

# In-Hospital Prevalence of Respiratory Compromise in England

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# ABSTRACT

## Objective

- Respiratory compromise (RC) is a state in which there is a high likelihood of decompensation into respiratory insufficiency, respiratory failure, respiratory arrest or death, but in which specific interventions (continuous monitoring and therapies) might prevent or mitigate decompensation.<sup>1</sup> The objective of this retrospective analysis is to estimate in-hospital prevalence of RC for elective patients in NHS England and determine risk-factors associated with RC events.

## Methods

- A retrospective analysis was completed from 1,851,347 elective episodes for NHS fiscal year 2015-16 using the Hospital Episode Statistics (HES) dataset. An RC event was defined as an elective episode which lasted at least 1 day and incurred by patients of at least 1 year of age who had an RC-related diagnosis or intervention.

## Results

- From the initial criteria, there were 1,851,347 total elective episodes out of 1,662,469 patients. Of these, 31,613 (1.9%) were RC events\*, of which 2,665 (0.16%) resulted in death. Risk of RC appears to be age-, but not gender-related, and more frequently incurred in the medical consultant specialty rather than in the surgical consultant specialty. Top diagnoses for patients who had an RC event were hypertension, respiratory failure, and chronic ischemic heart disease, and top procedures were ventilation support, implantation of cardiac pacemaker, and other vein related procedures.

## Conclusions

- In-hospital RC event rate in England is relatively common. Multiple factors are associated with in-hospital RC events and may suggest a need for better patient monitoring and risk-stratification for better patient outcomes.

## METHODS

- A retrospective analysis was completed using the Hospital Episode Statistics (HES) dataset extracted for the NHS fiscal year 2015-16.
- Initial criteria for episode inclusion were:
  - Elective admissions
  - Length of episode > 0 days
  - OPCS (Procedure) must be in episode
  - Age must be  $\geq 1$
  - Having at least 1 RC-related code
- For the statistical analysis, episodes were further required to include information on:
  - Age
  - Gender
  - Consultant specialty

- RC was defined as having at least one of the following diagnoses or procedures:

### Definition of RC (OPCS and ICD codes)

Advanced cardiac pulmonary resuscitation (OPCS: X503)

Cardiac arrest with successful resuscitation (ICD10: I460)

Respiratory arrest (ICD10: R092)

Opioids and related analgesics causing adverse effects in therapeutic use (ICD10: Y450)

Acute respiratory failure (ICD10: J960)

Respiratory failure unspecified (ICD10: J969)

Other and unspecified abnormalities of breathing (ICD10: R068)

Other specified respiratory disorders (ICD10: J989)

Invasive ventilation (OPCS: E851)

Non-invasive ventilation NEC (OPCS: E852)

Death on general ward (excluding still born)

*Note: Episodes where there was death but no RC code were excluded from the analysis.*

# RESULTS (1/3)

- From the initial criteria, there were 1,851,347 total episodes had by 1,662,469 patients.
- Of these, 31,613 (1.9%) were RC events\*, of which 2,665 (0.16%) resulted in death\*\*:

  - RC events were more frequently incurred in medical consultant specialty area than in surgical area (Figure 1)
  - Respiratory/thoracic medicine, cardiac surgery, and critical care medicine were top 3 consultant specialties for the patients who had an RC event (Figure 2)
  - The risk of RC appears to be age related, with highest frequency in the 50-80 year age group (Figure 3), but does not differ significantly between males and females

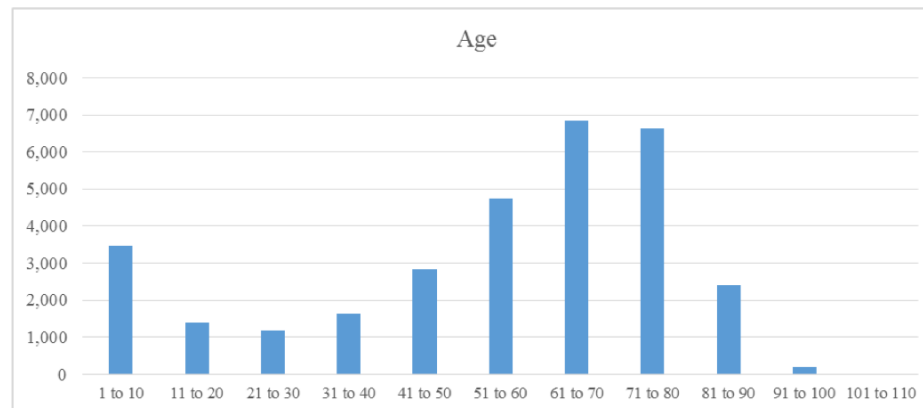
Figure 1: RC events split by consultant specialty area

Consultant Specialty Area	RC events
Medical	17,624
Surgical	13,880

Figure 2: Top 20 consultant specialties for RC events

Top 20 Consultant Specialties	RC events
Respiratory/thoracic medicine	4,765
Cardiac surgery	4,438
Critical care medicine	1,971
Respiratory Physiology	1,937
Cardiology	1,497
General surgery	1,489
Trauma & orthopaedics	1,457
Paediatric Respiratory Medicine	1,376
Paediatric Intensive Care	1,180
Thoracic surgery	753
Cardiothoracic surgery	705
General medicine	688
Urology	585
Neurosurgery	578
Colorectal surgery	539
ENT	513
Obstetrics	483
Paediatrics	465
Vascular surgery	461
Paediatric Ear Nose and Throat	406

Figure 3: RC events split by 10-year age groups.



\*...where patients may or may not had death at the end of the episode.

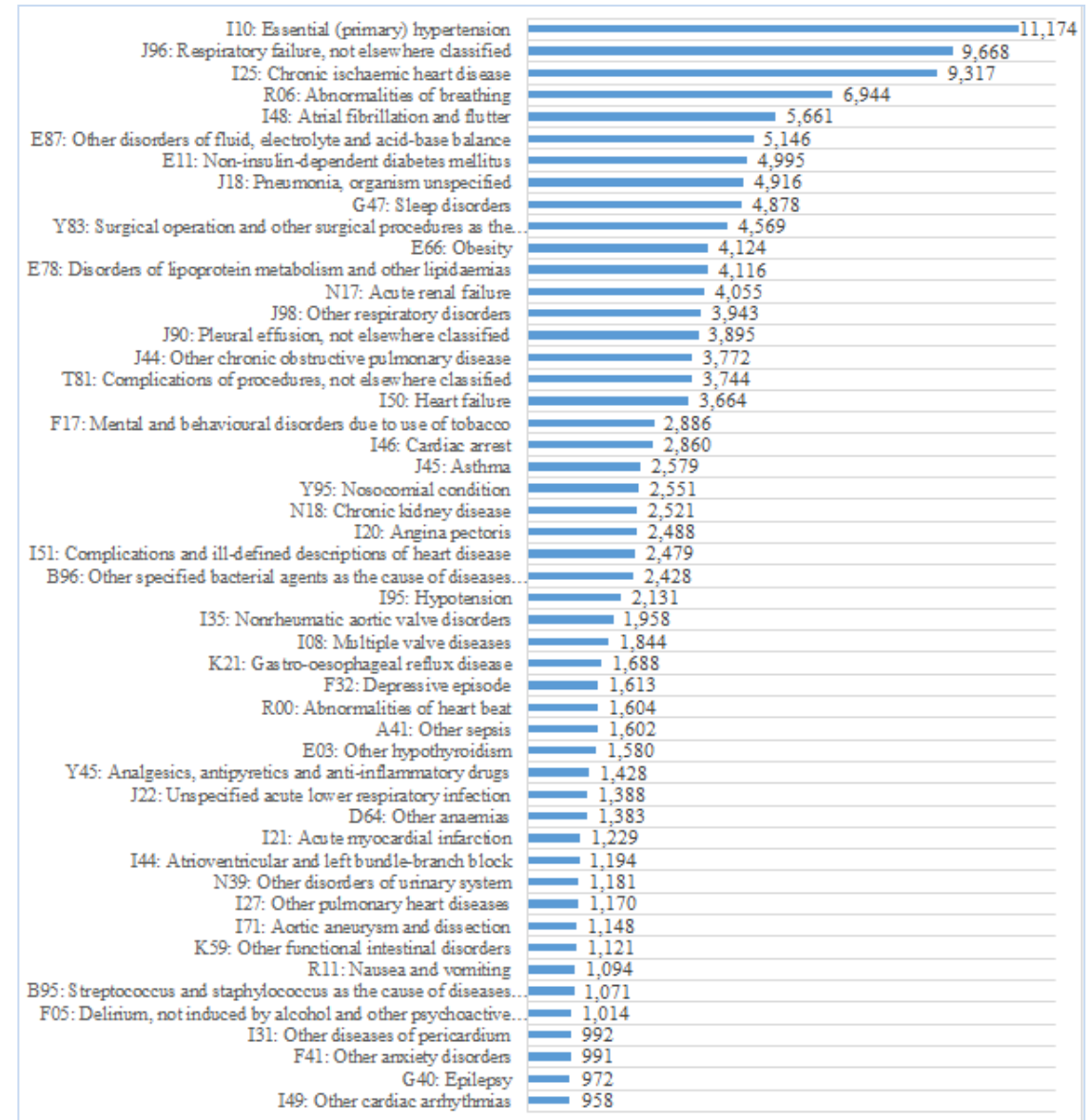
\*\*Death may or may not be attributable to RC.

# RESULTS (2/3)

- Top 10 (most common) diagnoses in patients who had an RC event:
  1. Essential (primary) **hypertension**
  2. **Respiratory failure**
  3. Chronic **ischemic heart disease**
  4. Abnormalities of breathing
  5. **Atrial fibrillation** and flutter
  6. Other disorders of fluid, electrolyte and acid-base balance
  7. Non-insulin-dependent **diabetes mellitus**
  8. **Pneumonia**
  9. **Sleep disorders**
  10. **Surgical operation** and other surgical procedures as the cause of abnormal reaction of the patient, or of later complication

Notable mentions:  
**Obesity is #11, Acute Renal Failure #13.**

Figure 4: Top comorbidities (diagnoses) in RC population



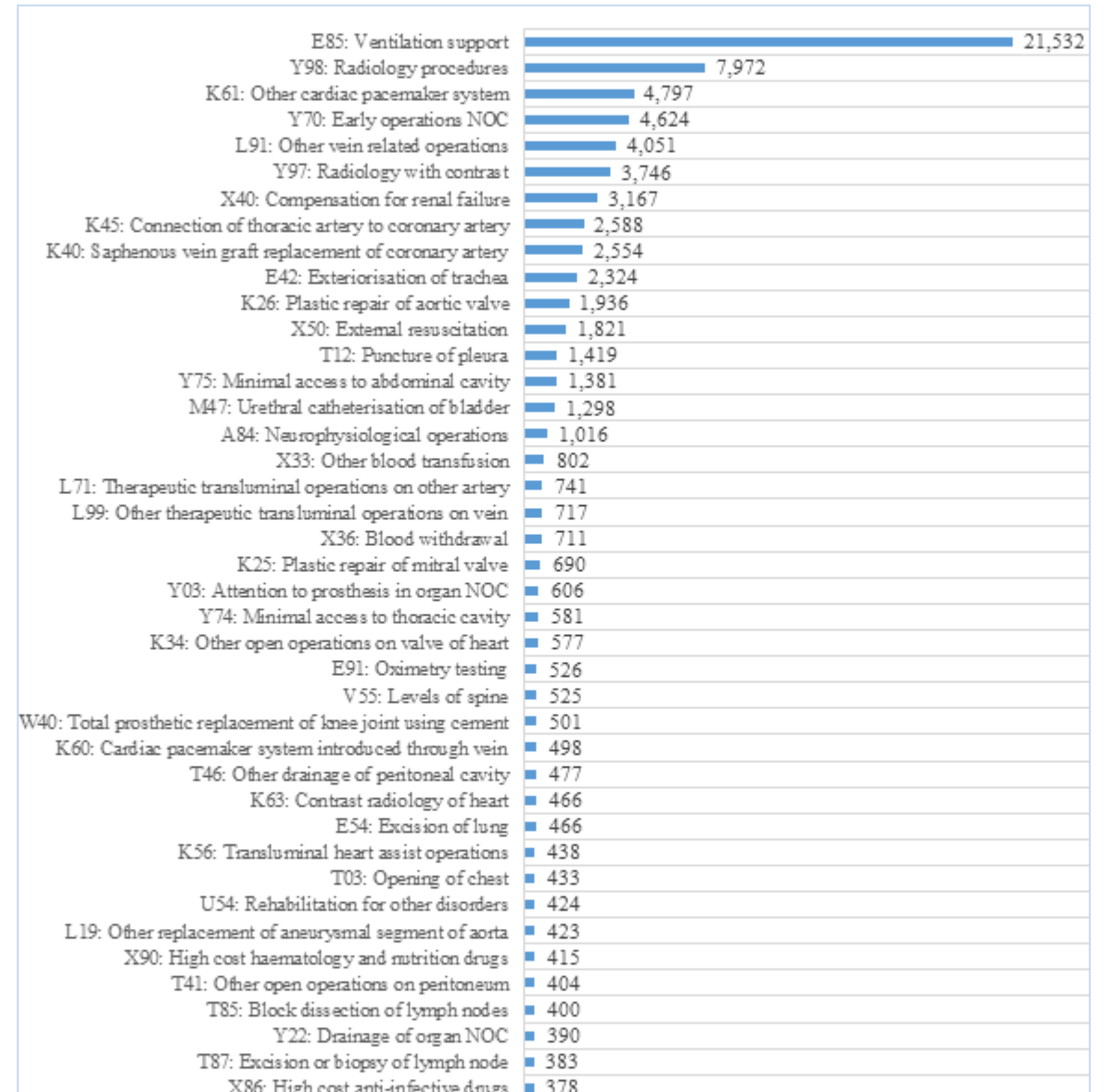
# RESULTS (3/3)

• Top 10 (most common) procedures\* in patients who had an RC event:

1. **Ventilation support**
2. Other cardiac **pacemaker** system (i.e., epicardial implantation of cardiac pacemaker)
3. Other **vein** related operations
4. Compensation of **renal failure**
5. **Connection of thoracic artery to coronary artery**
6. Saphenous **vein graft replacement**
7. **Exteriorization of trachea**
8. **Plastic repair of aortic valve**
9. **External resuscitation**
10. **Puncture of pleura**


\*Selected (but not all) body approach and diagnostic procedures have been removed in the graph, hence when presenting top 10, the remaining approach and diagnostic procedures (e.g., radiology) were excluded from being mentioned in the top 10. Additionally, mention of

Figure 5: Top procedures in RC population\*



# CONCLUSIONS

- In-hospital RC in England is relatively common and the incidence is similar to that reported for US retrospective database analyses<sup>1</sup>.
- Multiple factors are associated with in-hospital RC events and may suggest a need for better patient monitoring and patient stratification to improve patient outcomes.



1. *Development Of Postoperative Pulmonary Complications After Admission To General Care Floor In Elective Surgery Cases- Kelley, Scott; Agarwal, Santosh; Parikh, Niraj Erslon, Mary; Morris, Peter /Critical Care Medicine Volume 40(12) Supplement 1, December 2012DOI: 10.1097/01.ccm.0000424958.25075.6c*