

Chest drain practice after pulmonary resection

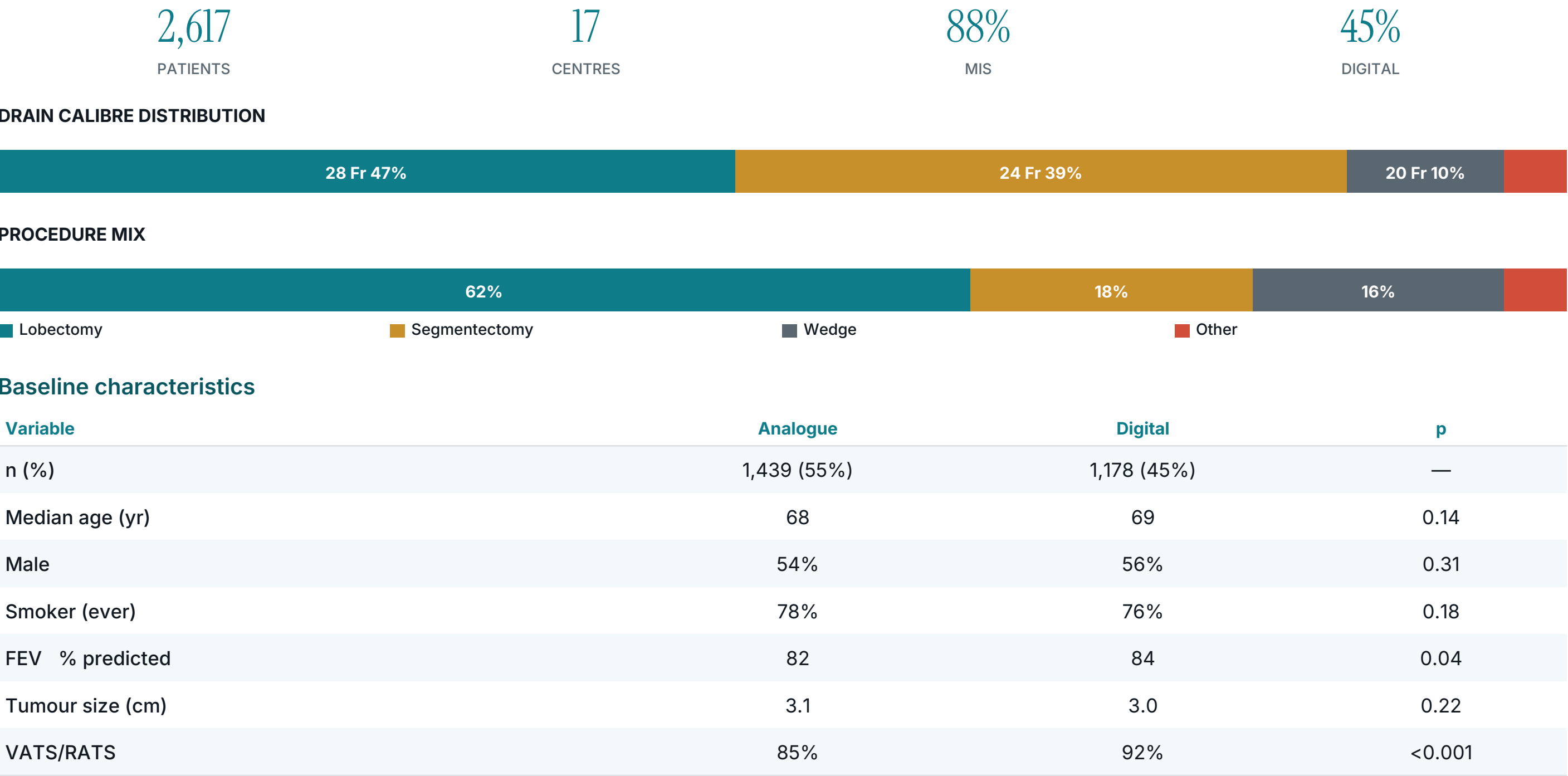
A UK multicentre registry · 2,617 patients · 17 centres · drain size, digital systems & PAL

N. Berjaoui, G. Weedle, A. Al-Shammari, J.S. Choi, A. Patel, A. Bille
Guy's & St Thomas' NHS Foundation Trust, London, UK · UK Thoracic Drain Registry collaborators

1. BACKGROUND · MATERIALS AND METHODS

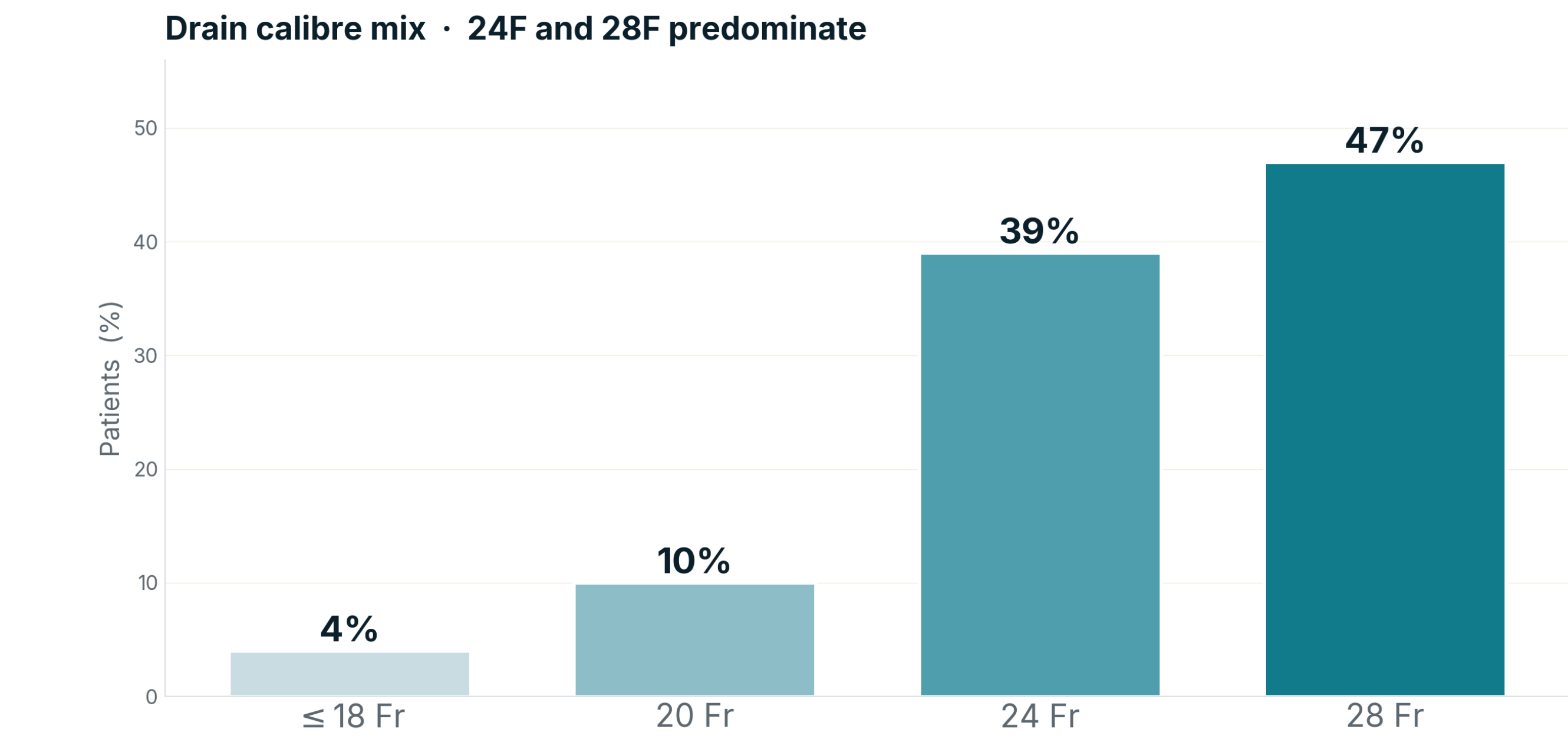
Pleural drainage protocols vary substantially between thoracic centres despite their direct impact on length of stay, prolonged air leak (PAL), and patient experience. We assembled a prospective UK registry across **17 centres** to quantify how **drain calibre** and **digital drainage** influence early post-operative outcomes after curative-intent pulmonary resection, with adjustment for case-mix and centre-level variation.

Cohort at a glance



- Methods · design & statistics
- Multicentre prospective registry, 18 UK thoracic units, 2014–2024.
 - Inclusion: adult elective curative-intent pulmonary resection with pleural drainage.
 - Centre inclusion:** Birmingham cohort **excluded** from the primary analysis for protocol non-conformity with drain-size and suction fields; sensitivity analysis with Birmingham retained available on request.
 - Negative suction subgroup:** analysed observationally; no adjusted signal for LOS or PAL, but the sub-cohort is small and centre-clustered.
 - Reporting note:** the negative-suction question is under-powered in this registry and should be addressed by a prospective randomised or real-world study.
 - Exclusion: non-resectional procedures; pneumonectomy; emergency surgery.
 - Endpoints: PAL > 5 d (primary), drain duration, LOS, severe surgical emphysema, drain-related complications, 30-day readmission.
 - Statistics: mixed-effects logistic regression with centre as random effect; propensity-score matching for digital vs analogue; funnel-plot centre-level analysis.

Drain calibre mix · 24F and 28F predominate



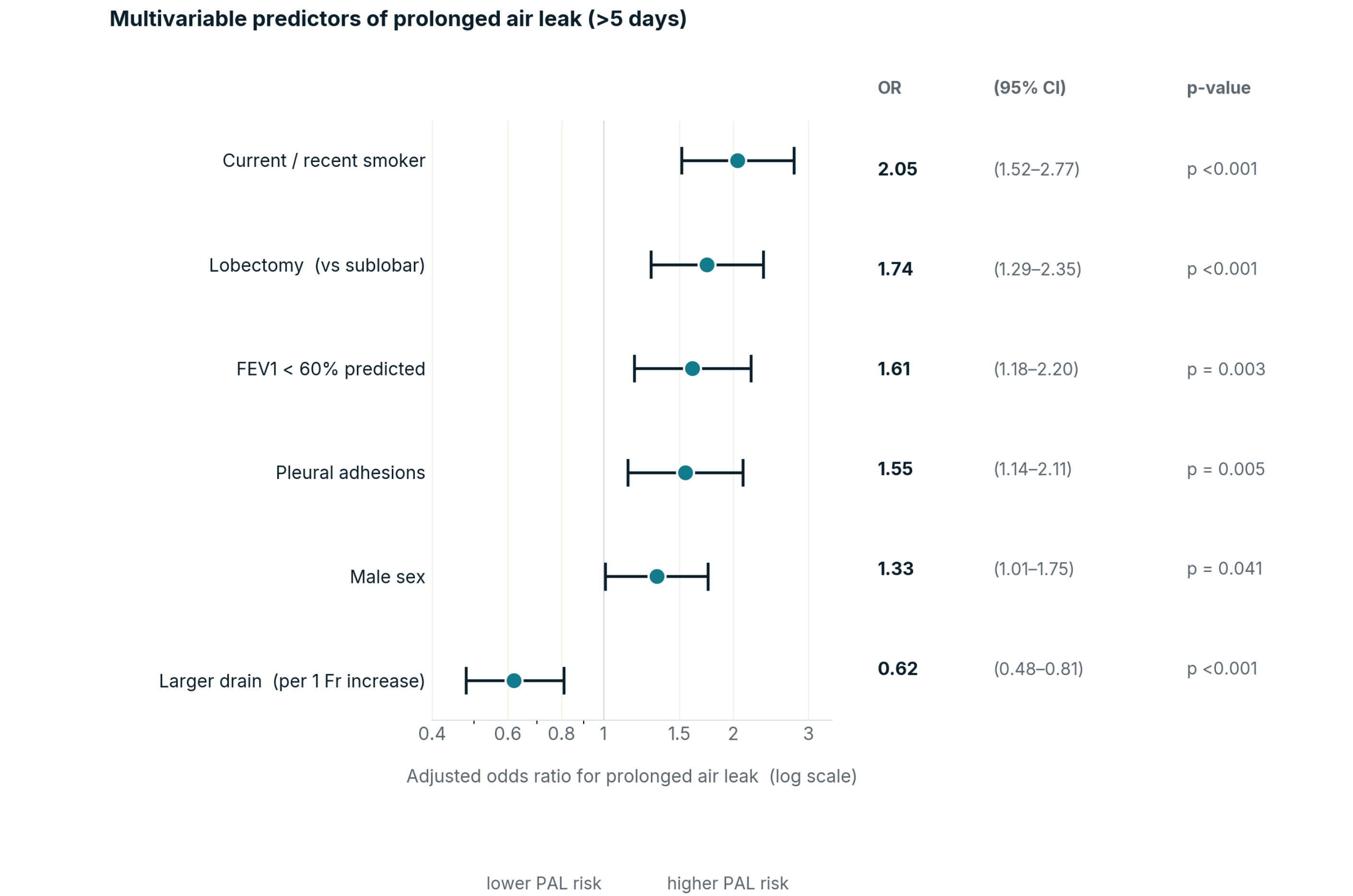
CONCLUSIONS · CLINICAL IMPLICATIONS

1. Larger-bore drains are associated with lower prolonged air leak.

Increasing drain calibre was independently associated with reduced PAL after adjustment for case-mix and centre. The direction and magnitude of effect argue against the routine downsizing of drains after lobectomy in patients at higher PAL risk.

2. RESULTS · DRAIN CALIBRE AND PROLONGED AIR LEAK

Findings



Each 1-Fr increase in drain calibre reduced PAL odds by 56%: adjusted OR 0.44 (95% CI 0.34–0.57; p < 0.0001). The effect was consistent across procedure types and centres, surviving sensitivity analyses for case-mix and surgeon volume.

Drain (Fr)	n	PAL >5 d	Median LOS
18	114	14.2%	8 d
20	263	11.6%	7 d
24	1,020	8.7%	5 d
28	1,220	7.2%	5 d

- How this compares · literature
- Brunelli 2010** (EJCTS): early evidence that smaller drains feasible after lobectomy, but PAL signal underpowered.
 - Pomplii 2014** (Ann Thorac Surg): single-centre RCT of digital vs analogue; LOS reduction with digital.
 - Cerfolio 2009** (JTCVS): algorithmic drain removal; established the PAL >5 d definition we use.

Procedure	n	Adj OR / 1 Fr	95% CI
Lobectomy	1,624	0.42	0.31–0.55
Segmentectomy	460	0.48	0.30–0.77
Wedge	429	0.57	0.34–0.96
Bilobectomy / sleeve	104	0.51	0.28–0.93

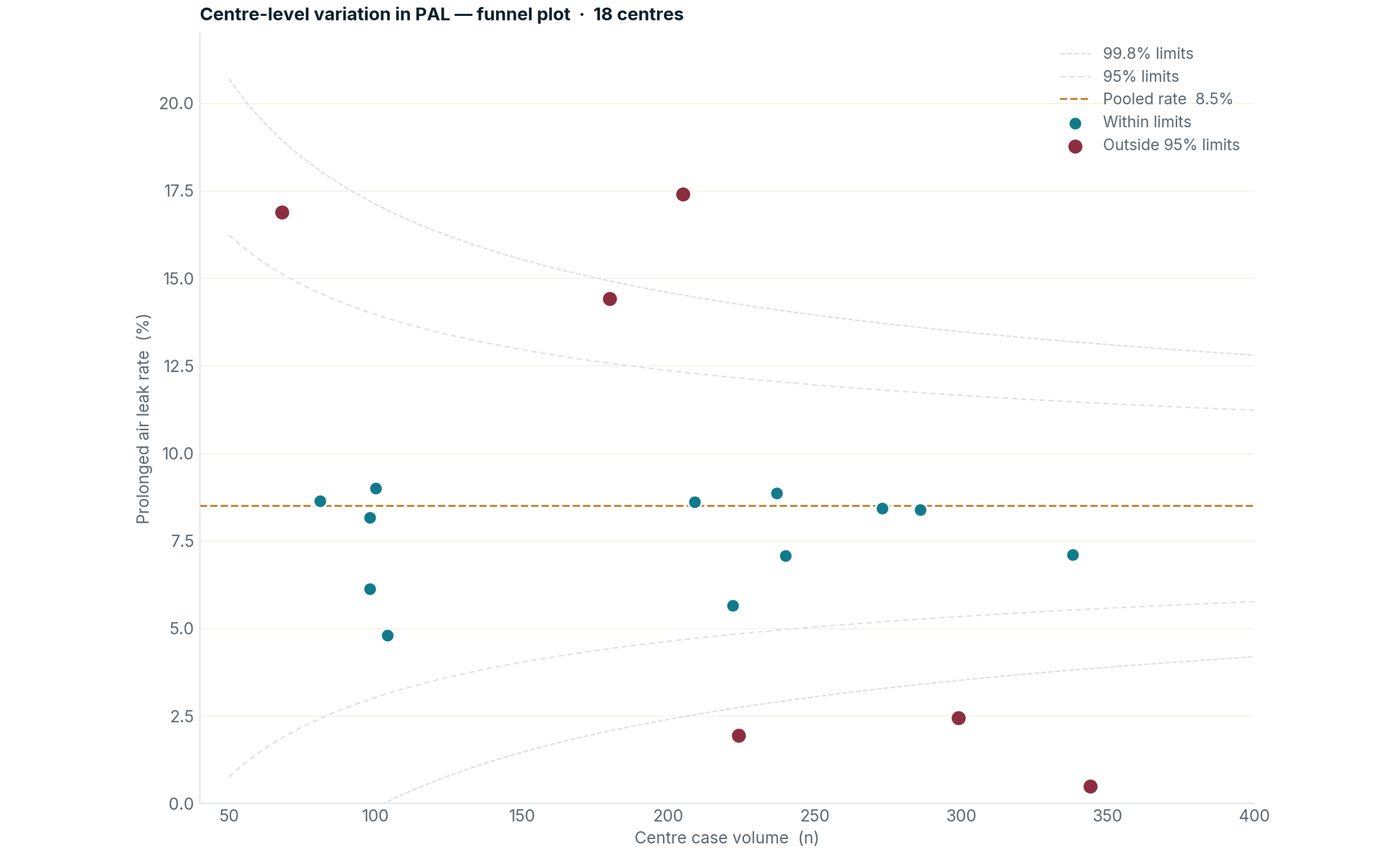
Direction of effect consistent across procedure types; strongest signal in lobectomy.

System-level LOS impact

Applying the propensity-matched digital LOS reduction (~1 day) to the estimated 8,500 UK anatomical lung resections per year, national adoption of digital drainage would release approximately 8,500 bed-days per year without changing surgical technique. Harmonising drain calibre would be additive.

3. RESULTS · DIGITAL DRAINAGE AND CENTRE VARIATION

Findings



Digital drainage shortened LOS by ~1 day and detected PAL more reliably (OR 1.58, 95% CI 1.16–2.16; p = 0.004) without increasing clinically meaningful PAL. Funnel-plot analysis identified 3 centres outside ±2 SD limits, adjusted for case-mix.

Outcome	Digital	Analogue	p
n (matched)	1,180	1,180	—
Median LOS (d)	4	5	<0.001
Drain duration (d)	2	3	<0.001
PAL >5 d	8.1%	8.9%	0.42
Severe emphysema	1.2%	1.8%	0.18
30-d readmission	5.4%	5.9%	0.55

Outcome	Suction (n=612)	No suction (n=1,405)	adj p
PAL > 5 d	9.5%	7.9%	0.31
Drain duration (d)	3	3	0.72
Median LOS (d)	5	5	0.68
Severe emphysema	1.6%	1.4%	0.74

No adjusted benefit of active negative suction; hypothesis-generating and requires a prospective real-world trial.

- Strengths · limitations**
- Strengths:** largest UK multicentre drain registry to date; prospectively collected; centre as random effect; propensity-matched digital comparison; Birmingham excluded from primary to protect protocol conformity.
 - Limitations:** residual confounding (drain choice not randomised); centre-level practice clustering despite mixed-effects model; PAL definition harmonised retrospectively; negative-suction sub-cohort under-powered.

- Proposed pathway change**
- Default calibre:** maintain 24–28 Fr after lobectomy and bilobectomy in patients at higher PAL risk (COPD, emphysema, upper-lobe resection).
 - Digital drainage:** adopt as the standard system for post-lobectomy monitoring, primarily as a LOS lever, not a PAL prevention tool.
 - Negative suction:** do not adopt outside a prospective real-world evaluation; current registry data do not support routine use.
 - Removal criteria:** harmonise fluid-volume threshold and air-leak plateau across centres to reduce practice variation.

- Next steps**
- Randomised trial:** negative suction vs no suction in a matched lobectomy cohort, powered for PAL > 5 d.
 - Registry expansion:** add three centres, harmonise capture, re-analyse when follow-up matures.
 - Implementation pilot:** introduce the proposed pathway in 3–4 UK units with pre/post PAL and LOS evaluation.