University of BRISTOL

Cost-effectiveness of pharmacy-led versus conventionally delivered antiviral treatment for hepatitis C in patients receiving opioid substitution therapy

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Background

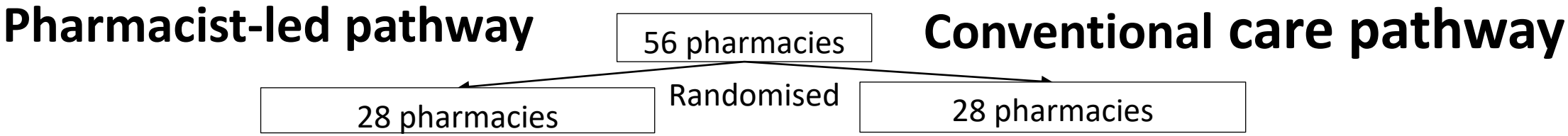
- In the UK, almost 90% of hepatitis C virus (HCV) infections are found in people who inject drugs (PWID).
- World Health Organization targets eliminating HCV as a public health problem by 2030.
- It is necessary to find, test, and treat PWID in order to meet WHO targets.
- Community testing has been shown to be effective at increasing uptake of testing and treatment.

SuperDOT-C trial

- Community pharmacies in 3 Scottish health boards - NHS Tayside, Grampian, and Greater Glasgow and Clyde.
- Cluster randomised at pharmacy level.
- Opioid substitution therapy (OST) patients attending pharmacies were eligible.
- Intervention – New pharmacist-led pathway in which patients are tested and treated entirely within the pharmacies.
- Comparator – Conventional care pathway in which patients are referred to treatment centre after initial dry blood spot test (DBST).
- Primary outcome – Proportion of patients with sustained virological response 12 weeks after completing treatment (SVR12)

Clinical findings

- Fifty-five community pharmacies recruited.
- 2718 OST patients eligible.
- Data collected from 356 patients who consented to drug treatment – 219 in pharmacist-led arm and 137 in conventional care arm.
- 98 (7%) achieved SVR12 (primary outcome) in pharmacist-led arm compared to 43 in conventional care arm (3%) (p: <0.0001).
- Clinical outcomes paper:
  - Radley A, de Bruin M, Inglis SK, Donnan PT, Hapca A, Barclay ST, et al. Clinical effectiveness of pharmacist-led versus conventionally delivered antiviral treatment for hepatitis C virus in patients receiving opioid substitution therapy: a pragmatic, cluster-randomised trial. Lancet Gastroenterol Hepatol. 2020.


Pharmacist-led pathway
56 pharmacies
Conventional care pathway
Randomised
28 pharmacies
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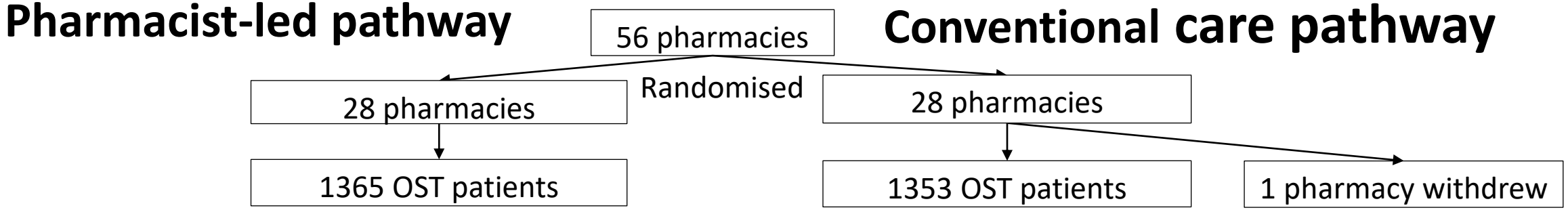
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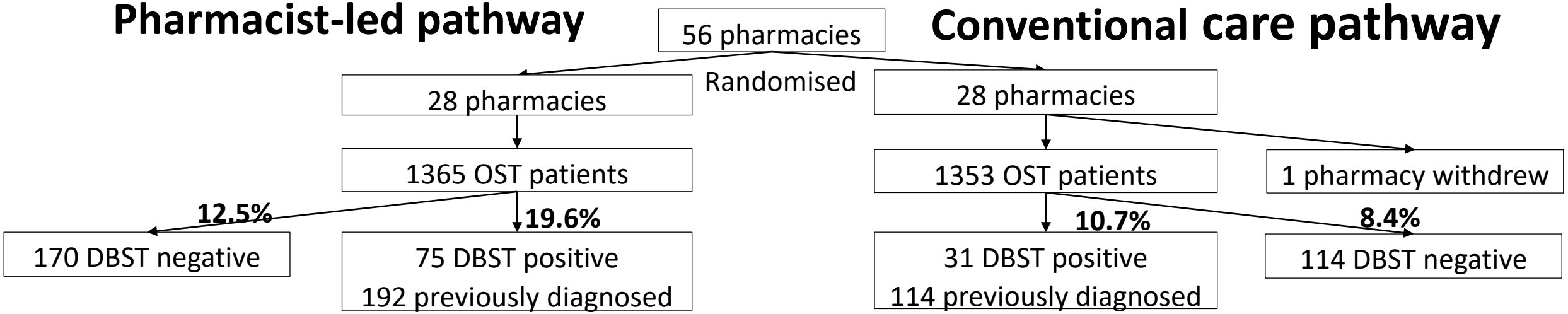
1365 OST patients
1353 OST patients
1 pharmacy withdrew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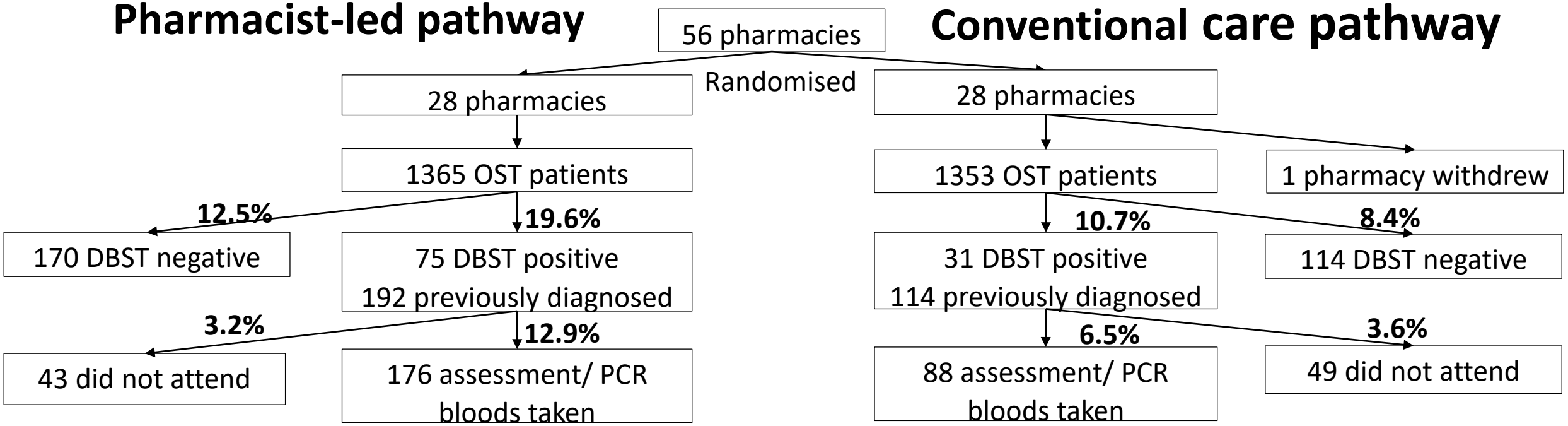
170 DBST negative
75 DBST positive
192 previously diagnosed
31 DBST positive
114 previously diagnosed
114 DBST negative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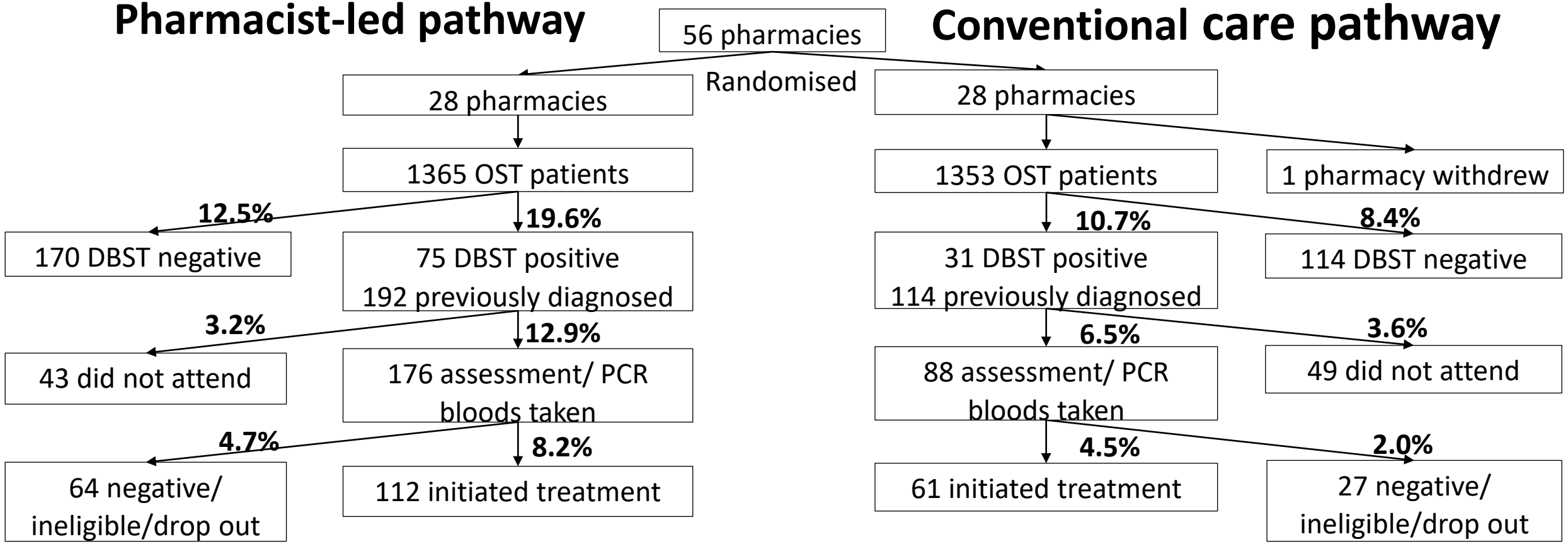
43 did not attend
176 assessment/ PCR bloods taken
88 assessment/ PCR bloods taken
49 did not attend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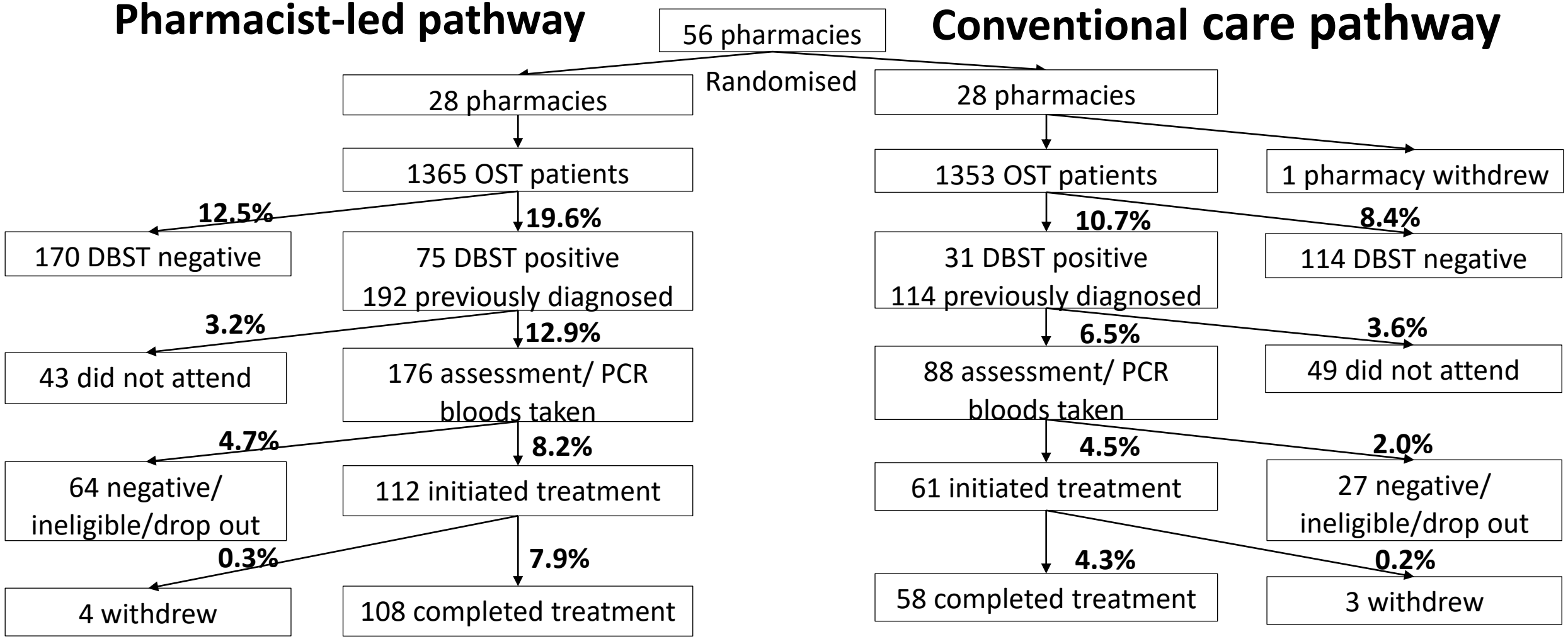
64 negative/ ineligible/drop out
112 initiated treatment
61 initiated treatment
27 negative/ ineligible/drop out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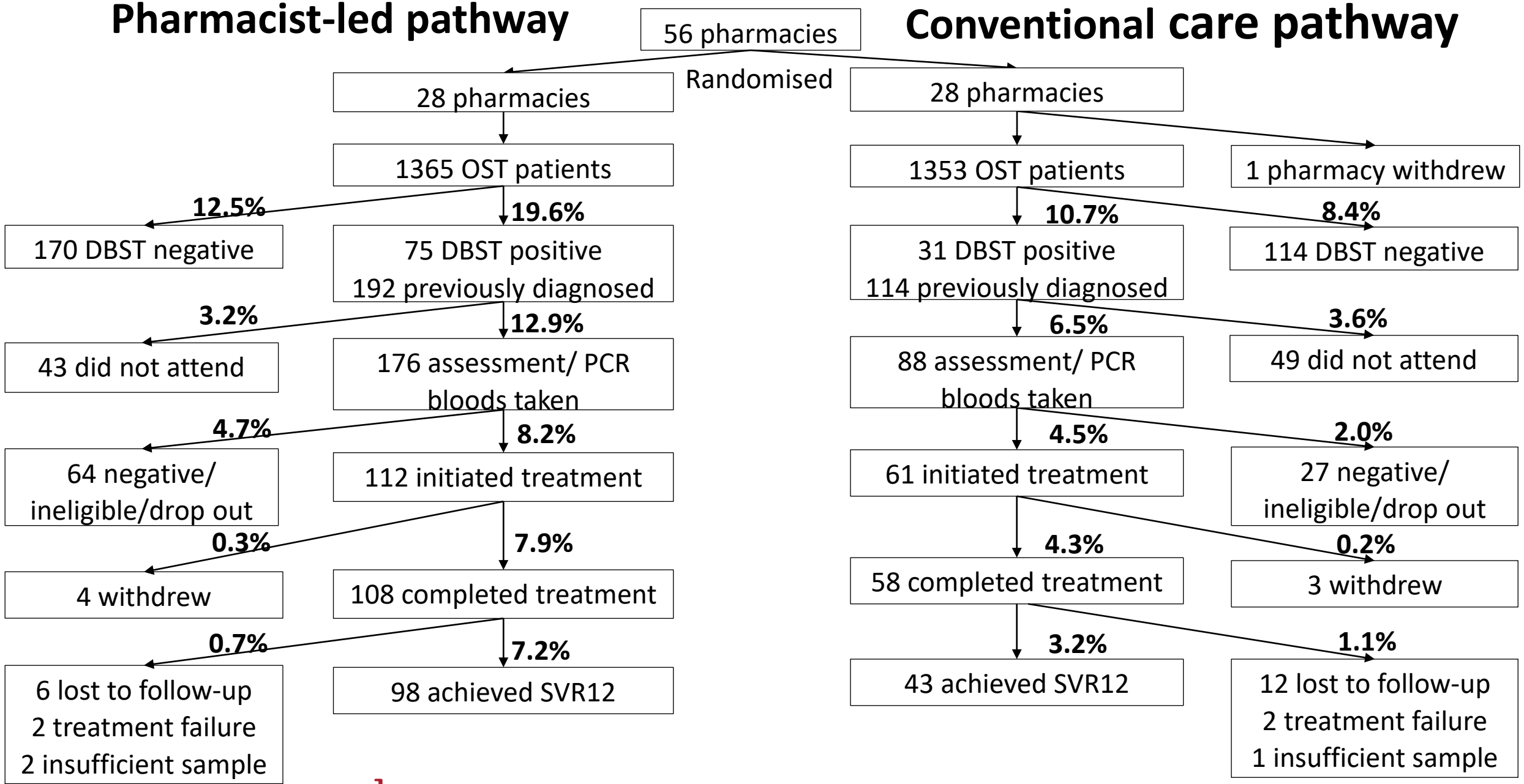
4 withdrew
108 completed treatment
58 completed treatment
3 withdrew



Within trial period economic analysis methods

- Cluster (pharmacy) level analysis using pharmacy-level testing data and individual patient-level treatment data.
- Healthcare provider/National Health Service perspective.
- Time horizon – trial 12-week follow-up period.
- Cost-effectiveness summarised as mean cost per additional SVR12 achieved.
- Uncertainty in results presented in cost-effectiveness acceptability curve.

Unit costs

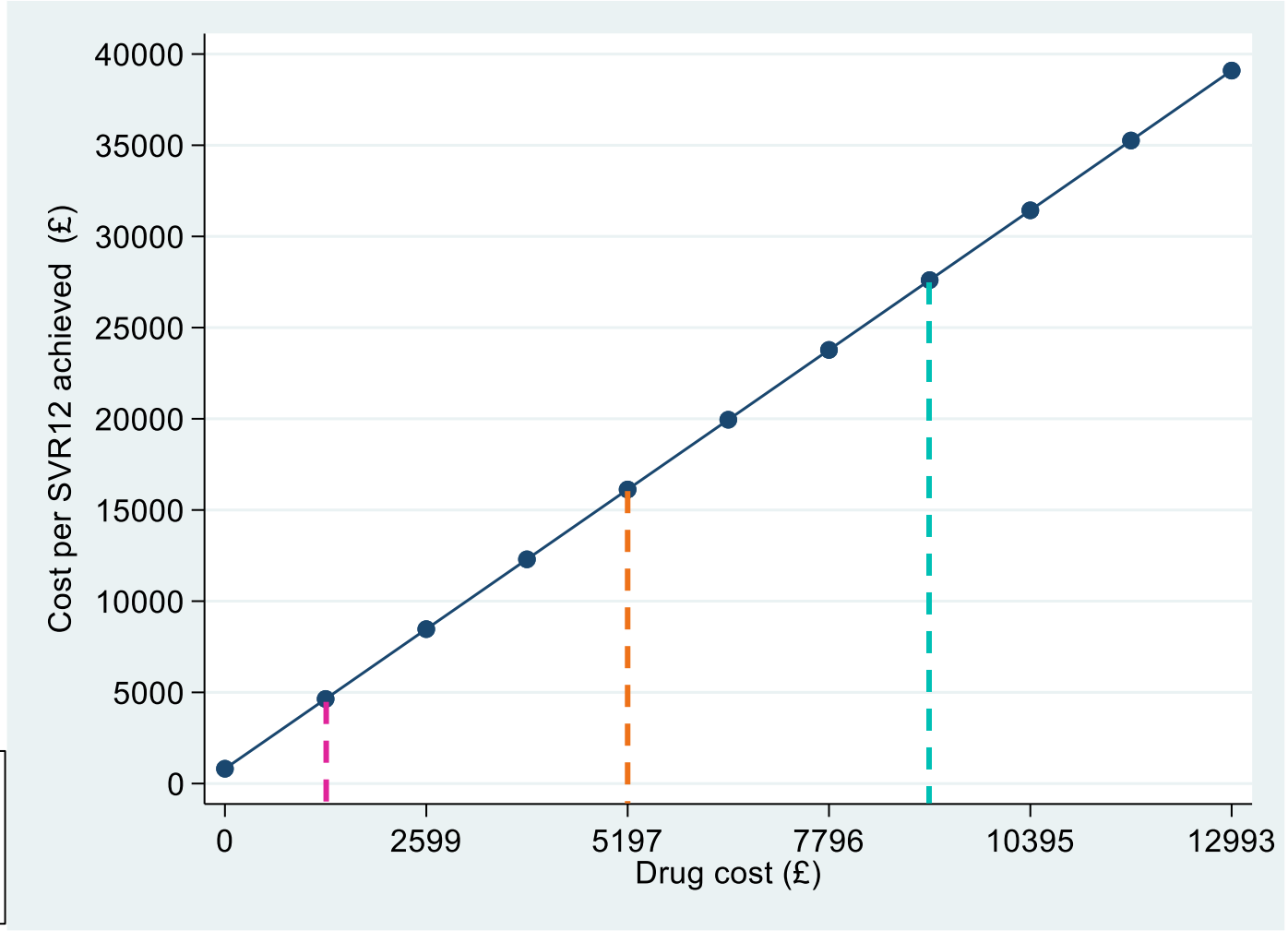
Resource	Unit cost (2019)	Unit cost source
DBST including lab	£15	NHS Tayside
DBST excluding lab	£8	Trial pharmacy reimbursement price
Assessment/PCR blood test	£53	NHS Tayside
Pharmacy support worker	£29/h	PSSRU 2019 band 4 scientific and professional staff
Pharmacist	£45/h	PSSRU 2019 band 6 scientific and professional staff
Nurse	£55/h	PSSRU 2019 band 7 nurse
Sofosbuvir and ledipasvir	£12,993 / 28 tablets (£0-£12993 in sensitivity analysis)	BNF online

Total and mean costs for the pharmacist-led and conventional care arms at the pharmacy level

	Pharmacist-led arm mean (SD). n=28	Conventional care mean (SD). n=27	Difference between arms
Testing	£526 (£67)	£279 (£44)	£247
Staff Time	£2741 (£385)	£1428 (£245)	£1313
Sofosbuvir/ledipasvir	£150,580 (£116,978)	£80,858 (£78,564)	£69,722
Total	£153,847 (£119,311)	£82,565 (£78,564)	£71,282
Total per OST patient	£3,674 (£3,031)	£1,965 (£1,946)	£1,709
Proportion of OST patients who achieve SVR12	0.08 (0.07)	0.03 (0.04)	0.05

Cost-effectiveness

Mean incremental cost per OST patient	£1,720
Mean incremental SVR12 rate	.04
Cost-effectiveness	£39,094
95% CI	£22,733, £50,330

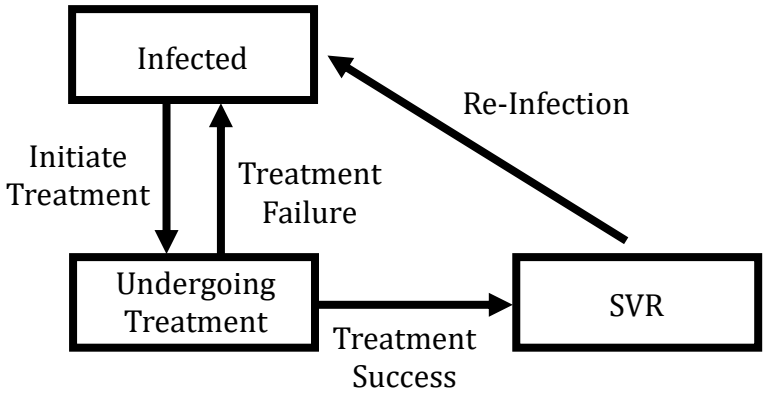


Results

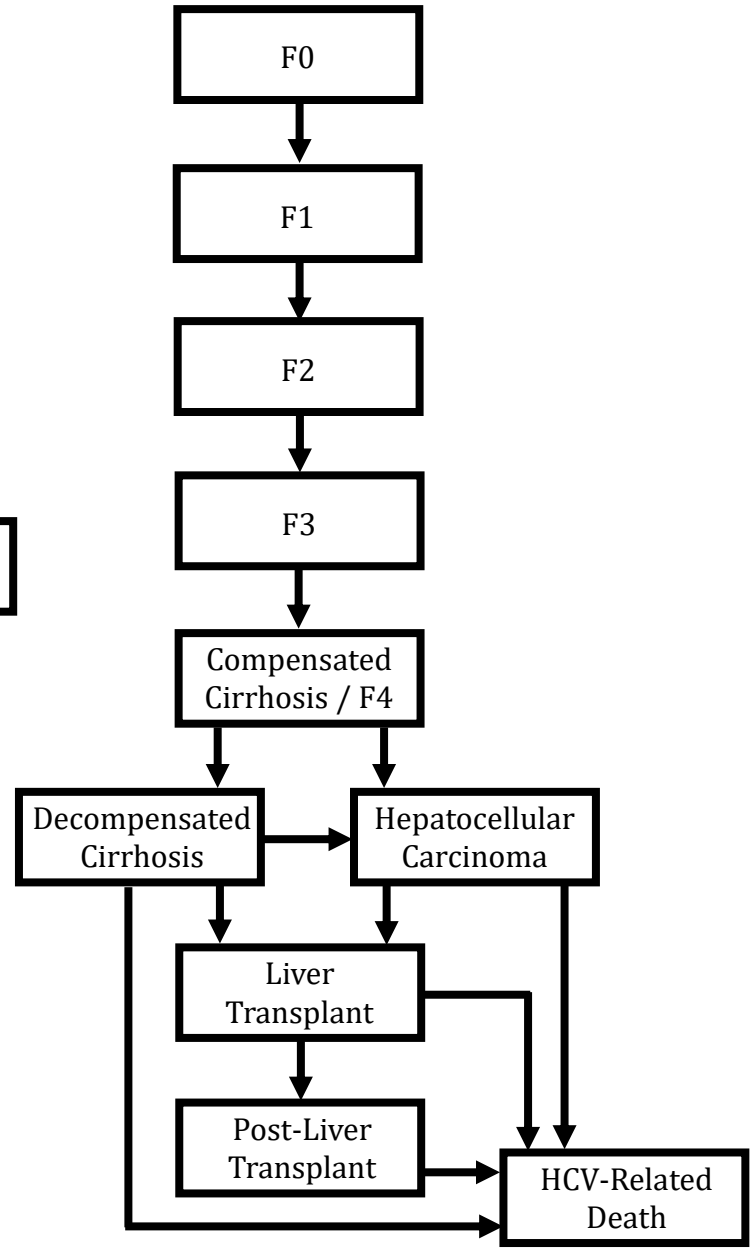
- Higher rate of testing (17.9% vs 10.7%, p: 0.059), treatment initiation (8% vs 5%, p: 0.0015) and SVR12 achieved (7.2% vs 3.2%, p: <0.0001).
- At NHS indicative price (£12,993/28 tablets), new pathway was more expensive (mean cost/patient: £3,373 vs £1,698) than conventional care as more patients tested and treated.
- Incremental cost per additional patient who achieved SVR12 was £39,094 (95% CI: £22,733, £50,330).
- Findings sensitive to drug costs –30%/60%/90% discount on list price improved cost-effectiveness to £27,605/£16,122/£4,640 per SVR12 achieved.

Cost-effectiveness analysis methods

- Developed a closed cohort Markov model of HCV disease progression and treatment to simulate long-term outcomes of chronic HCV infection.
- Assumed entire cohort in either pharmacist-led or conventional pathway
- Tracked outcomes over a 50-year time horizon (3.5% discounting) for comparison between the two pathways.



HCV infection, treatment, SVR



HCV disease progression

Cost-effectiveness analysis methods - Parameterisation

- Assumed higher treatment rate in pharmacist-led (32.8%) vs conventional (18.0%) in first year based on trial[1], but halved from second year onwards.
- Disease progression transition probabilities and health-related quality of life utility indices taken from published literature.[2-6]
- Model parameters sampled probabilistically from uncertainty distributions.
- Included one-off costs of testing and treatment from trial data, as well as annual costs of managing HCV-related disease from literature.[3]
- Cost-effectiveness presented as the incremental cost-effectiveness ratio (ICER) in terms of the median cost per QALY gained (n=1,000), with probability of being cost-effective at UK WTP thresholds (£20-30k).
- Conducted sensitivity analyses on:
  - Re-infection rate (baseline 19.9/100py): 10/100py, 5/100py, 2/100py
  - DAA drug price: 30%, 60%, 90% reduction from baseline

[1]Radley et al. 2020; [2]Erman et al. 2019; [3]Shepherd et al. 2007; [4]Van der Meer et al. 2012; [5]Morgan et al. 2013; [6]Kanwal et al. 2014

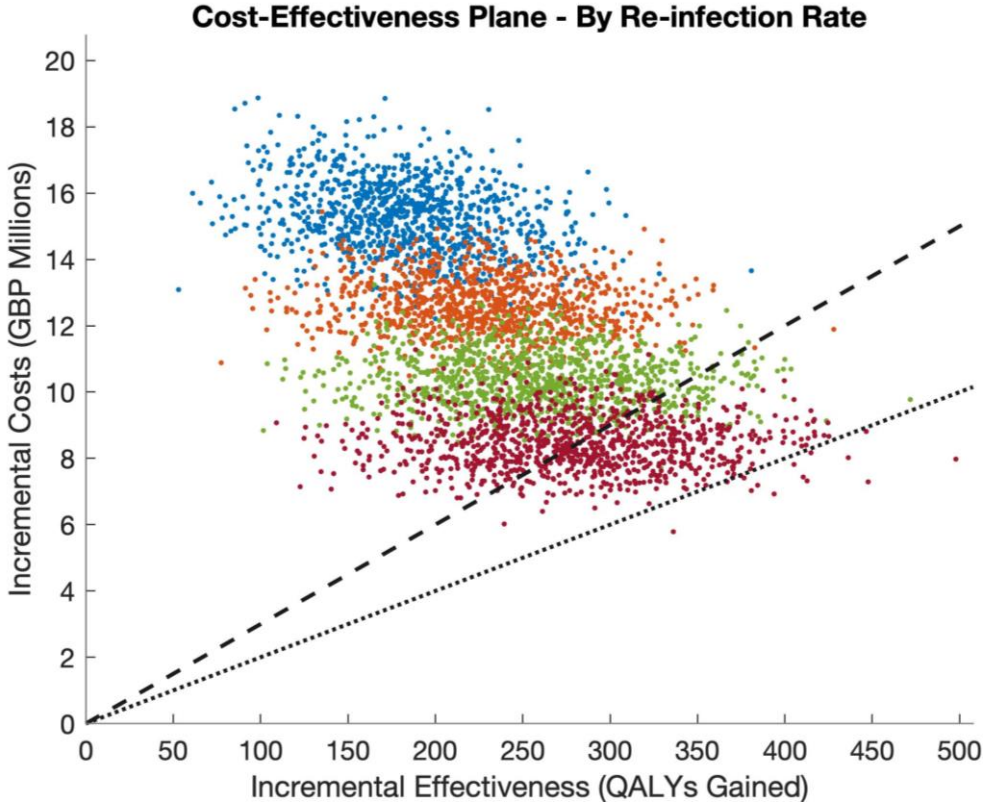
Preliminary cost-effectiveness results

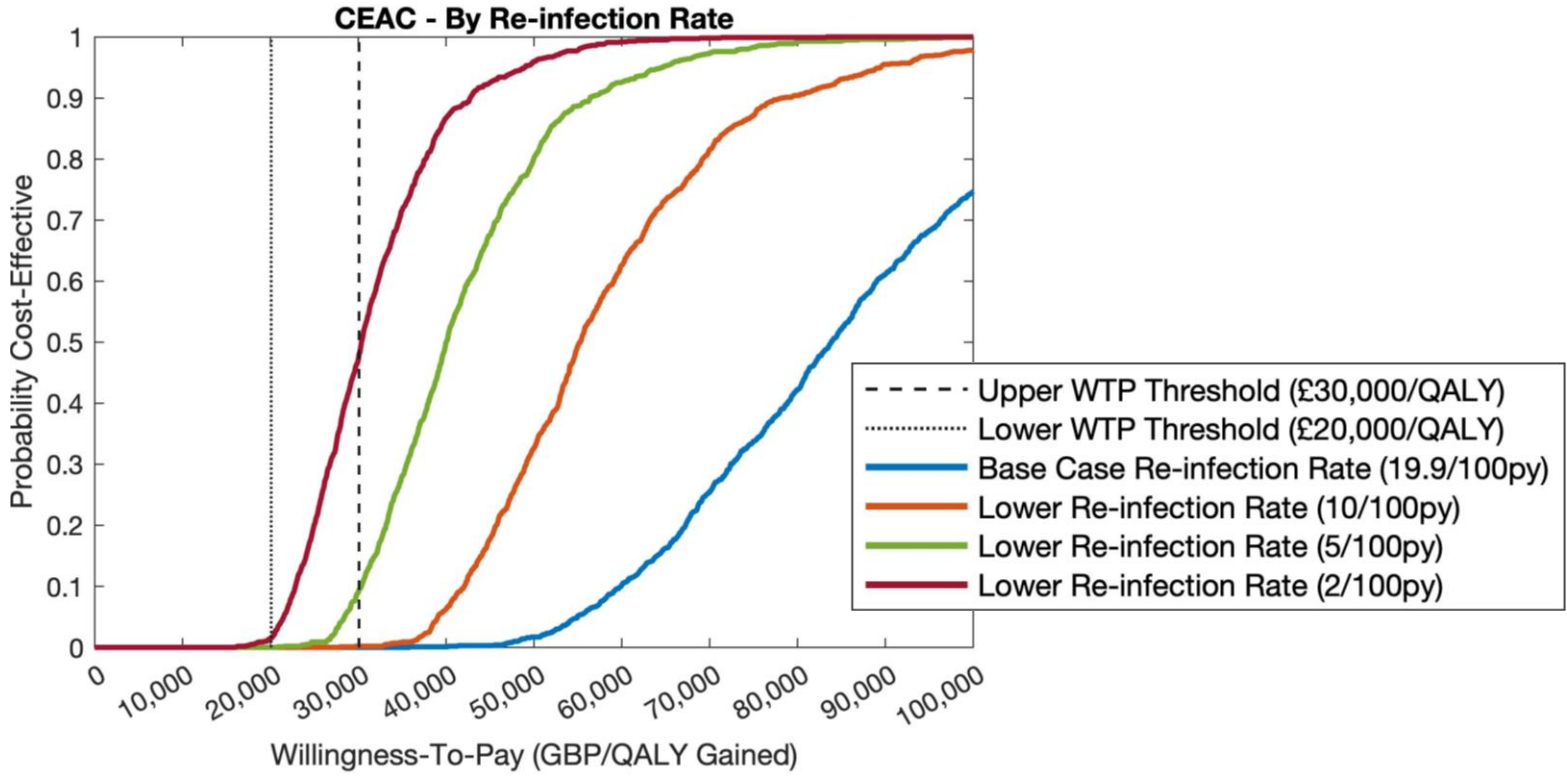
- At baseline values, the pharmacist-led pathway was not cost-effective compared to the conventional pathway, with an ICER = £83,825 per QALY gained.
- In the next two slides, we explored sensitivity analyses varying assumptions on re-infection rates and DAA drug costs.

Baseline	Costs (£ Millions)		QALYs		ICER	Probability
	Total	Incremental	Total	Incremental		
Conventional	44.6	--	7478.7	--	--	--
Pharmacist-led	60.0	15.3	7672.8	182.9	83,825	At £30k: 0% At £20k: 0%

Preliminary cost-effectiveness results – Re-infection

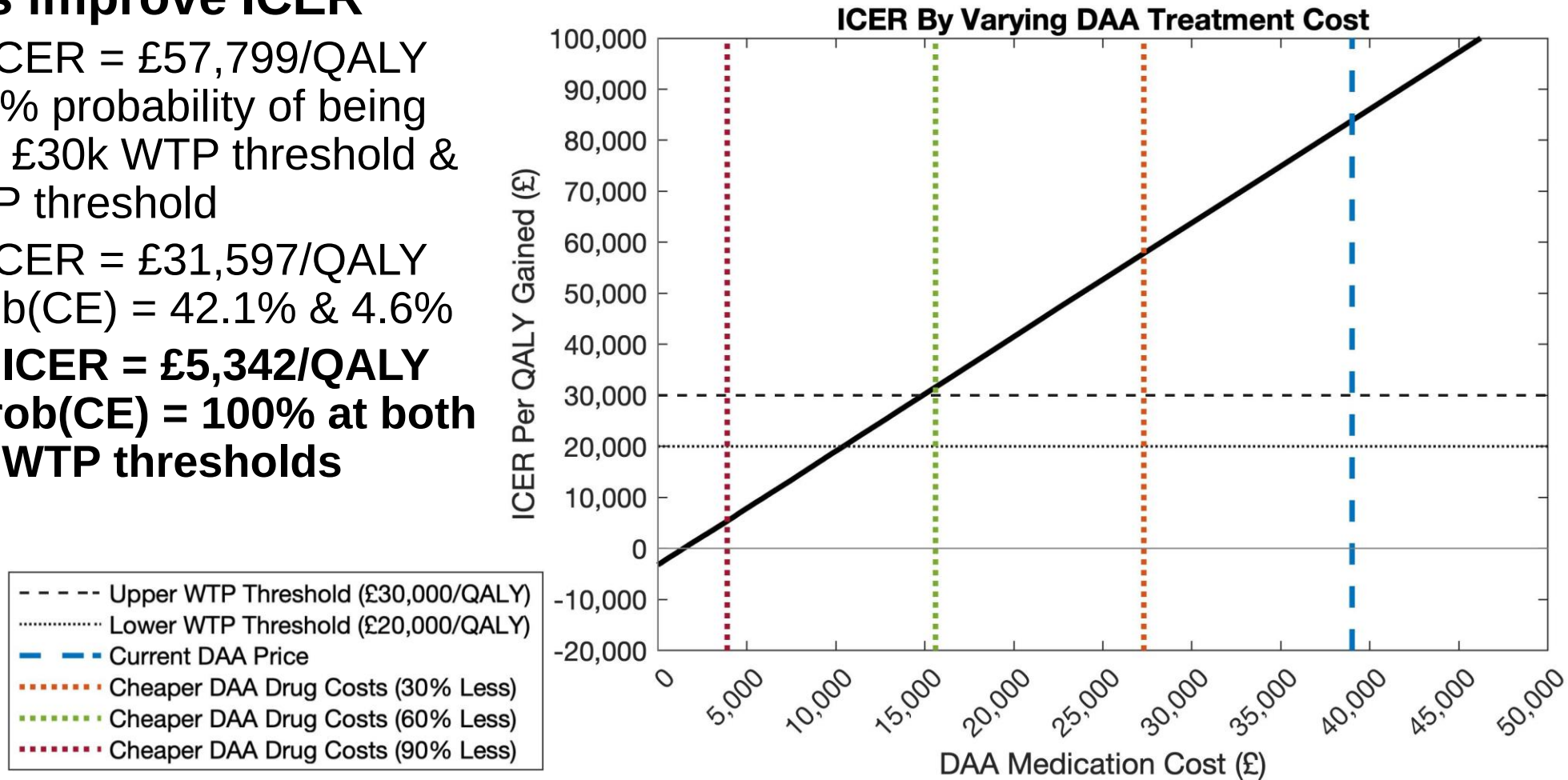
- Sensitivity analyses suggest **lower re-infection rates improve ICER**
  - At 10/100py: ICER = £55,224/QALY gained, with 0.2% probability of being cost-effective at £30k WTP threshold & 0% at £20k WTP threshold
  - At 5/100py: ICER = £40,019/QALY gained, with prob(CE) = 9.0% & 0%
  - **At 2/100py: ICER = £30,376/QALY gained, with prob(CE) = 47.0% & 1.5%**





Preliminary cost-effectiveness results – Cheaper DAAs

- Further sensitivity analyses supported previous findings that **reductions in DAA drug costs improve ICER**
  - 30% discount: ICER = £57,799/QALY gained, with 0.3% probability of being cost-effective at £30k WTP threshold & 0% at £20k WTP threshold
  - 60% discount: ICER = £31,597/QALY gained, with prob(CE) = 42.1% & 4.6%
  - **90% discount: ICER = £5,342/QALY gained, with prob(CE) = 100% at both £30k and £20k WTP thresholds**



Conclusion

- The new pharmacist-led pathway is effective at increasing testing and treatment uptake in OST patients.
- Cost-effectiveness is highly dependent on drug prices and re-infection rates.
- At BNF list price the intervention is unlikely to be cost-effective.
- But at realistic drug discount rates the intervention is cost-effective.
- Increased rates of SVR12 have potential long term benefits to patients and savings to health systems due to reduced rates of liver disease and transmission.

The authors would like to thank the people who inject drugs who have participated in the study along with the wider research team and health professionals involved in the delivery of the intervention.

Disclosure of Interest:

- J Dillon received grants from the Scottish Government Department of Health, Gilead, and Bristol-Myers Squibb during the study; and AbbVie, MSD, Janssen, Roche, and Genedrive outside the study.
- A Radley received grants from Gilead and Bristol-Myers Squibb during the study and received grants from Roche and AbbVie outside the study.

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