

### **Supplementary material**

The supplementary material was provided by the authors and some information may not have been peer reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by the Hong Kong Academy of Medicine and the Hong Kong Medical Association. The Hong Kong Academy of Medicine and the Hong Kong Medical Association disclaim all liability and responsibility arising from any reliance placed on the content.

Supplement to: KKP Chan, TCC Ng, CY Sze, et al. Validation of diagnosis codes for pleural diseases and procedure codes for relevant respiratory procedures in a healthcare database in Hong Kong: a single tertiary centre study. Hong Kong Med J 2026;Epub 30 Jan 2026. <https://doi.org/10.12809/hkmj2412275>.

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

ICD-9-CM codes	Description	No. of true-positive cases with diagnosis code validated	No. of false-positive cases	Breakdown of false-positive cases
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

ICD-9-CM codes	Description	No. of true-positive cases with diagnosis code validated	No. of false-positive cases	Breakdown of false-positive cases
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			
--	----------	--	--	--

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

ICD-9-CM codes	Description	No. of true-positive cases with diagnosis code validated	No. of false-positive cases	Breakdown of false-positive cases
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

ICD-9-CM codes	Description	No. of true-positive cases with procedure code validated	No. of false-positive cases	Breakdown of false-positive cases
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	<p>Incorrect procedure [insertion of non-tunnelled pleural catheter] (n=27, 54.0%)</p> <p>Incorrect procedure [pleural fluid drainage via existing indwelling pleural catheter] (n=13, 26.0%)</p> <p>Incorrect procedure [removal of indwelling pleural catheter] (n=1, 2.0%)</p> <p>Incorrect procedure [insertion of port-a-cath] (n=1, 2.0%)</p>
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