



### **Supplementary material**

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**Supplementary Table 1.** Breakdown of false-positive diagnosis codes for non-traumatic pneumothorax in the Prince of Wales Hospital cohort

<b>ICD-9-CM codes</b>	<b>Description</b>	<b>No. of true-positive cases with diagnosis code validated</b>	<b>No. of false-positive cases</b>	<b>Breakdown of false-positive cases</b>
512	Pneumothorax	43	7	Inappropriate coding [iatrogenic pneumothorax] (n=4, 8.0%) Inappropriate coding [traumatic pneumothorax] (n=3, 6.0%)
512.1.0	Iatrogenic pneumothorax	50	0	N/A
512.1.2	Postoperative pneumothorax	35	15	Inappropriate coding [iatrogenic pneumothorax after transthoracic lung biopsy] (n=9, 18.0%) Inappropriate coding [recurrent primary spontaneous pneumothorax with prior surgical pleurodesis] (n=3, 6.0%) Inappropriate coding [secondary spontaneous pneumothorax] (n=1, 2.0%) Inappropriate coding [iatrogenic pneumothorax after transbronchial lung biopsy] (n=1, 2.0%) Utilisation of prior diagnosis code (n=1, 2.0%)

Abbreviations: ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; N/A = not applicable

**Supplementary Table 2.** Breakdown of false-positive diagnosis codes for non-traumatic pleural effusion in the Prince of Wales Hospital cohort

<b>ICD-9-CM codes</b>	<b>Description</b>	<b>No. of true-positive cases with diagnosis code validated</b>	<b>No. of false-positive cases</b>	<b>Breakdown of false-positive cases</b>
012.00	Tuberculous pleurisy, unspecified examination	45	5	Utilisation of prior diagnosis code (n=4, 8.0%) Incorrect diagnosis [no pleural effusion identified] (n=1, 2.0%)
197.2	Secondary malignant neoplasm of pleura	47	3	Utilisation of prior diagnosis code (n=2, 4.0%) Incorrect diagnosis [malignant pericardial effusion] (n=1, 2.0%)
220.4	Meigs' syndrome	5	0	N/A
510.0	Empyema with fistula	45	5	Utilisation of prior diagnosis code (n=3, 6.0%) Incorrect diagnosis [subdural empyema] (n=2, 4.0%)
510.0.1	Pleuroperitoneal fistula	41	7	Utilisation of prior diagnosis code (n=3, 6.3%) Inappropriate coding [history of pleuroperitoneal fistula in an inactive state] (n=2, 4.2%) Incorrect diagnosis [pleuroperitoneal fistula not confirmed by surgery or imaging] (n=2, 4.2%)
511.1	Pleurisy with effusion, with mention of a	47	3	Incorrect diagnosis [fluid overload] (n=3, 6.0%)

	bacterial cause other than tuberculosis			
511.8.0	Non-tuberculous pleural effusion	33	3	Incorrect diagnosis [no pleural effusion identified] (n=3, 8.3%)
511.8.1	Haemothorax	48	2	Incorrect diagnosis [no haemothorax identified] (n=1, 2.0%) Utilisation of prior diagnosis code (n=1, 2.0%)
511.8.2	Hydrothorax	30	5	Incorrect diagnosis [malignant pleural effusion] (n=3, 8.6%) Utilisation of prior diagnosis code (n=2, 5.7%)
511.8.3	Hydrothorax related to dialysis	0	0	N/A
511.8.4	Haemo-pneumothorax	39	1	Incorrect diagnosis [pneumothorax only] (n=1, 2.5%)
511.8.5	Hydro-pneumothorax	48	2	Utilisation of prior diagnosis code (n=2, 4.0%)
511.8.6	Chylous effusion in pleural cavity	10	2	Incorrect diagnosis [chylous ascites] (n=1, 8.3%) Incorrect diagnosis [fetal chylothorax] (n=1, 8.3%)
511.8.7	Postoperative haemothorax	14	0	N/A
511.8.8	Hydrothorax as complication of peritoneal dialysis	0	0	N/A
511.9	Unspecified pleural	49	1	Utilisation of prior diagnosis code (n=1, 2.0%)

	effusion			
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Abbreviations: ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; N/A = not applicable

**Supplementary Table 3.** Breakdown of false-positive diagnosis codes for trauma-related pleural events in the Prince of Wales Hospital cohort

<b>ICD-9-CM codes</b>	<b>Description</b>	<b>No. of true-positive cases with diagnosis code validated</b>	<b>No. of false-positive cases</b>	<b>Breakdown of false-positive cases</b>
860.0	Traumatic pneumothorax without mention of open wound into thorax	50	0	N/A
860.1	Traumatic pneumothorax with open wound into thorax	9	1	Utilisation of prior diagnosis code (n=1, 10.0%)
860.2	Traumatic haemothorax without mention of open wound into thorax	46	4	Incorrect diagnosis [traumatic pneumothorax] (n=2, 4.0%) Incorrect diagnosis [traumatic haemopericardium] (n=1, 2.0%) Incorrect diagnosis [iatrogenic haemothorax] (n=1, 2.0%)
860.3	Traumatic haemothorax with open wound into	6	1	Utilisation of prior diagnosis code (n=1, 14.3%)

	thorax			
860.4	Traumatic pneumo-haemothorax without mention of open wound into thorax	17	0	N/A
860.5	Traumatic pneumo-haemothorax with open wound into thorax	4	0	N/A

Abbreviations: ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; N/A = not applicable

**Supplementary Table 4.** Breakdown of false-positive procedure codes (starting with 33) in the Prince of Wales Hospital cohort

<b>ICD-9-CM codes</b>	<b>Description</b>	<b>No. of true-positive cases with procedure code validated</b>	<b>No. of false-positive cases</b>	<b>Breakdown of false-positive cases</b>
33.22.0	Fibreoptic bronchoscopy	50	0	N/A
33.23.0	Bronchoscopy	50	0	N/A
33.23.1	Rigid bronchoscopy	49	1	Procedure aborted before completion (n=1, 2.0%)
33.23.2	Endoscopic ultrasonography of lung	1	0	N/A
33.23.3	Endoscopic ultrasonography of bronchus	4	0	N/A
33.23.4	Endoscopic ultrasonography of mediastinum	0	0	N/A
33.23.5	Endobronchial ultrasonography	50	0	N/A
33.23.6	Electromagnetic navigation	50	0	N/A

	bronchoscopy			
33.23.7	Robotic-assisted bronchoscopy	8	0	N/A
33.24.0	Closed endoscopic biopsy of bronchus	42	8	Incorrect procedure [transbronchial lung biopsy] (n=8, 16.0%)
33.24.1	Bronchoscopic biopsy	0	0	N/A
33.24.2	Fibreoptic bronchoscopy with biopsy	0	0	N/A
33.24.3	Endoscopic ultrasonography of bronchus with biopsy	3	1	Incorrect procedure [bronchoscopy only] (n=1, 25.0%)
33.24.4	Electromagnetic navigation bronchoscopy with biopsy	50	0	N/A
33.24.5	Bronchoalveolar lavage	50	0	N/A
33.24.6	Bronchoscopy with brushing	50	0	N/A

33.24.7	Flexible bronchoscopy with biopsy of bronchus	36	14	Incorrect procedure [transbronchial lung biopsy] (n=14, 28.0%)
33.26.0	Closed biopsy of lung	46	4	Procedure not performed (n=3, 6.0%) Incorrect procedure [open lung biopsy] (n=1, 2.0%)
33.26.1	Fine-needle aspiration biopsy of lung	47	3	Incorrect procedure [fine-needle aspiration biopsy of lymph node] (n=2, 4.0%) Procedure aborted before completion (n=1, 2.0%)
33.26.2	Computed tomography-guided fine-needle aspiration cytology of chest mass	0	0	N/A
33.26.3	Endoscopic ultrasonography of lung with biopsy	2	0	N/A
33.26.4	Percutaneous fine-needle aspiration biopsy of lung with imaging guidance	48	2	Incorrect procedure [fine-needle aspiration biopsy of mediastinal lesion] (n=1, 2.0%) Incorrect procedure [fine-needle aspiration biopsy of pleural lesion] (n=1, 2.0%)
33.27.0	Lung biopsy via endoscopy	0	0	N/A

33.27.1	Bronchoscopic biopsy under fluoroscopic guidance	27	2	Incorrect procedure [fluoroscopic guidance not used] (n=2, 6.9%)
33.27.2	Flexible bronchoscopy with biopsy of lung	48	2	Incorrect procedure [fine-needle aspiration instead of biopsy] (n=2, 4.0%)
33.93.1	Percutaneous drainage of lung with imaging guidance	35	15	Incorrect procedure [percutaneous drainage of pleural effusion] (n=10, 20.0%) Incorrect procedure [percutaneous drainage of chest wall lesions] (n=2, 4.0%) Procedure not performed (n=2, 4.0%) Incorrect procedure [percutaneous drainage of hip joint] (n=1, 2.0%)
33.98.2	Implantation of endobronchial valve via bronchoscopy	12	3	Attempted implantation of endobronchial valve but failed procedure (n=2, 13.3%) Procedure not performed (n=1, 6.7%)

Abbreviations: ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; N/A = not applicable

**Supplementary Table 5.** Breakdown of false-positive procedure codes (starting with 34) in the Prince of Wales Hospital cohort

<b>ICD-9-CM codes</b>	<b>Description</b>	<b>No. of true-positive cases with procedure code validated</b>	<b>No. of false-positive cases</b>	<b>Breakdown of false-positive cases</b>
34.04.0	Insertion of intercostal catheter for drainage	50	0	N/A
34.04.1	Chest drain insertion	50	0	N/A
34.04.2	Percutaneous drainage of pleura with imaging guidance	50	0	N/A
34.04.3	Indwelling pleural catheterisation	8	42	Incorrect procedure [insertion of non-tunneled pleural catheter] (n=27, 54.0%) Incorrect procedure [pleural fluid drainage via existing indwelling pleural catheter] (n=13, 26.0%) Incorrect procedure [removal of indwelling pleural catheter] (n=1, 2.0%) Incorrect procedure [insertion of port-a-cath] (n=1, 2.0%)
34.04.4	Drainage of pleural	50	0	N/A

	cavity			
34.04.5	Drainage of pleural cavity, percutaneous	47	3	Incorrect procedure [drainage of lung abscess] (n=1, 2.0%) Incorrect procedure [drainage of ascites] (n=1, 2.0%) Procedure not performed (n=1, 2.0%)
34.5.0	Pleurectomy	0	0	N/A
34.5.1	Decortication of lung	45	0	N/A
34.5.9	Other excision of pleura	36	0	N/A
34.6	Scarification of pleura/pleurodesis	49	1	Incorrect procedure [obstetric surgery with pleurodesis of bilateral fetal pleural space] (n=1, 2.0%)
34.09.0	Thoracotomy	50	0	N/A
34.09.10000	Thoracotomy with chest drainage	50	0	N/A
34.09.1	Intercostal thoracostomy drainage	8	0	N/A
34.09.2	Pleural window	1	0	N/A
34.09.3	Drainage of pleural cavity, open	8	5	Incorrect procedure [image-guided percutaneous insertion of pleural drain] (n=4, 30.8%) Incorrect procedure [open drainage of pericardial cavity] (n=1, 7.7%)

34.09.4	Video-assisted thoracoscopy for haemostasis	0	0	N/A
34.09.999	Incision of pleura	10	0	N/A
34.21.0	Transpleural thoracoscopy	50	0	N/A
34.21.1	Thoracoscopy	4	0	N/A
34.21.2	Video-assisted thoracoscopy	50	0	N/A
34.21.5	Video-assisted thoracoscopy, haemostasis	22	0	N/A
34.24.0	Pleural biopsy	49	1	Procedure not performed (n=1, 2.0%)
34.24.1	Percutaneous fine-needle aspiration biopsy of pleura with image guidance	38	12	Incorrect procedure [insertion of pleural drain without biopsy] (n=12, 24.0%)
34.28.1	Pleuroscopy	50	0	N/A
34.91	Thoracentesis/chest tapping	50	0	N/A
34.92.0	Injection into	0	0	N/A

	thoracic cavity			
34.92.1	Chemical pleurodesis	50	0	N/A
34.92.2	Pleurodesis, chemical	0	0	N/A
34.92.3	Intrapleural instillation of fibrinolytic agents	48	2	Procedure not performed (n=2, 4.0%)

Abbreviations: ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification; N/A = not applicable