



**Health**

Hunter New England  
Local Health District

# Home IV Therapy Outcomes

**Self-administration**

**Injecting Drug Users & OPAT**

**Pauline Dobson, Dr Mark Loewenthal, Dr Katy Lai**

**Immunology & Infectious Diseases Unit**

**John Hunter Hospital, Newcastle NSW**

**and**

**Faculty of Health, University of Newcastle**





- **Out & About Home IV Therapy Program**
- Home IV therapy only, with parenteral antibiotics as majority of admissions
- Infectious Diseases led
- Both paediatric and adult patients
- HITH Clinical database
  - Every admission reviewed by research nurse for completeness of data and problems/complications



# HITH Service Coverage HNELHD



Recent patient locations	Km's from JHH one way
Merriwa	180
Buladelah	94
Glendon Brook	77
Tea Gardens	73
Corlette	64
Cooranbong	43
Medowie x 2	41
Rutherford	41
Aberglasslyn	37
Abermain	35
Bolwarra Heights	35
Weston	33
Ashtonfield	25
Thornton x 2	22

43% > 30km from HITH service  
 Model of care: Local Community Nurse or Self-care

# Background



- The first HITH started 40 years ago as self-administered IV antibiotics.<sup>1</sup>
  - Still the bulk of this treatment is clinician administered
- Mounting evidence to support self-administration
- Supervised self-administration included in NSW HITH guideline as an approved model of care
- OPAT = outpatient parenteral antibiotic therapy

# What others have found



## Journal of Antimicrobial Chemotherapy

J Antimicrob Chemother 2016; 71: 506–512  
doi:10.1093/jac/dkv344 Advance Access publication 28 October 2015

### Vascular access complications during outpatient parenteral antimicrobial therapy at home: a retrospective cohort study

Nabin K. Shrestha<sup>1\*</sup>, Jugnu Shrestha<sup>1</sup>, Angela Everett<sup>1</sup>, Donald Carroll<sup>2</sup>, Steven M. Gordon<sup>1</sup>, Robert S. Butler<sup>3</sup> and Susan J. Rehm<sup>1</sup>

<sup>1</sup>Department of Infectious Diseases, Cleveland Clinic, Cleveland, OH 44195, USA; <sup>2</sup>Cleveland Clinic Home Infusion Pharmacy, Cleveland Clinic, Cleveland, OH 44195, USA; <sup>3</sup>Department of Quantitative Health Sciences, Cleveland Clinic, Cleveland, OH 44195, USA

Eur J Clin Microbiol Infect Dis (2012) 31:2611–2619  
DOI 10.1007/s10096-012-1604-z

ARTICLE

### Self-administration of outpatient parenteral antibiotic therapy and risk of catheter-related adverse events: a retrospective cohort study

D. A. Barr · L. Seiple · R. A. Seaton

Journal of Antimicrobial Chemotherapy (2007) 60, 356–362  
doi:10.1093/jac/dkm210  
Advance Access publication 11 June 2007

JAC

### Outpatient parenteral antimicrobial therapy (OPAT): is it safe for selected patients to self-administer at home? A retrospective analysis of a large cohort over 13 years

Philippa C. Matthews<sup>1,2\*</sup>, Christopher P. Conlon<sup>1</sup>, Anthony R. Berendt<sup>1,2</sup>, Jill Kayley<sup>3</sup>, Lorraine Jefferies<sup>4</sup>, Bridget L. Atkins<sup>1,2</sup> and Ivor Byren<sup>1,2</sup>

<sup>1</sup>Oxford Radcliffe Hospitals NHS Trust, John Radcliffe Hospital, Headley Way, Oxford OX3 9DU, UK; <sup>2</sup>Bone Infection Unit, Nuffield Orthopaedic Centre NHS Trust, Windmill Road, Headington, Oxford OX3 7LD, UK; <sup>3</sup>The Pavilion, Thames Road, Goring on Thames, Berkshire RG8 9AH, UK; <sup>4</sup>Oxfordshire Primary Care Trust, Unit 1, Isis Business Park, Pony Road, Oxford OX4 2RD, UK

## THE NEW ZEALAND MEDICAL JOURNAL

Vol 117 No 1200 ISSN 1175 8716



### Outpatient parenteral antimicrobial therapy (OPAT): a review of experience at Auckland Hospital

Arlo Upton, Rod Ellis-Pegler, Andrew Woodhouse

European Journal of Internal Medicine 26 (2015) 131–136

Contents lists available at ScienceDirect



European Journal of Internal Medicine

journal homepage: [www.elsevier.com/locate/ejim](http://www.elsevier.com/locate/ejim)



Original Article

### Self-administered outpatient parenteral antimicrobial therapy (S-OPAT) for infective endocarditis: A safe and effective model



Marcos Pajarón<sup>a,\*</sup>, Manuel F. Fernández-Miera<sup>a</sup>, Iciar Allende<sup>b</sup>, Ana M. Arnaiz<sup>c</sup>, Manuel Gutiérrez-Cuadra<sup>c</sup>, Manuel Cobo-Belaustegui<sup>d</sup>, Carlos Armiñanzas<sup>c</sup>, Jose R. de Berrazueta<sup>e</sup>, María C. Fariñas<sup>c</sup>, Pedro Sanroma<sup>a</sup>, on behalf of the Hospital Valdecilla Endocarditis Study Group

<sup>a</sup> Unidad de Hospitalización a Domicilio Hospital Universitario Marqués de Valdecilla, Avda. Valdecilla s/n, 39008 Santander, Spain

<sup>b</sup> Dept. Medicina de Atención Primaria y Comunitaria, Área de Salud I. C/ San Fernando 15 Sta. Cruz de Bezana, 39100 Cantabria, Spain

<sup>c</sup> Dept. Medicina Interna, Unidad de Enfermedades Infecciosas, Hospital Universitario Marqués de Valdecilla, Avda. Valdecilla s/n, 39008 Santander, Spain

International Journal of Infectious Diseases 30 (2015) 161–165

Contents lists available at ScienceDirect



International Journal of Infectious Diseases

journal homepage: [www.elsevier.com/locate/ijid](http://www.elsevier.com/locate/ijid)



### Supervised self-administration of outpatient parenteral antibiotic therapy: a report from a large tertiary hospital in Australia



S. Subedi<sup>\*</sup>, D.F.M. Looke, D.A. McDougall, M.M. Sehu, E.G. Playford

Infection Management Service, Princess Alexandra Hospital, Brisbane, Queensland, Australia



Health  
Hunter New England  
Local Health District

# Published literature summary



Author (year)	Setting	Journal	Number S-OPAT	Number H-OPAT	Total	Comments
Dobson, Lai, Loewenthal 2018	Out & About IV Therapy Program Newcastle Australia	Pending	2904	4002	6906	OPAT Admissions
			1637	3157	4794	Patients
Mujal 2016	University Hospital Barcelona, Spain	JAC	351	0	315	Focus on older adults
Strestha 2016	Cleveland Clinic Ohio USA	JAC	1461	0	1461	No comparator group
Subedi 2015	PAH Hospital Brisbane Australia	IJAA	144	0	144	No comparator group
Bhavan 2015	Texas Public hospital USA	PLoS Med	944	224	1168	Uninsured got SOPAT. Propensity score adjusted.
Pajaron 2015	University Hospital Santander, Spain	Eur J Int Med	45	0	45	Infective endocarditis, no comparator
Barr 2012	Glasgow public hospital, UK	IJAA	493	1740	2233	Episodes. Only 1.3% had a PICC
Kieran 2009	St James Hospital Ireland, UK	Eur J CMID	48	12	60	Episodes not patients.
Matthews 2007	Oxford HITH serving 2 hospitals, UK	JAC	513	1621	2134	
Ingram 2007	NUH Singapore	JAC	53	316	369	
Upton 2004	Auckland Hospital, NZ	NZ J Med	94	6	100	
Stiver 1982	Public Hospital Winnipeg, Canada	CMAJ	102	0	102	Used peripheral IVC
Antoniskis 1978	Hospital Portland Oregon, USA	West J Med	13	7	20	First published description

# Self-administration Option



- Personal choice
  - Patient / Carer must be willing to self-administer
- Assessed for:
  - Cognition
  - Hygiene
  - Compliance & IDU history
  - Functional
    - Motor skills (dexterity, tremor)
    - Ability to read written instructions (language)
    - Hearing (alarms, telephone contact)
    - Vision (pump controls)

# The process

- Teaching session
  - One usually adequate
  - May require more for electronic pumps, or multiple antibiotics
- Extension set, to allow patients to flush PICC using both hands
- Every patient, regardless of whether they are self or clinician administration, are contacted daily by phone
  - Check temp, PICC / pump status, complications, falls





# Our Study



- Prospective cohort, paediatric & adult patients admitted to Out & About from 1/10/1995 – 31/12/17
- Only home parenteral antibiotic therapy included
- Clinician administration (H-OPAT)
  - Community nurse, RACF nurse, GP Practice Nurse, HITH nurse in clinic
- Self-administration (S-OPAT)
  - either patient or their carer administers IV therapy

# Summary Demographics



Variable	H-OPAT	S-OPAT	Combined
	Clinician Administered	Self-Administered	
Admissions	4002	2904	6906
Patients	3023	1771	4794
Patient days	86,968	61,557	148,525
Median Length of stay	21 (1-209)	19 (1-294)	20 (p=0.00001)
Gender – Male	2532 (63.3%)	1690 (58.2%)	4222 (61.1%)
Age – (mean, range)	60.5 (3 months - 96yrs)	40.3 (3 weeks – 92yrs)	51.1
Paediatric	155	449	604

# Admissions & Patients

- 81.4% patients admitted once only
- 11.9% had two admissions
- Small numbers of patients have repeated admissions
  - 5.6% had between 4–47 admissions
  - Most are CF and bronchiectasis
- Females have more admissions
  - 1.6 vs males 1.35

Admissions Per patient	Number of Patients	Percent
1	3902	81.4
2	573	11.9
3	149	3.1
4	57	1.19
5	25	0.52
6	18	0.38
7	10	0.21
8	9	0.19
9	5	0.10
10	9	0.19
11	6	0.13
12	4	0.08
13	3	0.06
14	2	0.04
15	7	0.15
16	1	0.02
18	2	0.04
19	2	0.04
20	2	0.04
21	1	0.02
23	1	0.02
25	1	0.02
30	1	0.02
31	1	0.02
35	1	0.02
45	1	0.02
47	1	0.02
<b>Total</b>	<b>4794</b>	<b>100</b>



# Conditions Managed by Admission



Variable	Clinician (n=4002)	Self (n=2904)	Combined (n=6906)
Bone & Joint infection	2330 (58.2%)	1263 (43.5%)	3593 (51.8%)
Cystic Fibrosis	82 (2%)	794 (27.3%)	876 (12.7%)
Abscess	296 (7.4%)	165 (5.7%)	461 (6.7%)
Skin & Soft Tissue	287 (7.2%)	132 (4.5%)	419 (6.1%)
Infective endocarditis	315 (7.9%)	93 (3.2%)	408 (5.9%)
Sepsis/Bacteraemia	251 (6.3%)	127 (4.4%)	378 (5.5%)
Bronchiectasis/COPD	147 (3.7%)	128 (4.4%)	275 (3.9%)
Other Infection	294 (7.3%)	202 (6.9%)	496 (7.2%)

**Other infection includes:** malignant otitis media; encephalitis; ascending cholangitis; empyema; nocardia; meningitis; parotitis; leptospirosis; pyomyositis; pericarditis, infected devices e.g. pacemakers, permacaths, CVCs, cochlear implants, VP shunts, peritoneal dialysis catheters; abdominal mesh



# What type of line did they have?



Vascular Device	Clinician	Self	Combined
PICC	3807 (92.1%)	2329 (78.1%)	6136 (86.2%)
Implantable Port	91 (2.2%)	566 (18.9%)	657 (9.2%)
CVC	202 (4.9%)	66 (2.2%)	268 (3.8%)
Tunnelled Catheter	34 (0.8%)	21 (0.65%)	55 (0.8%)
Total	4134	2982	7116

More catheters than patients, some required 2<sup>nd</sup> catheter to finish course

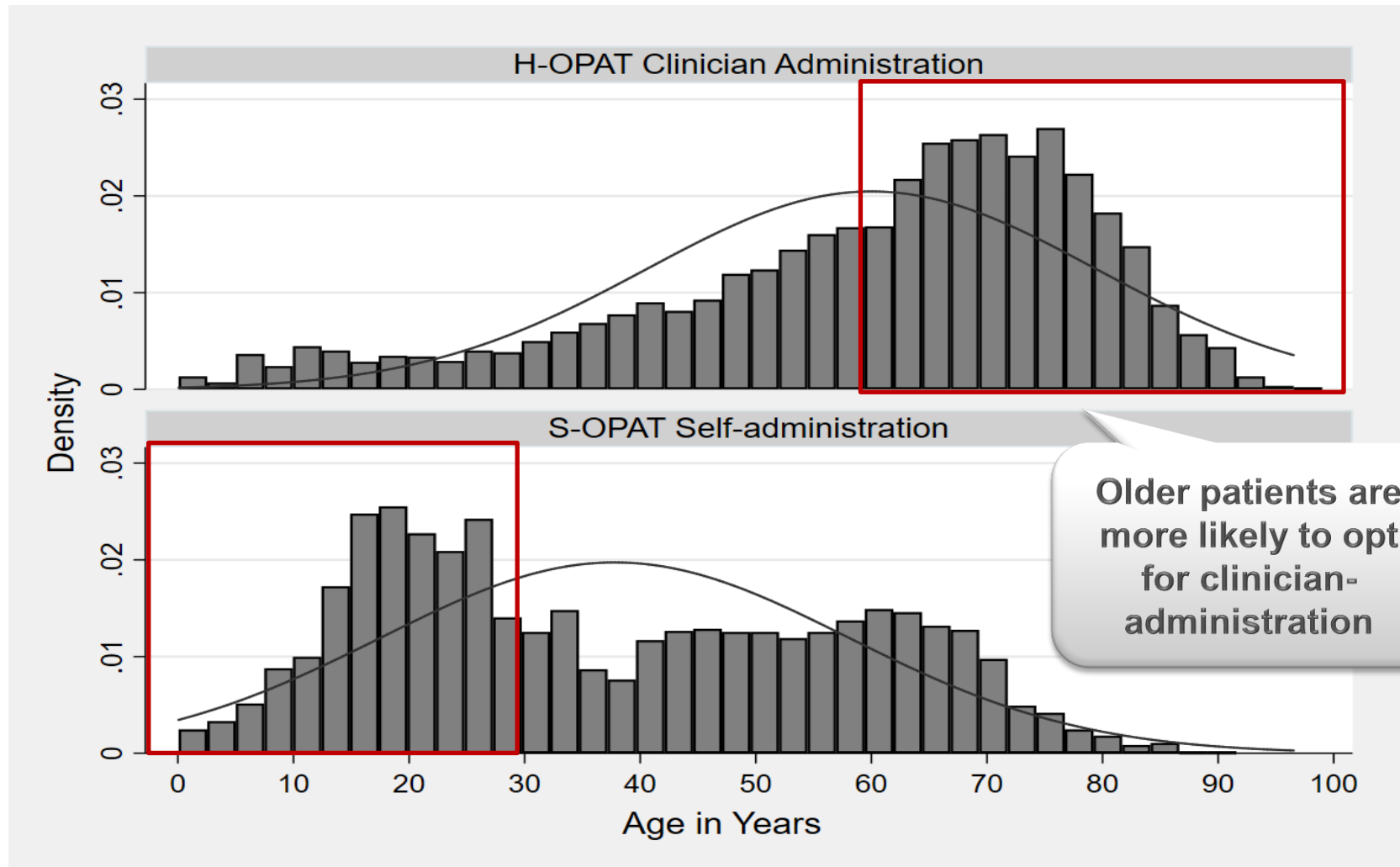
# Mode of parenteral antibiotics



Mode	Clinician	Self	Total
Continuous 24h	3856 (90.5%)	2582 (75.1%)	6438 (83.6%)
Bolus	313 (7.4%)	717 (20.8%)	1030 (13.4%)
Intermittent infusion	90 (2.1%)	141 (4.1%)	231 (3%)
Total	4259	3440	7699



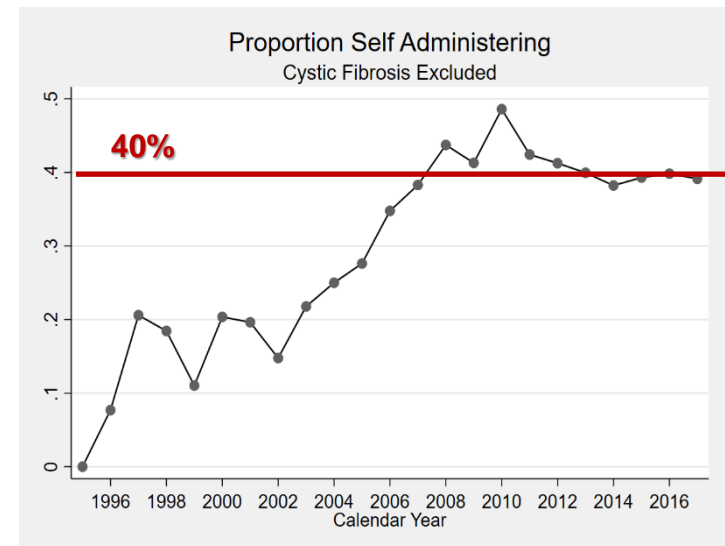
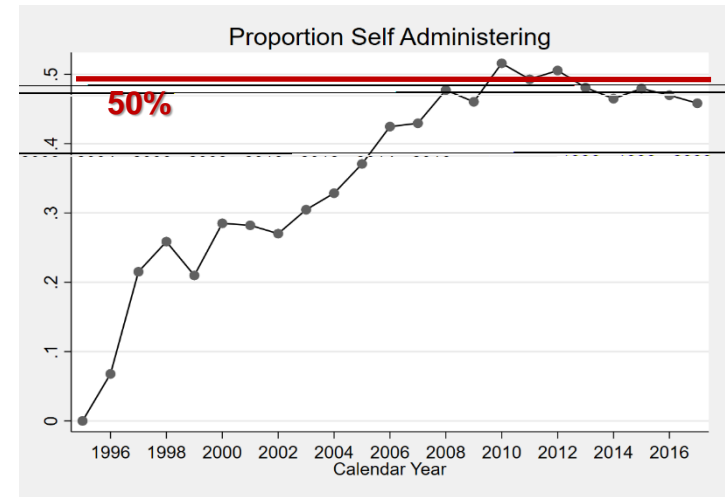
# Age by who administered



# Proportion self-administering over time

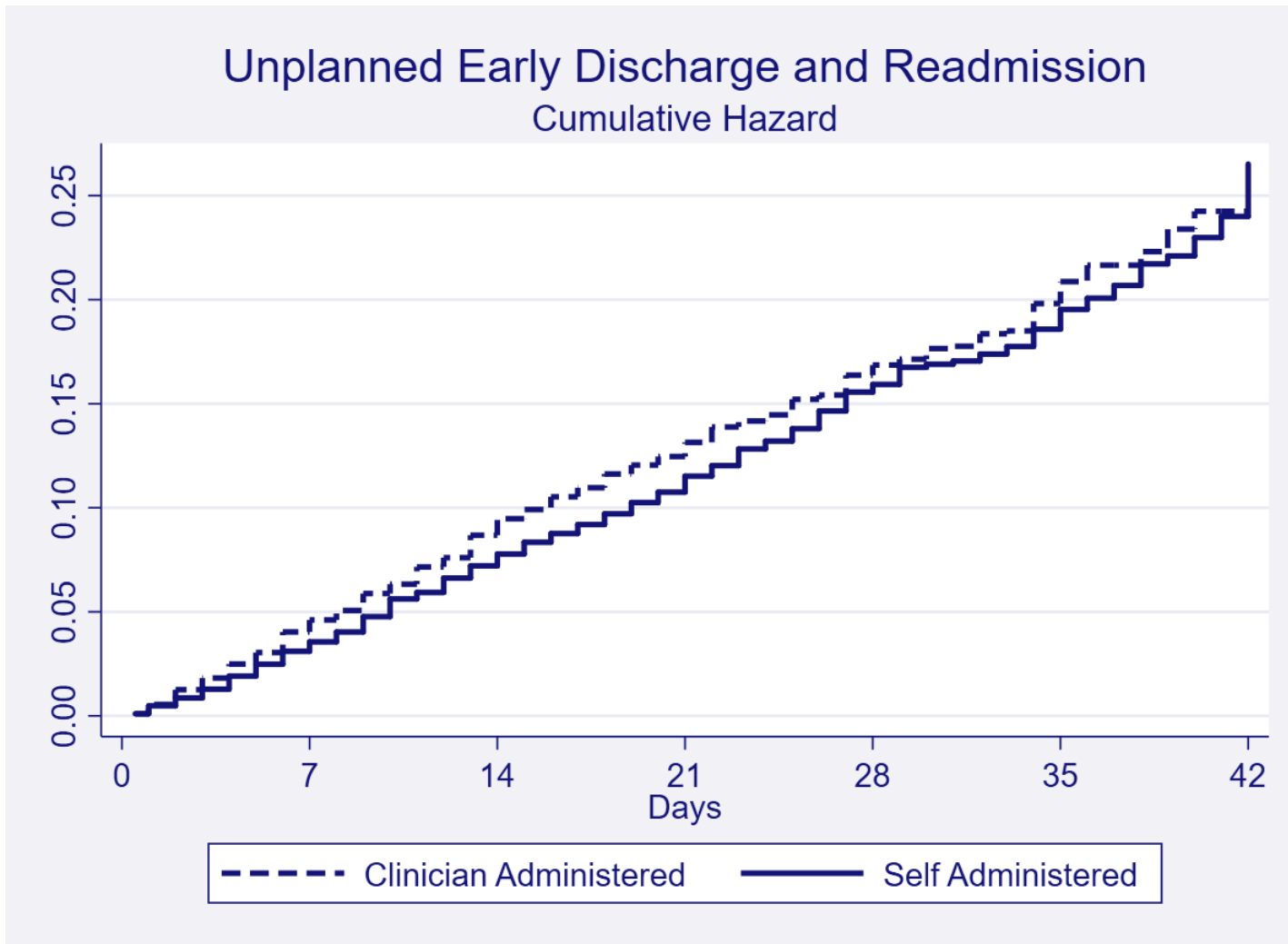


- The proportion of those who self-administer has now plateaued
- And remains the case when Cystic Fibrosis is excluded





# Were they discharged early or readmitted?



# Catheter failure - Overall



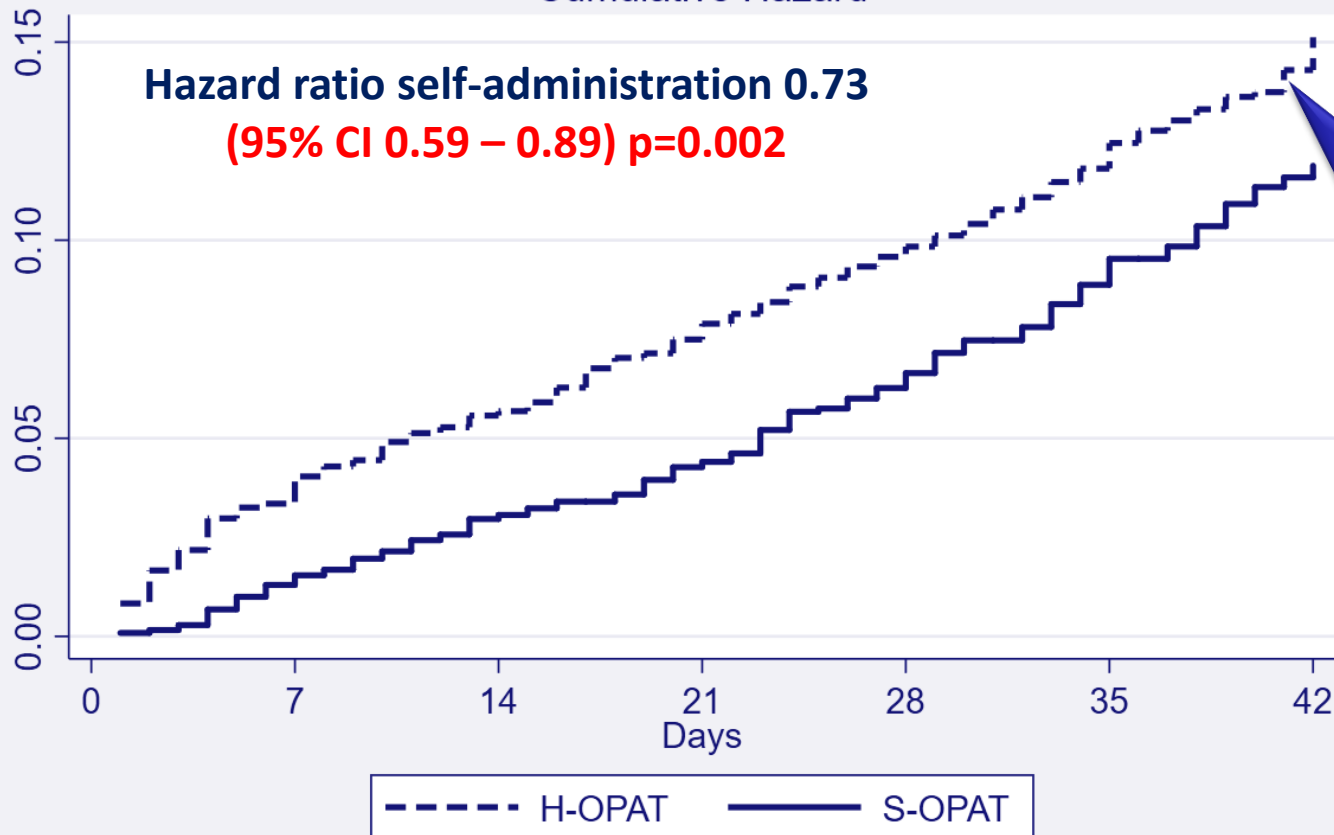
Administration	Lines	Line Days	Failures	Failure Rate per 1000 line days
Clinician H-OPAT	4134	86,421	291	3.4
Self S-OPAT	2983	61,301	162	2.6
<b>Total</b>	<b>7117</b>	<b>147,722</b>	<b>453</b>	<b>3.1</b>

**Equivalent > 400 patient years of follow-up**

# Line Survival by Who Administers

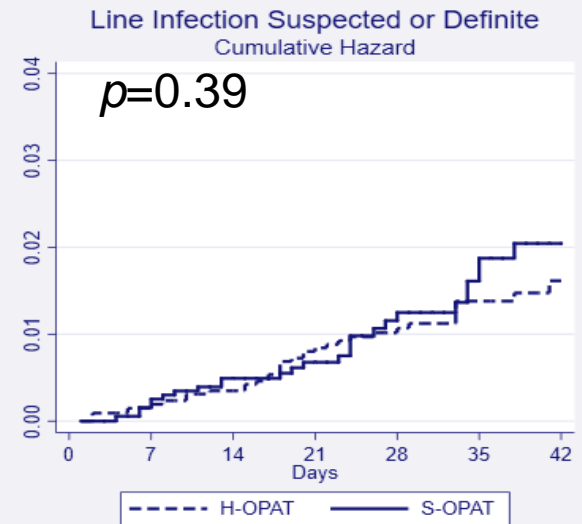
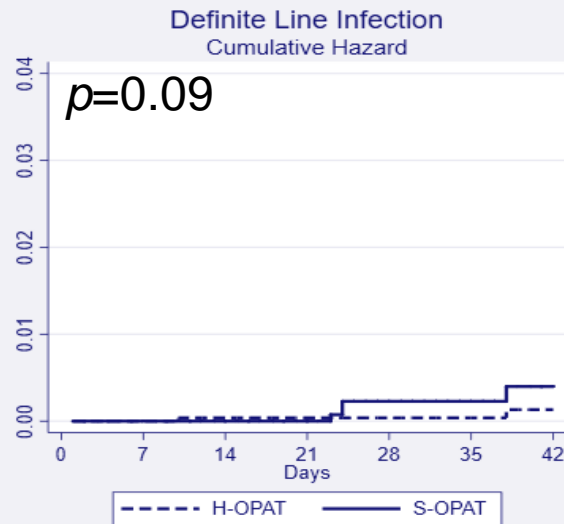
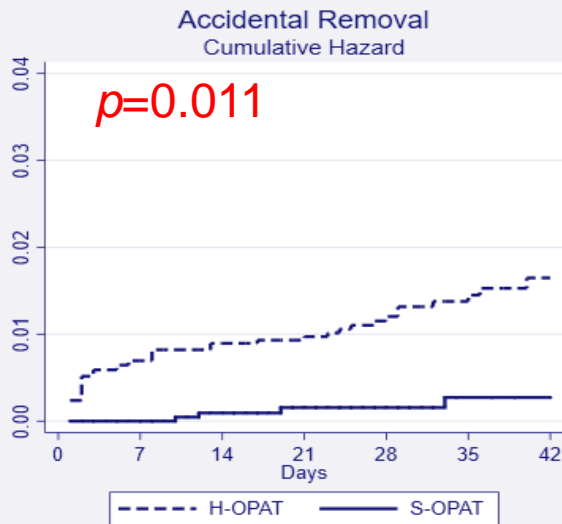
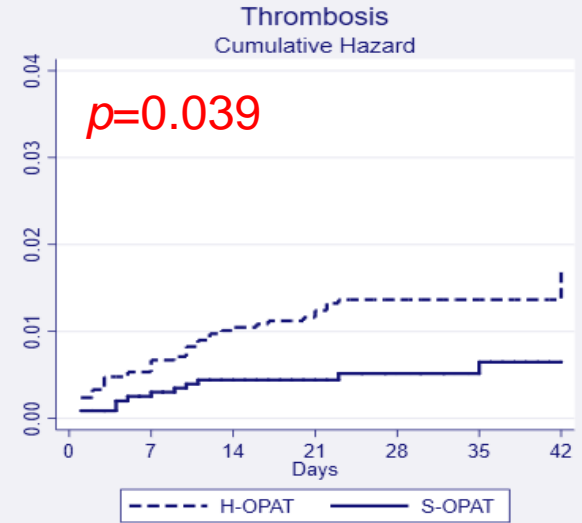
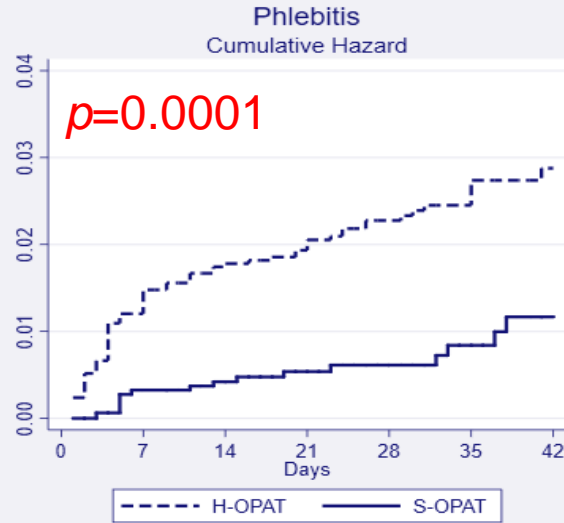
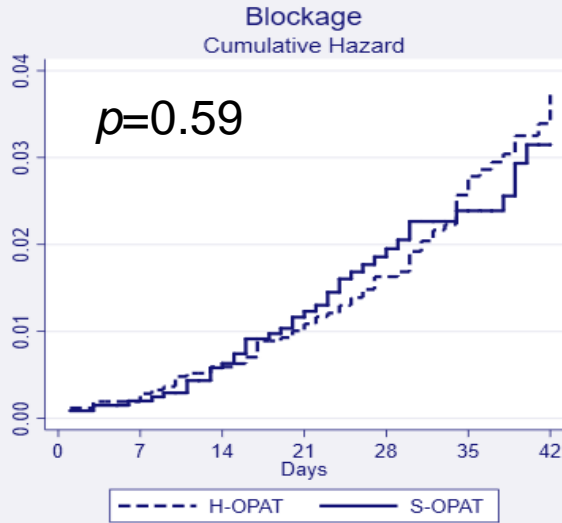


Total Central Venous Catheter Complication Rate  
Cumulative Hazard



Clinician lines have a higher cumulative hazard at all times

# All line complications



# Pros and Cons of Self-Administration



- Self-administration survey of Out & About Patients
  - Advantages
    - “not tied down (to time when it suits nurse to call)”; “control over situation” “family life normal”, “get back to work”, “helps understanding of disease”
  - Choose self-administration again: 93%
- Service Advantages
  - Suitable for rural areas where limited numbers of nursing staff working 7 days / week & evenings
  - Capacity of service is not as affected by number of HITH team staff
  - Costs lower: fewer staff, cars & transport
- Service Disadvantages
  - Requires thorough assessment prior to acceptance

# Conclusion



- In **selected** patients, self-administration is **safe**, and **equivalent or better** in outcomes to clinician administered home parenteral antibiotic therapy



# INJECTING DRUG USERS OUTCOMES ON OPAT



# Introduction



- In a recent report, 30% of IDU being treated for infection and discharged on oral antibiotics left hospital against medical advice<sup>2</sup>



# Comparing IDU & Non-IDU



- Examined all admissions to home IV antibiotic program, compared outcomes in IDU/non-IDU
- Created “last used” classification (self report / questioning)
  - Current: used within the last 3 months
  - Recent: used 4 months to 2 years
  - Distant: used more than 2 years ago
- CDC criteria for Laboratory confirmed blood stream infection (LCBI)
- Non-compliance recorded in problem record e.g.
  - Not available when community nurse visits, uncontactable for daily phone calls, missing medical review appointments, refusing to come in to the clinic when problems arise

# Demographics



- 1995 - 2017 (1<sup>st</sup> IDU admission 1998)
- Non-IDU 6,493 admissions
- IDU 162 admissions in 122 patients (range 1-11 admissions) 159 evaluable
  - Non-IDU 61% Male; IDU **70% Male**  $p=0.026$
- Days on HITH program
  - Non-IDU 134,909 days, **median 20 days**
  - IDU 3,502 days, **median 23 days**  $p=0.013$

# IDU Conditions treated

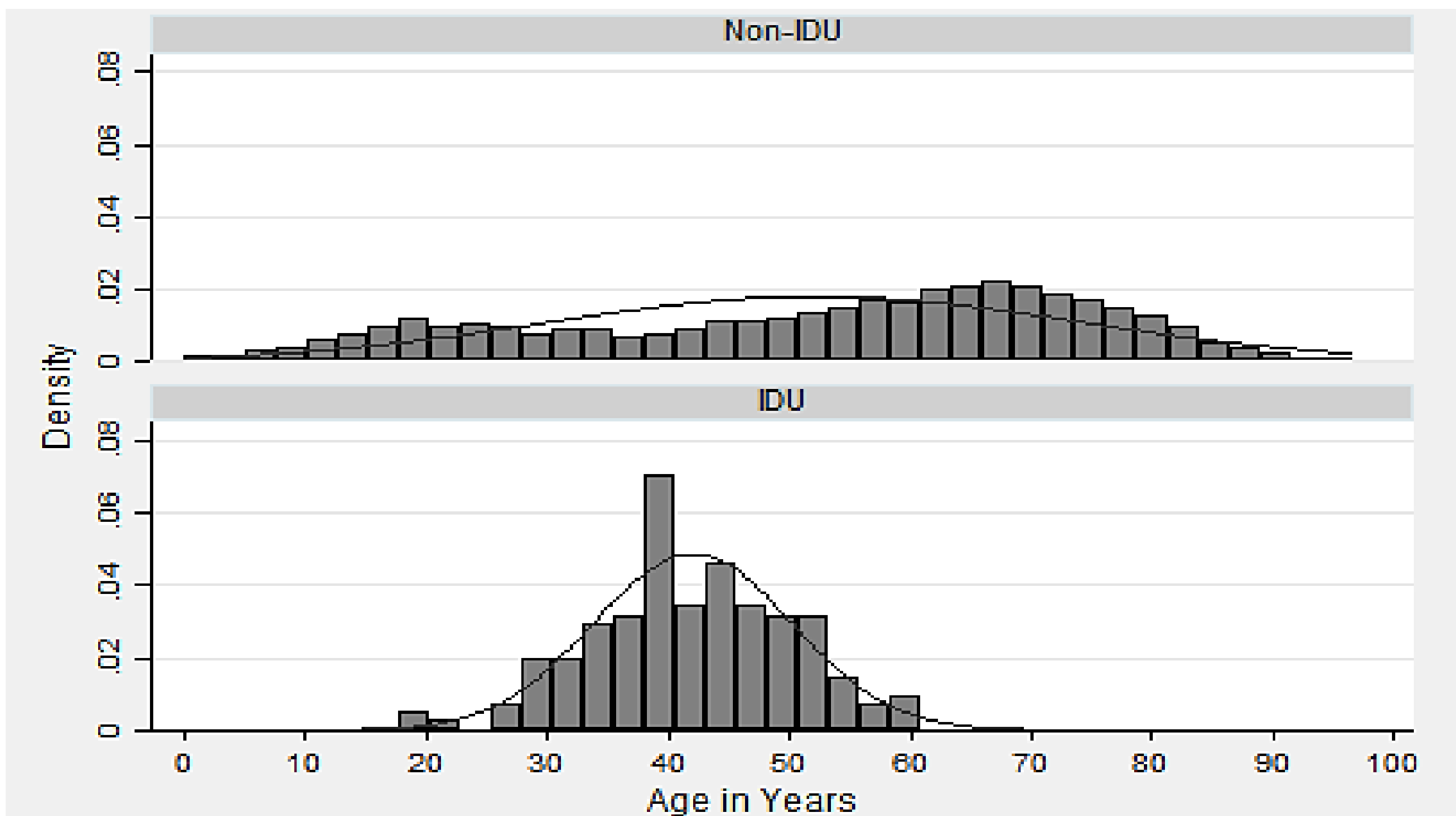


- Bone & Joint Infection (51.8%)
  - Native bone & joint infection 64, (39.5%)
  - Prosthetic bone & joint 20 (12.3%)
- Endocarditis 35 (21.6%)
- Bacteraemia 18 (11.1%)
- Abscess 12 (7.4%)
- Skin & Soft tissue 4 (2.5%)
- Other (5.5%): mycotic aneurysm, infected cranioplasty, empyema, neurosyphilis, pneumonia, infected cardiac prosthesis (pacemaker leads)



- Peripherally inserted central catheters  
PICCs = 141 (88.7%)
- Subclavian CVC = 15 (9.4%)
- Implantable port = 3 (1.9%)
  - Reflection of access difficulties

# Age



Median age

- IDU = 41.5 years; Non-IDU 56.8 years  $P=0.009$

# Recency of use



- Current (in last 3 months) = 57 (35.8%)
- Recent (4 months – 2 years) = 25 (15.7%)
- Distant (more than 2 years) = 67 (42.1%)
- Unknown / Not documented = 10 (6.3%)

# Non-compliance



- Non compliance events:
  - Non-IDU 38, **0.61%** IDU 10, **6.4%**  $p=<0.001$

## Compared to non-IDU

- Current IDU are **16.4** x more likely to be non-compliant (95% CI 6.2 – 43.4)  $p=<0.001$
- Recent IDU are **14.3** times more likely to be non-compliant (95% CI 3.25-62.63)  $p=<0.001$
- Distant IDU are **7.69** x more likely to be non-compliant (95% CI 2.3 – 25.55)  $p=0.001$

# Outcomes



Measure	Non-IDU (n=6493)	IDU (n=159)	P value
Early discharge (complication)	143 (2.2%)	2 (1.3%)	0.32
Readmission	169 (2.6%)	1 (0.6%)	0.08
After hours phone call use	1021 (15.8%)	29 (18.3%)	0.22
After hours call out	240 (3.7%)	14 (8.9%)	<b>0.003</b>



# Catheter complications

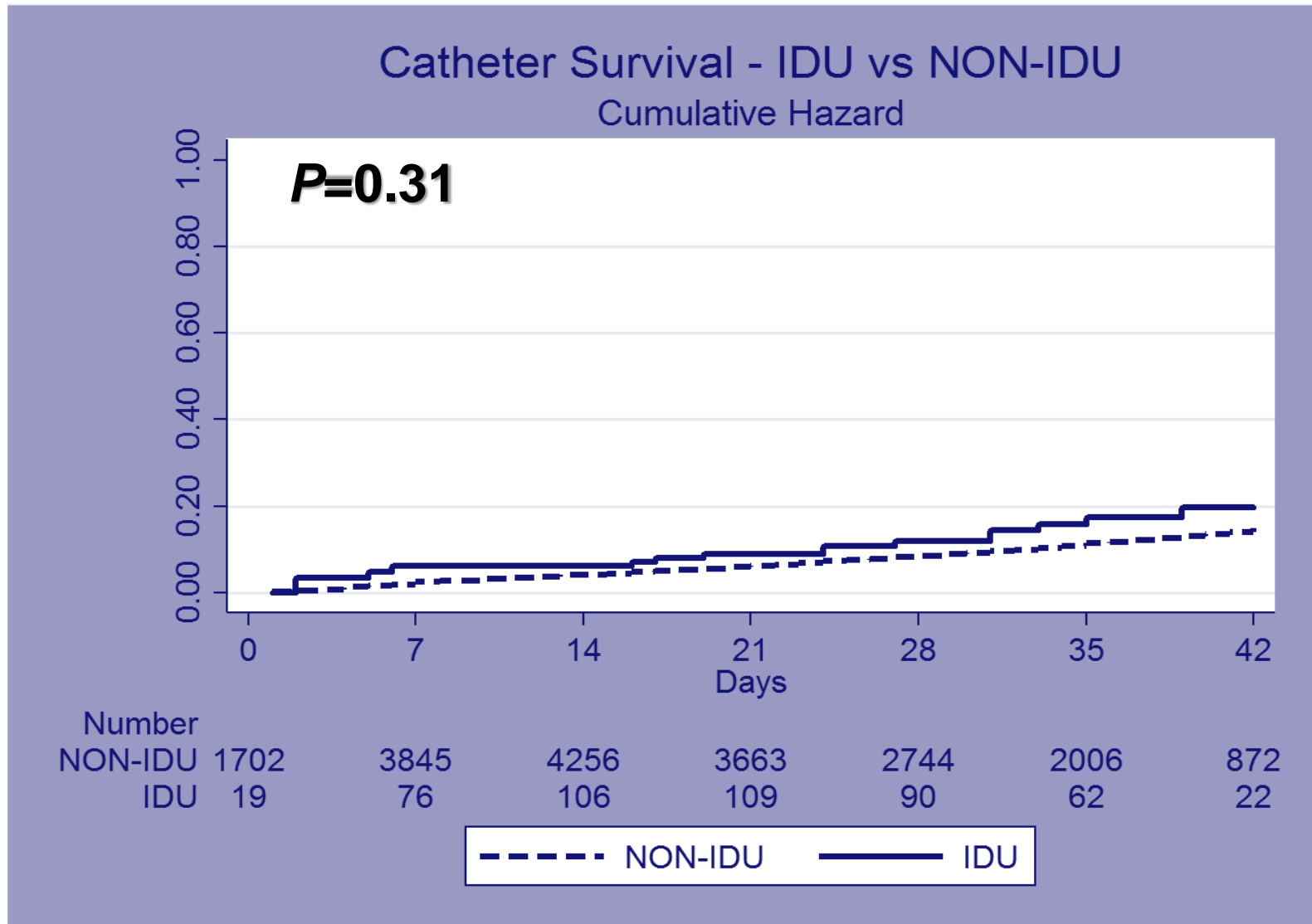


- All catheter complications
  - IDU 4.8/1000 catheter days
  - Non-IDU 3.4/1000 catheter days  $p=0.31$

## Incidence rate compared

Catheter complication	Non-IDU (Events, IR)	IDU (Events, IR, p value)
Blockage	93 events; IR 0.69	4 events; IR 1.1, $p=0.42$
Phlebitis	56 events; IR 0.42	1 event; IR 0.29, $p=0.76$
Catheter damage	65 events; IR 0.48	3 events; IR 0.85, $p=0.36$
Thrombosis	33 events; IR 0.24	0 events; IR 0, $p=0.34$
Accidental Removal	23 events; IR 0.17	3 events; IR 0.86, $p=0.003$
Definite line infection	4 events; IR 0.029	0 events; IR 0, $p=0.72$

# Catheter Survival



# Hazard Ratio – Line failure



- Current
  - 2.4 (95% CI 1.23-4.64,  $p=0.01$ )
- Recent
  - 0.39 (95% CI 0.56 – 2.83,  $p=0.36$ )
- Distant
  - 1.03 (95% CI 0.46 – 2.32,  $p=0.93$ )
- Unknown
  - 1.02 (95% CI 0.14 – 7.28,  $p=0.98$ )

Hazard Ratio is the risk of a negative outcome (line failure) in one group (non-IDU) compared to another group (IDU) occurring at a given point in time

# Long term success



- Criteria determined at time of admission
- 6 months after discharge patients are contacted to see if they have met the pre-determined success criteria
  - e.g. no recurrence of infection, no readmission for same condition, off antibiotics, functional joint, wound healed, alive
- Non-IDU 80.5% long term success
- IDU 78% long term success ( $p=0.6$ )



# Messages



- In our cohort of **selected** IDU patients
  - Catheter damage, blockage, and accidental removal are more frequent in IDU but only accidental removal is statistically significant
  - Non-IDU are more likely to be discharged early or be readmitted than IDU
  - Non-compliance with therapy is much more likely in IDU
  - Selected IDU can be managed appropriately on HITH and have similar outcomes to non-IDU (98% complete their course)
  - Thorough assessment that includes compliance and behaviour in the inpatient setting is essential before accepting an IDU on HITH