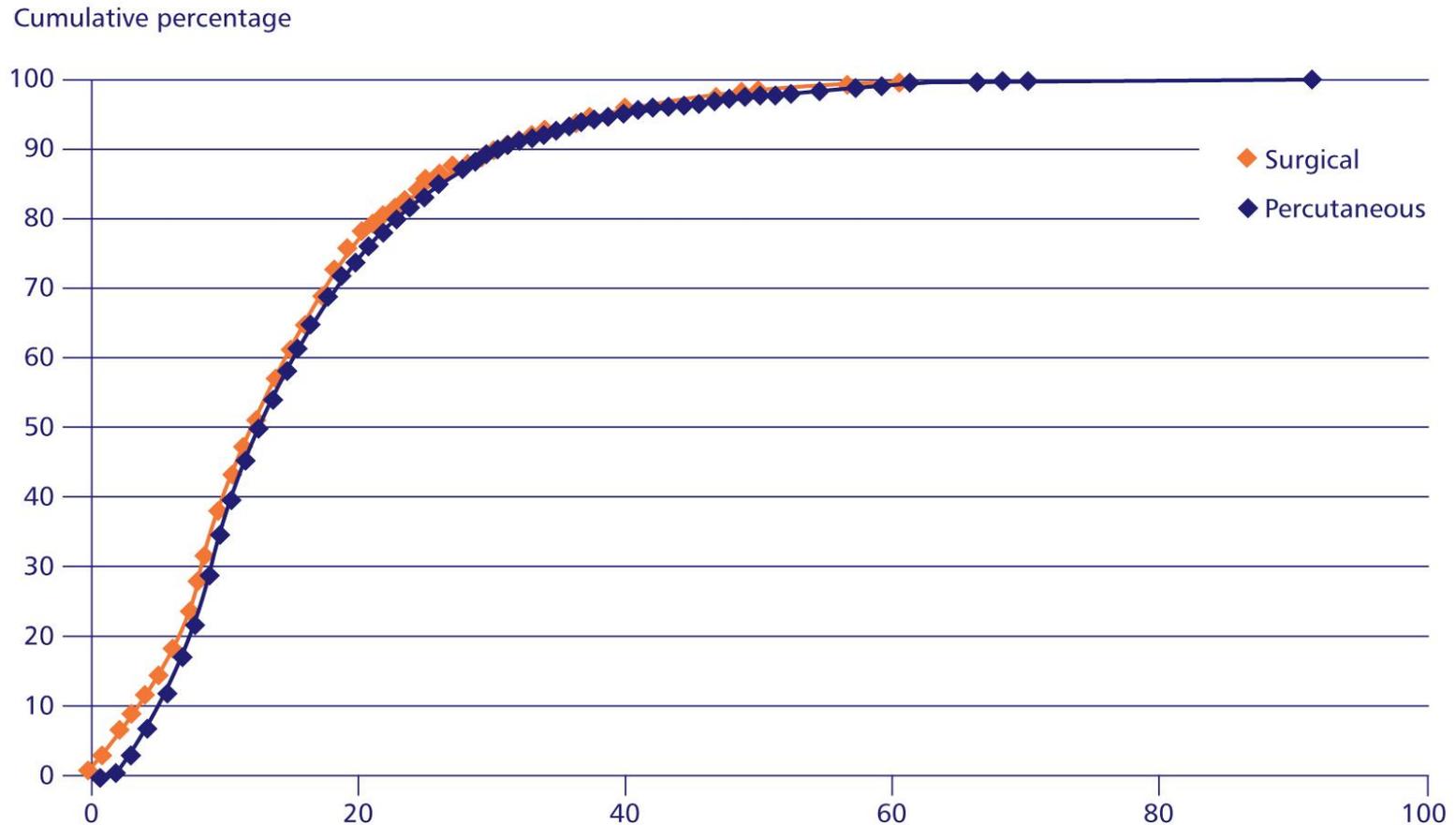


Figure 7.2 Days between insertion and decannulation in critical care

# 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 |
| <b>Subtotal</b> | <b>141</b> |      |
| Unknown         | 5          |      |
| Not applicable  | 10         |      |
| <b>Total</b>    | <b>156</b> |      |

# Airway assessment prior to decannulation

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

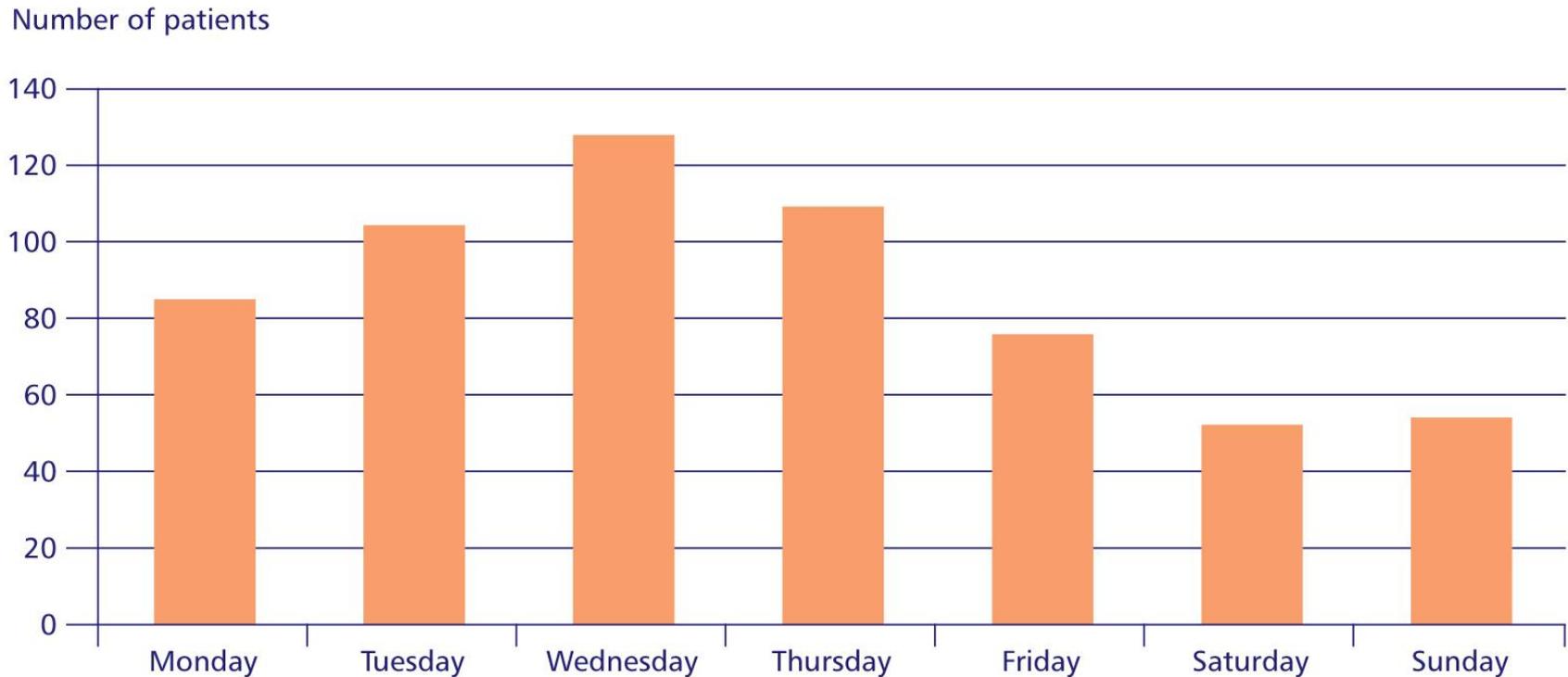
|                   | n          | %    |
|-------------------|------------|------|
| Yes               | 122        | 79.7 |
| No                | 31         | 20.3 |
| <b>Subtotal</b>   | <b>153</b> |      |
| Insufficient data | 70         |      |
| Not answered      | 9          |      |
| <b>Total</b>      | <b>232</b> |      |

# 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

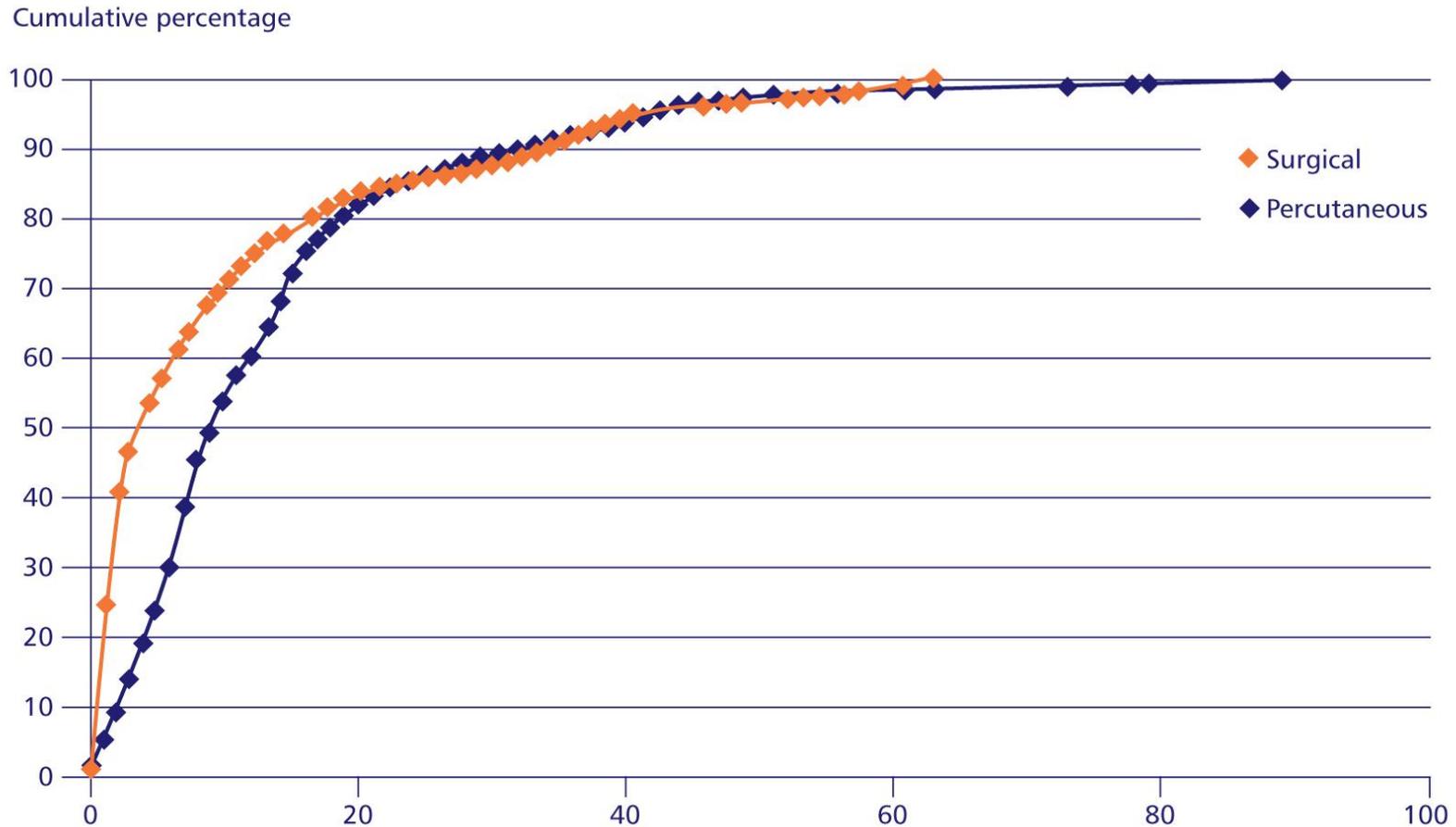
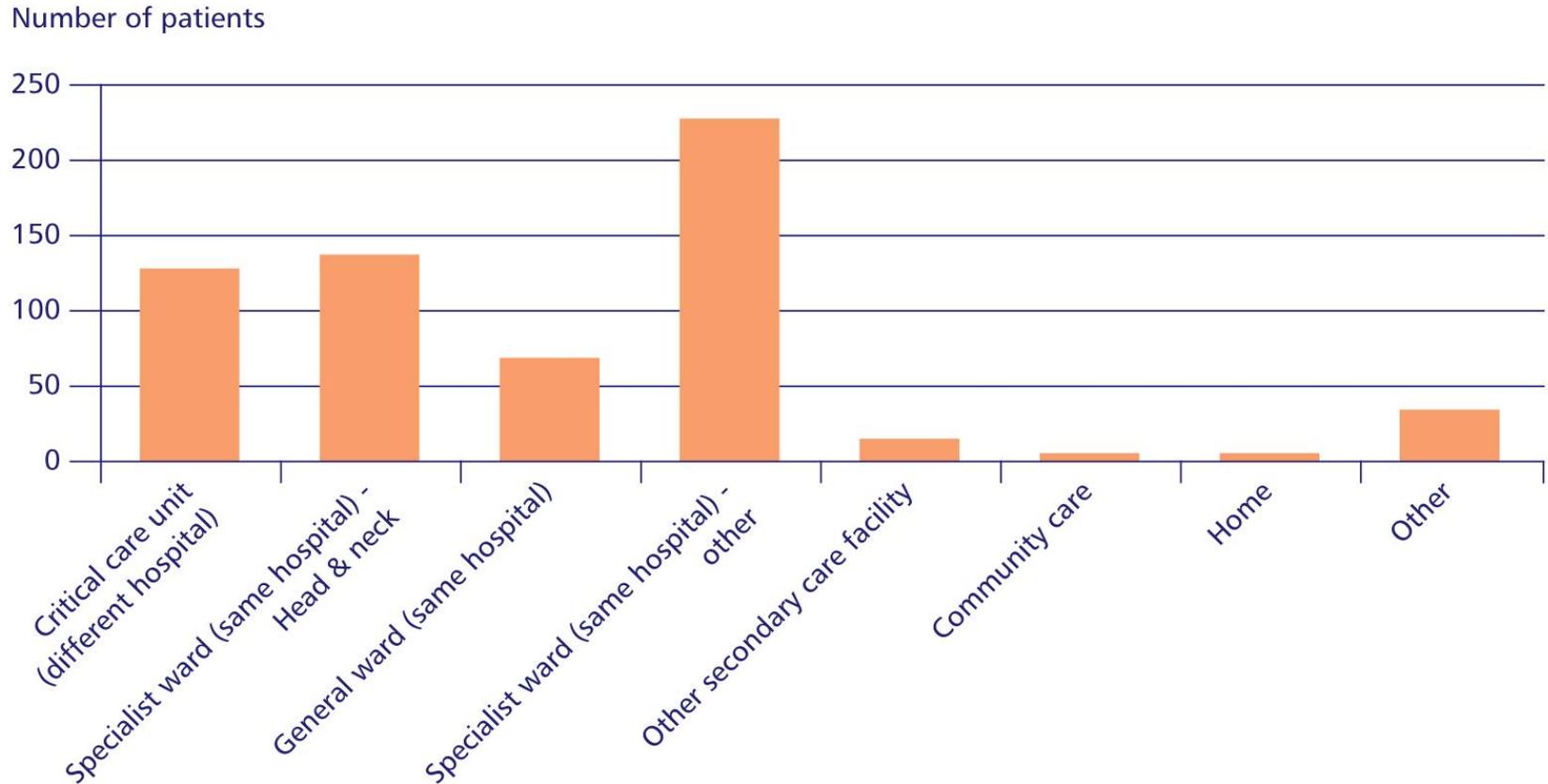


Figure 7.5 Days between tracheostomy insertion and discharge from the critical care unit

# 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 |
| <b>Subtotal</b> | <b>503</b> |      |
| Not answered    | 154        |      |
| <b>Total</b>    | <b>657</b> |      |

# 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  |
| <b>Subtotal</b>                                 | <b>155</b> |      |
| Not answered                                    | 2          |      |
| <b>Total</b>                                    | <b>157</b> |      |

# 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 |
| <b>Subtotal</b> | <b>384</b> |      |
| Unknown         | 126        |      |
| Not answered    | 43         |      |
| <b>Total</b>    | <b>553</b> |      |

# 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         |
| <b>Subtotal</b>  | <b>280</b>                     | <b>240</b>   | <b>520</b> | <b>26</b>    | <b>546</b> |
| Not answered   | 4                              | 0            | 4          | 3            | 7          |
| <b>Total</b>   | <b>284</b>                     | <b>240</b>   | <b>524</b> | <b>29</b>    | <b>553</b> |

# Ward discharge with a tracheostomy

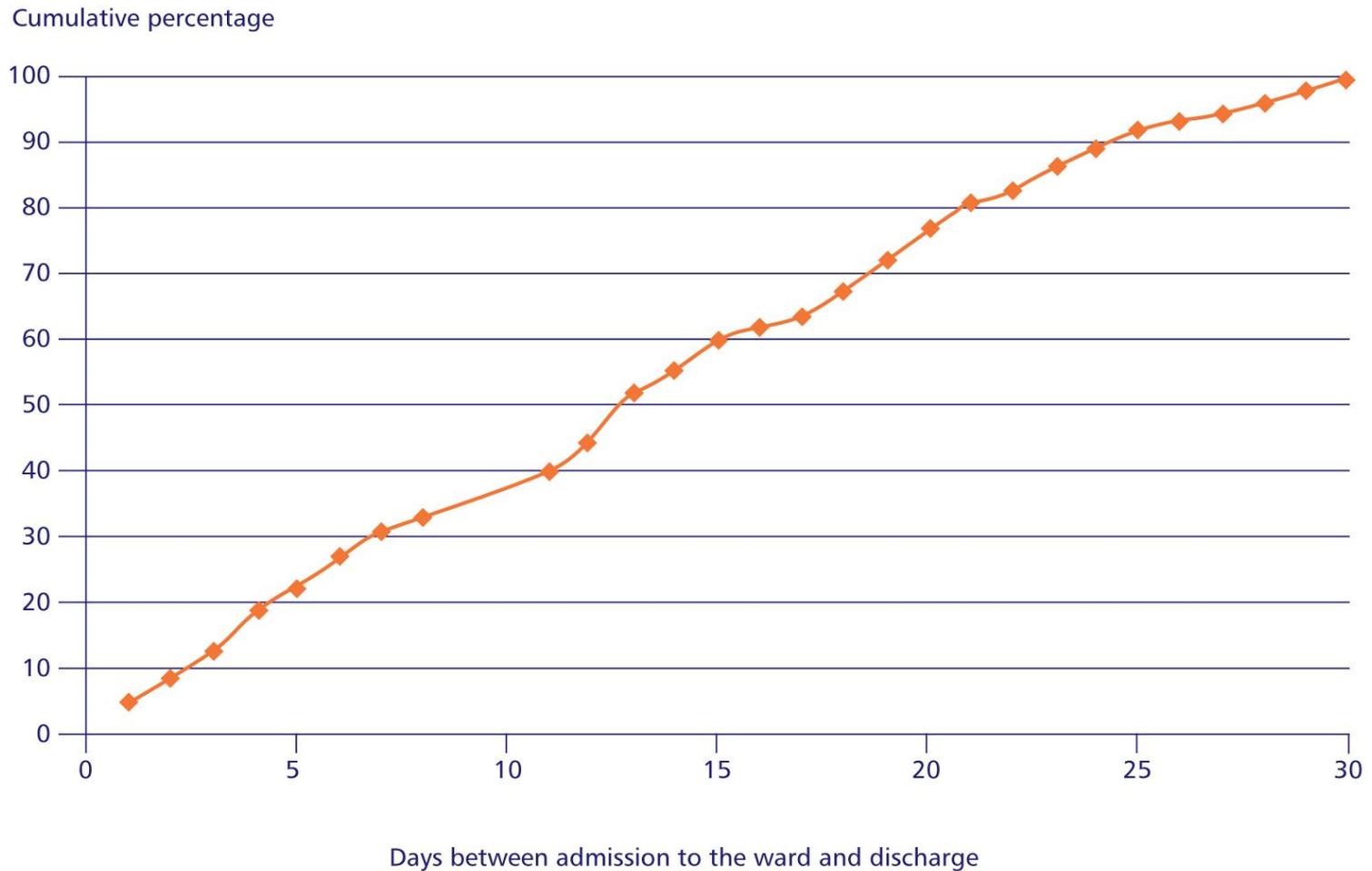


Figure 7.7 Discharge from ward with tracheostomy in place by day 30

# 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*)

|  | <b>n</b>  |
|--|-----------|
| Ongoing need for secondary medical care                  | 45        |
| Difficulties in securing appropriate community care      | 14        |
| Difficulties in finding a specialist rehabilitation unit | 16        |
| Other  | 9         |
| <b>Subtotal</b>  | <b>84</b> |
| 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.

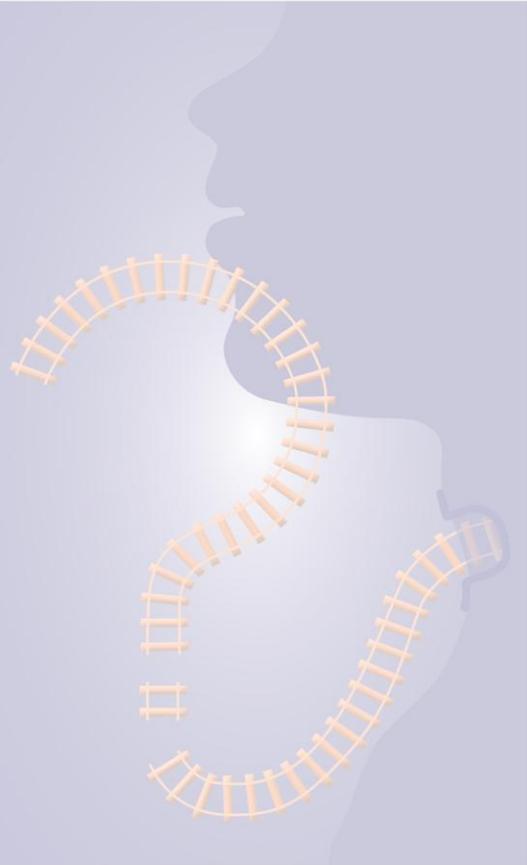
*Advisors commented upon the general lack of provision for such training in many parts of the country which often caused major delays in hospital discharge.*

# 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

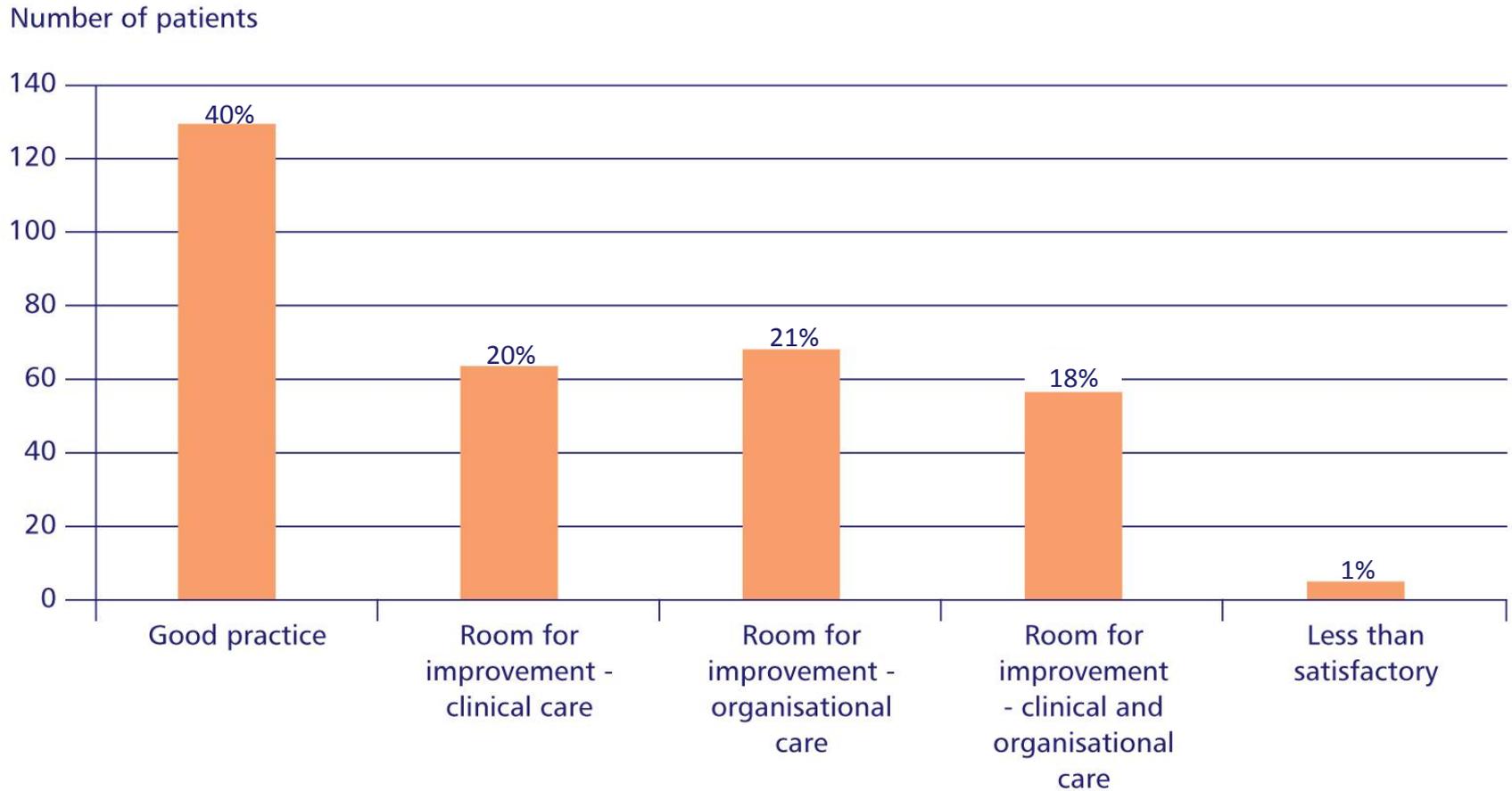
# Recommendations

- 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



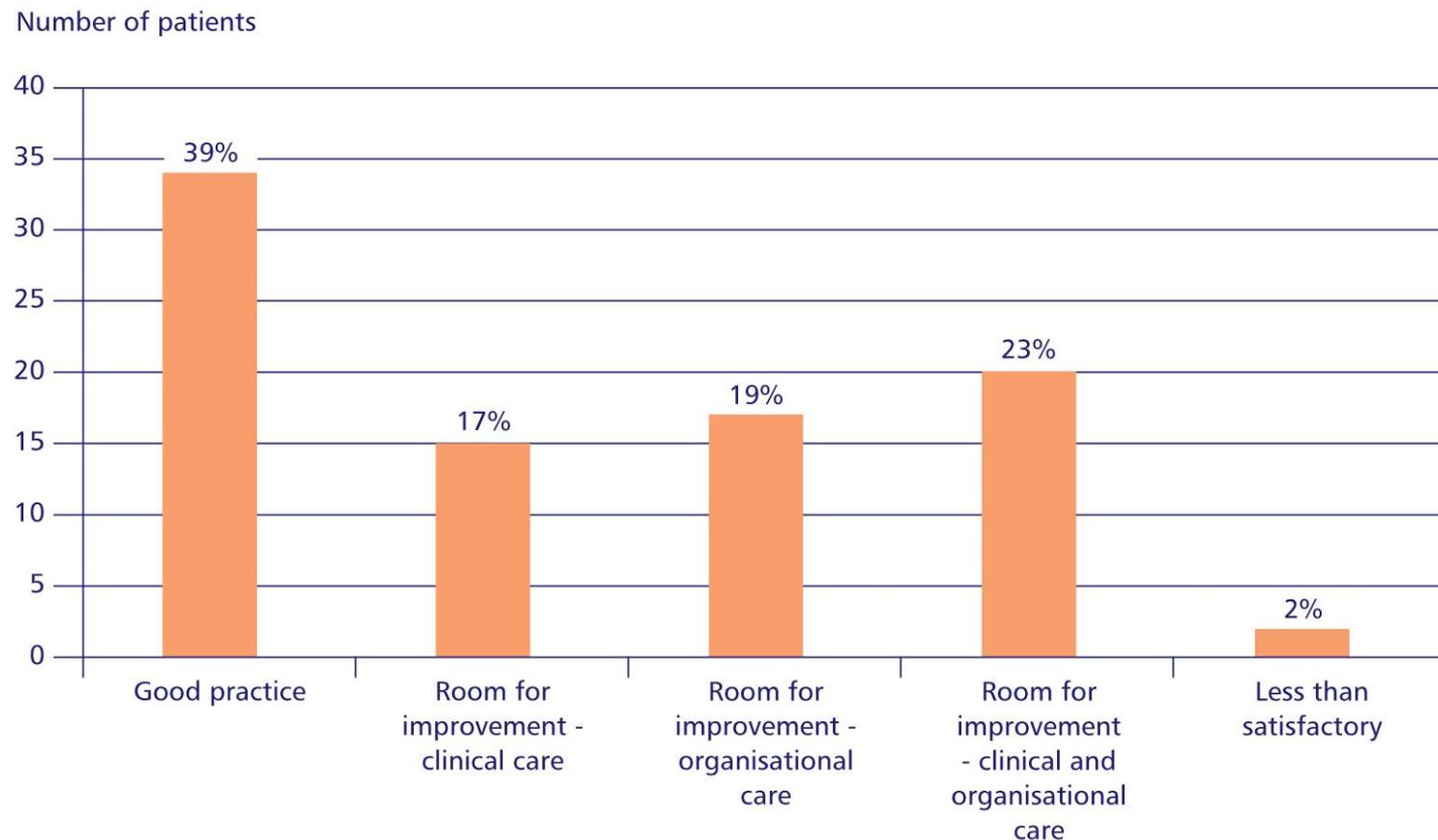
# Overall assessment of care

# 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**

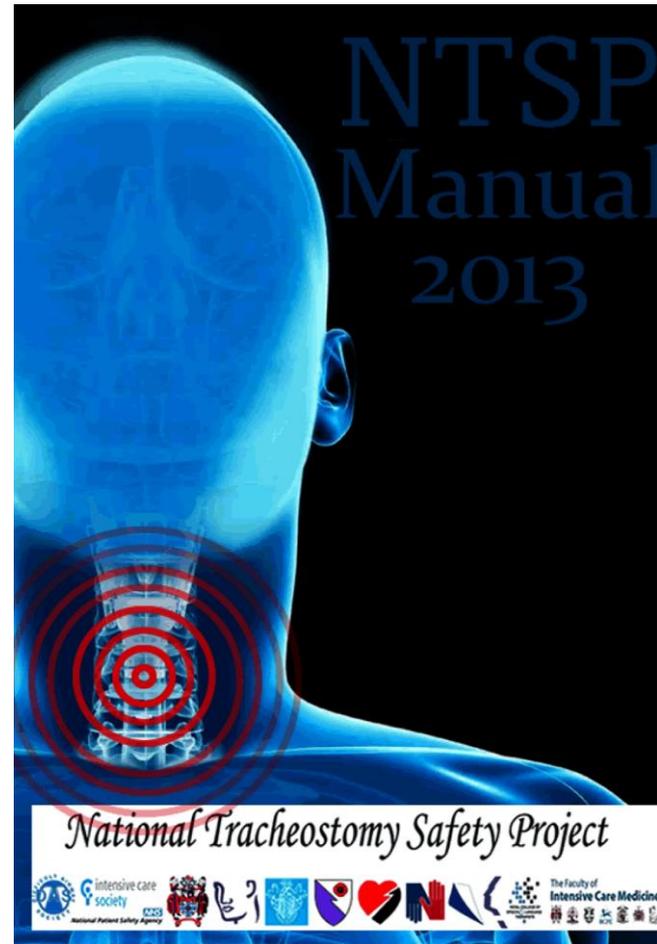
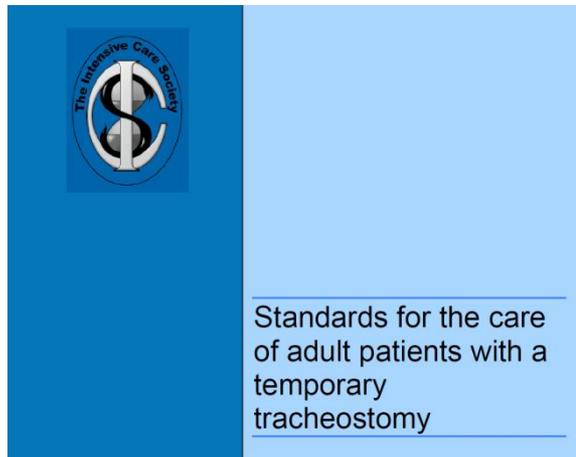
# Principal recommendations

- 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

[www.ncepod.org.uk](http://www.ncepod.org.uk)

