NIHR | Community Healthcare MedTech and In Vitro Diagnostics Co-operative

NIHR | Applied Research Collaboration West Midlands

NIHR | Oxford Biomedical Research Centre

POCT in ambulatory care and hospital at home – the key to changing pathways

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Professor of Acute Ambulatory Care, University of Warwick

Past President, UK Hospital at Home Society

@DanLasserson

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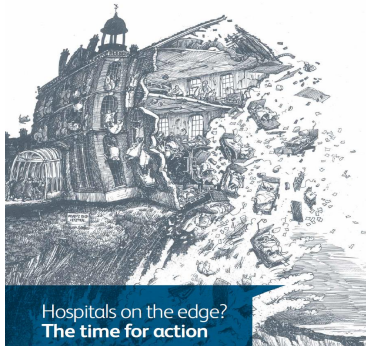
Acute Care Pathway Challenges – over a decade ago



Acute Care Pathway Challenges

- A Medical Division that has in-hospital and community based components
- Ambulatory emergency care should be the default for all patients, unless admission required on clinical need
- Develop specialist models of care that operate beyond the ‘hospital walls’, providing care integrated with community providers/GPs, particularly into care homes

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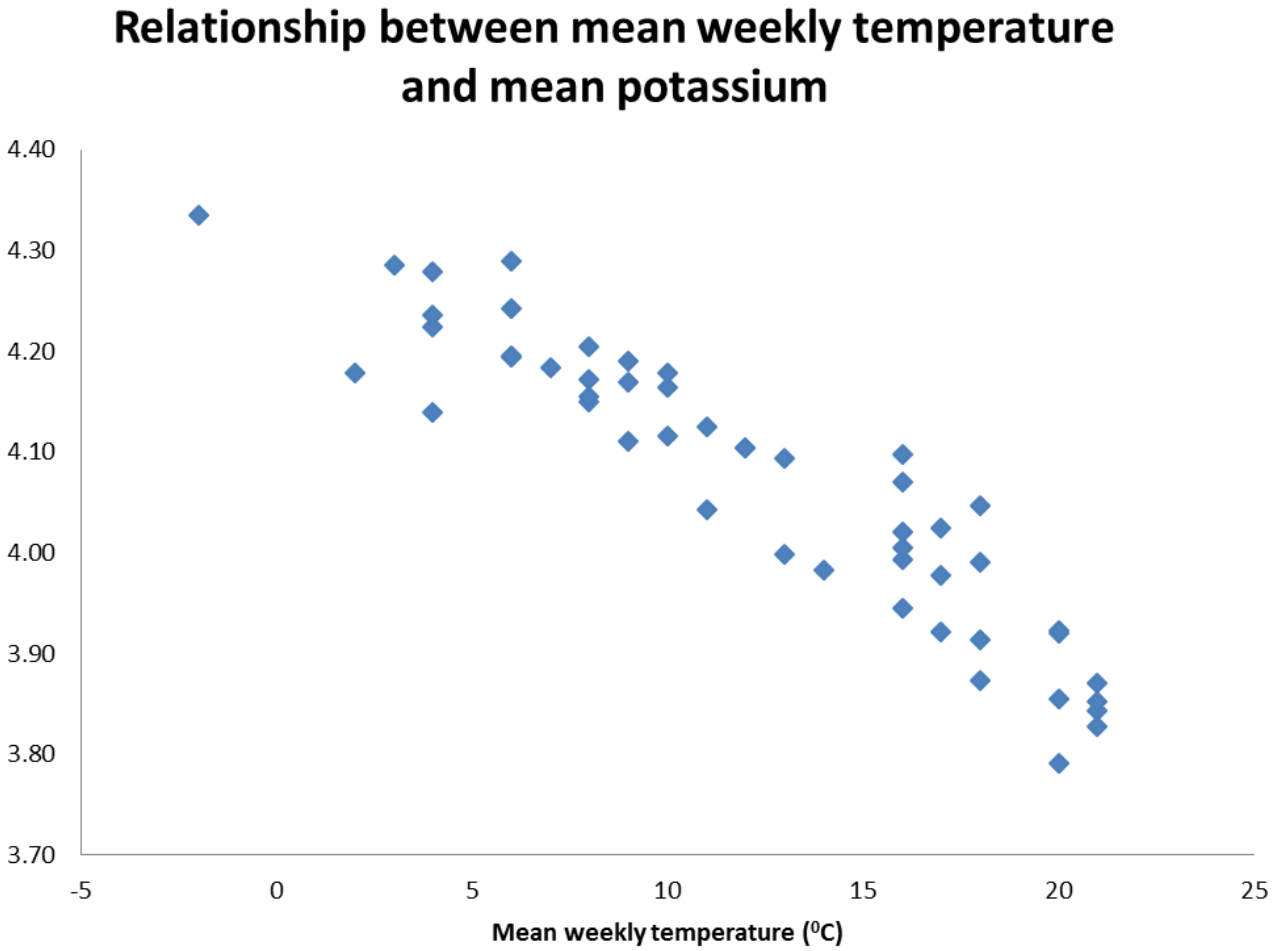
What is ambulatory emergency care?

- Diagnosis, observation, treatment, rehabilitation not provided in the traditional hospital bed base or out-patients
- “Improved patient experience…reduce negative impact of hospital admission…cost-effective..”
- Needs **rapid diagnostics**, decision-makers

Emergency Multidisciplinary Unit

- ‘Shopfloor’ Disciplines
  - Nursing
  - Physiotherapy
  - Occupational therapy
  - Social work
  - Transport
  - Medical – ‘interface capability’, drawn from 1°and 2°care clinicians
- Rapid diagnostics for senior led decision making
- Credible alternative to acute admission

Do we really need POC bloods?



Data from OUH NHS FT

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POC testing platform

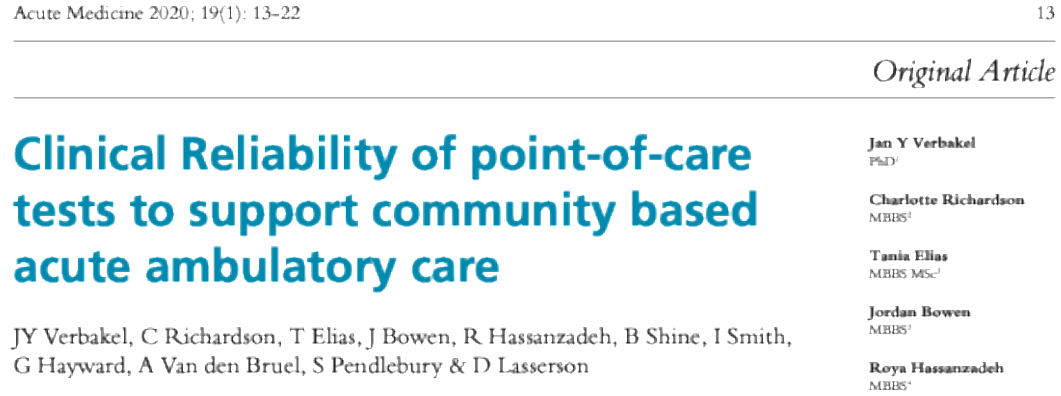
POC testing platform

- Closed cartridge system
- Minimal QC needed (3/12)
- Linked to the LIMS – one continuous pathology record
- Close links with our OUH POC biochemistry team

POC testing platform

- Chem8
  - Na, K, urea, creat, ca+, Hb, glucose
- CG4+
  - Lactate, pH, HCO3-, PO2, PCO2, BE
- BNP
- Troponin
- INR
- CRP (afinion)

Importance of validations outside hospital



Acute Medicine 2020; 19(1): 13-22

Original Article

Clinical Reliability of point-of-care tests to support community based acute ambulatory care

JY Verbakel, C Richardson, T Elias, J Bowen, R Hassanzadeh, B Shine, I Smith, G Hayward, A Van den Bruel, S Pendlebury & D Lasserson

Jan Y Verbakel PhD[1]
Charlotte Richardson MBBS[2]
Tania Elias MBBS MSc[3]
Jordan Bowen MBBS[2]
Roya Hassanzadeh MBBS[4]

- Usability in the field
  - Maintaining same level of steps for sample handling and analysis
  - Staff trained *clinically*, not in laboratory sciences
  - Theoretically, movement may affect some test platforms

- Clinical validity tested in 462 adults (median age = 81 years)
  - assessed and treated outside the acute hospital setting
  - community based ambulatory care unit with H@H team

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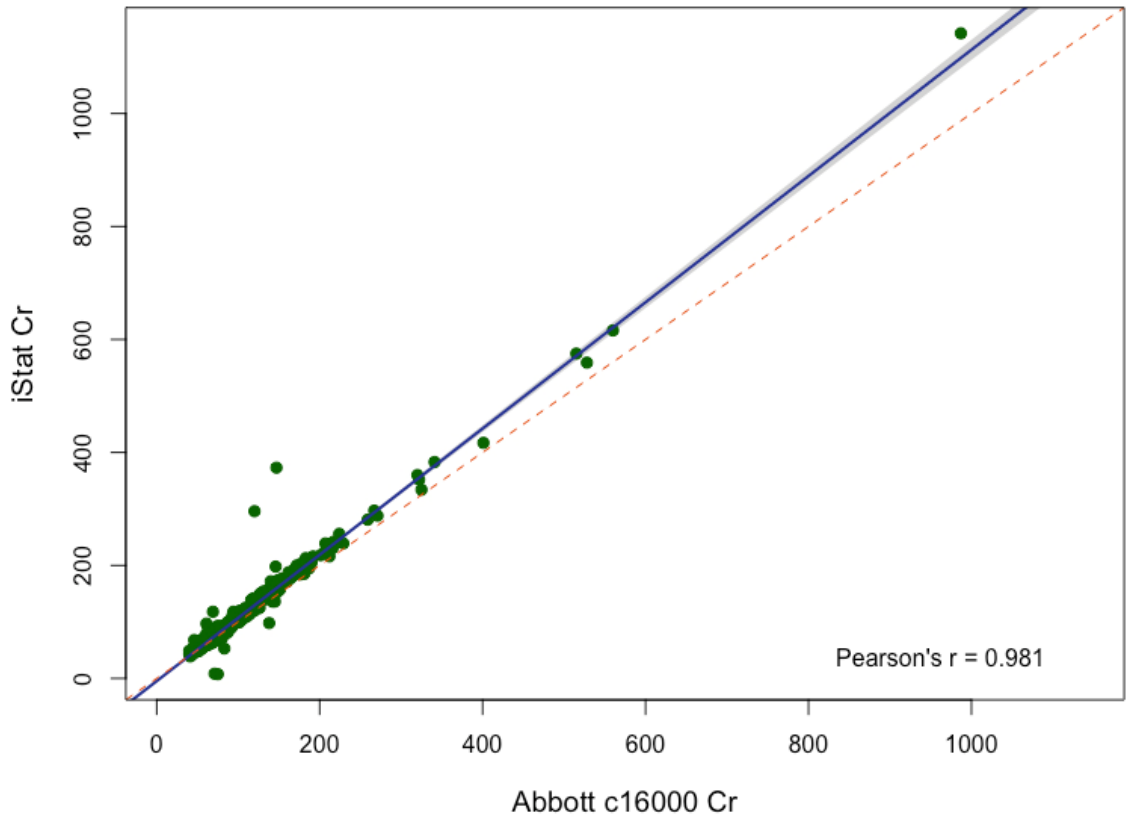
Presenting results of agreement between POC tests and paired laboratory tests



Clinical Reliability of Point of Care Tests to support community based acute care. *Acute Med*. 2020;19(1):4-14.

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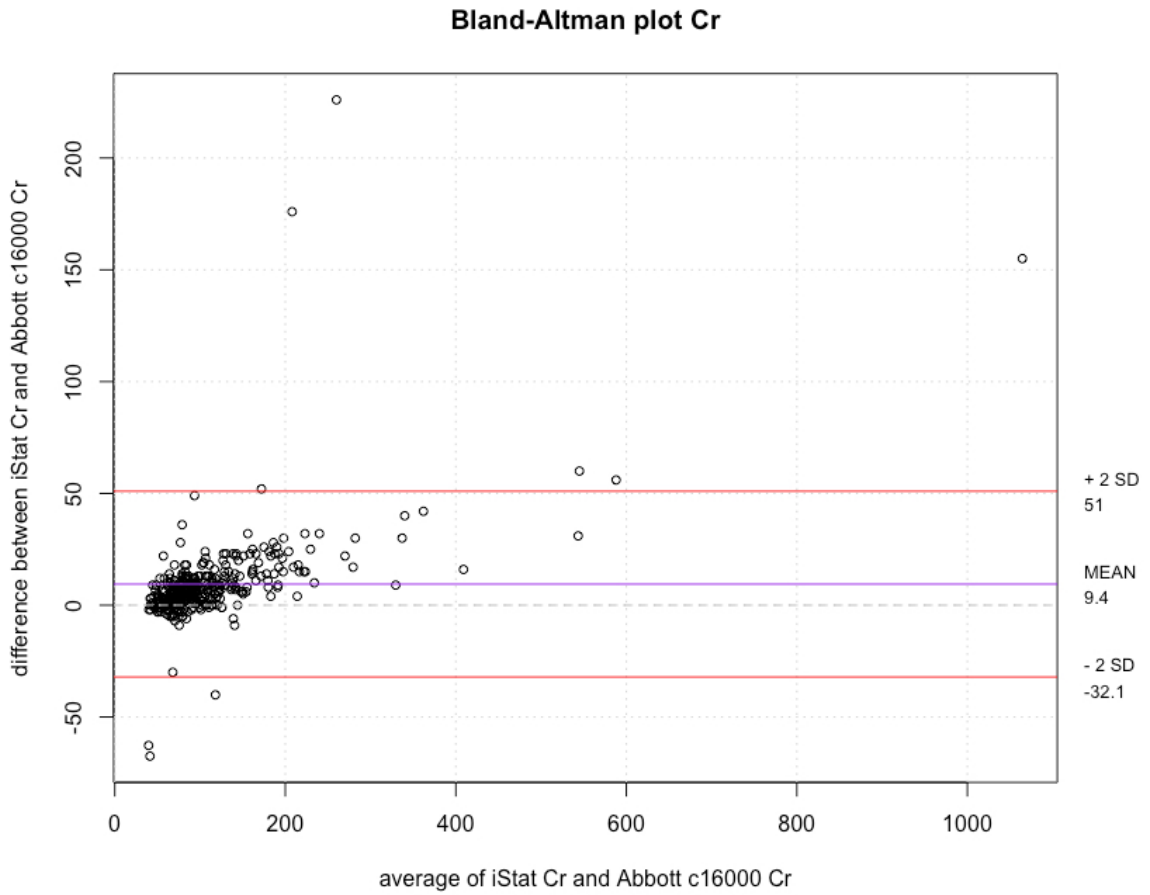

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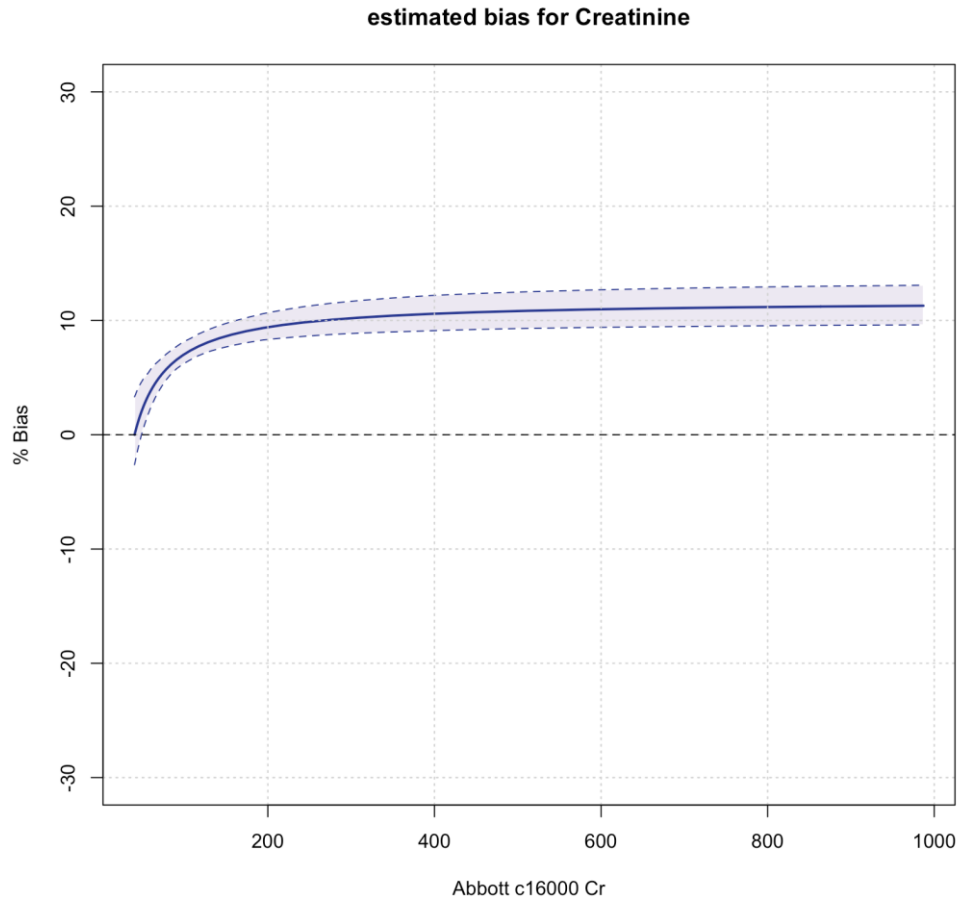

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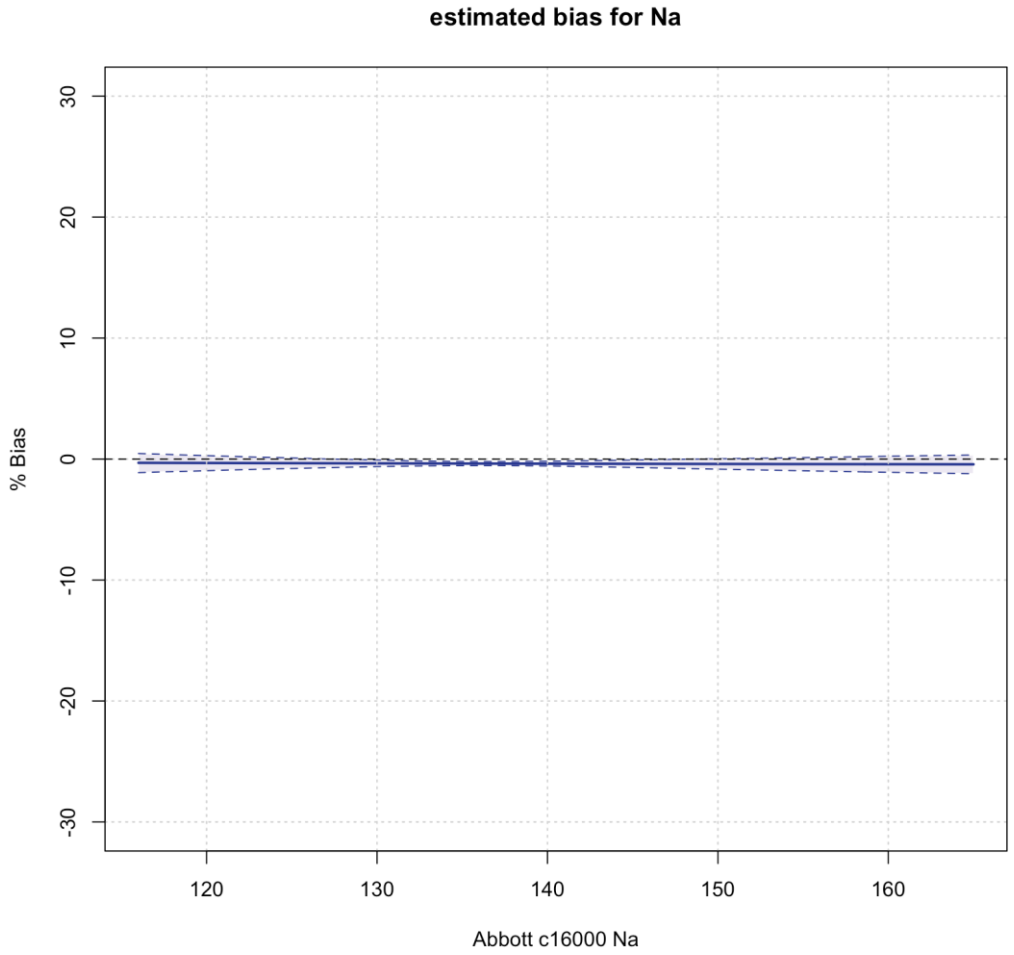
Bias plots



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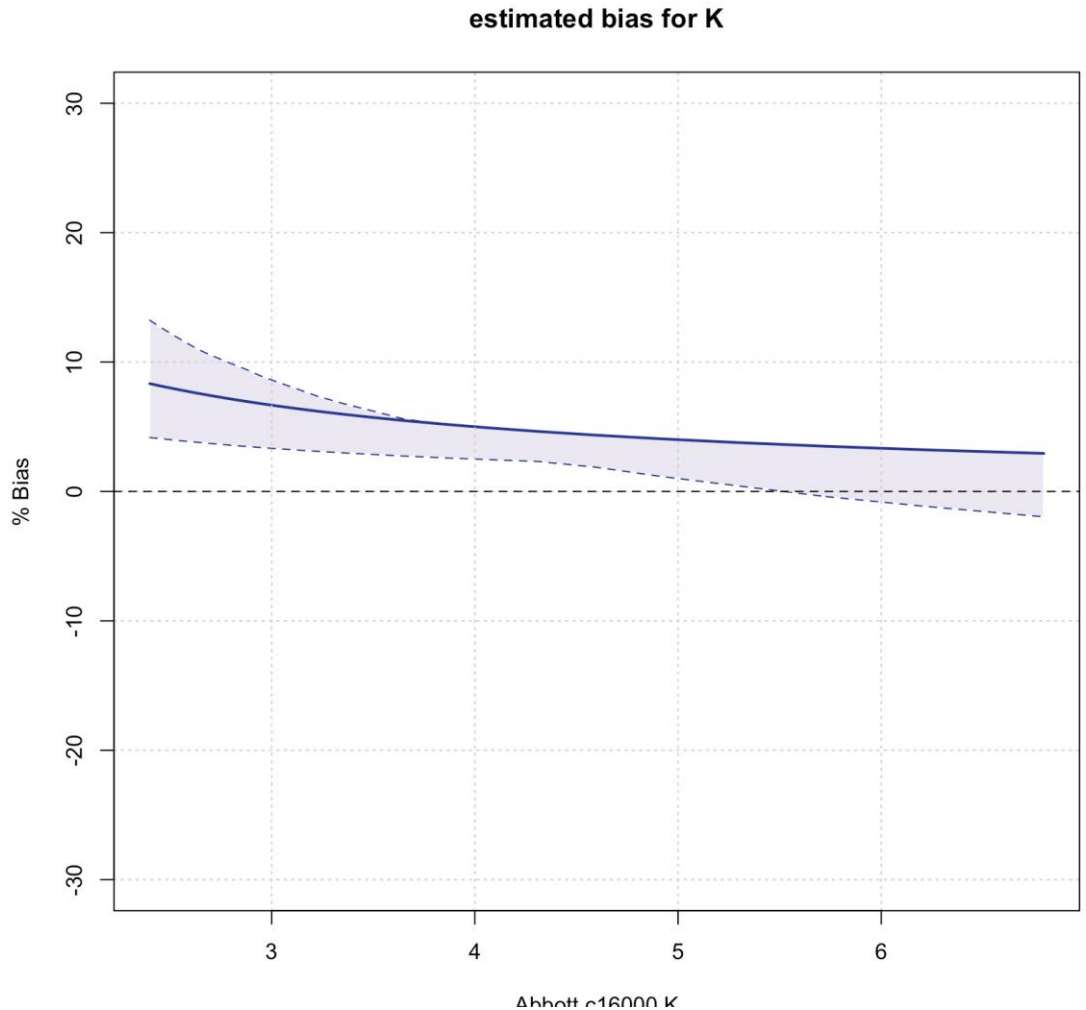

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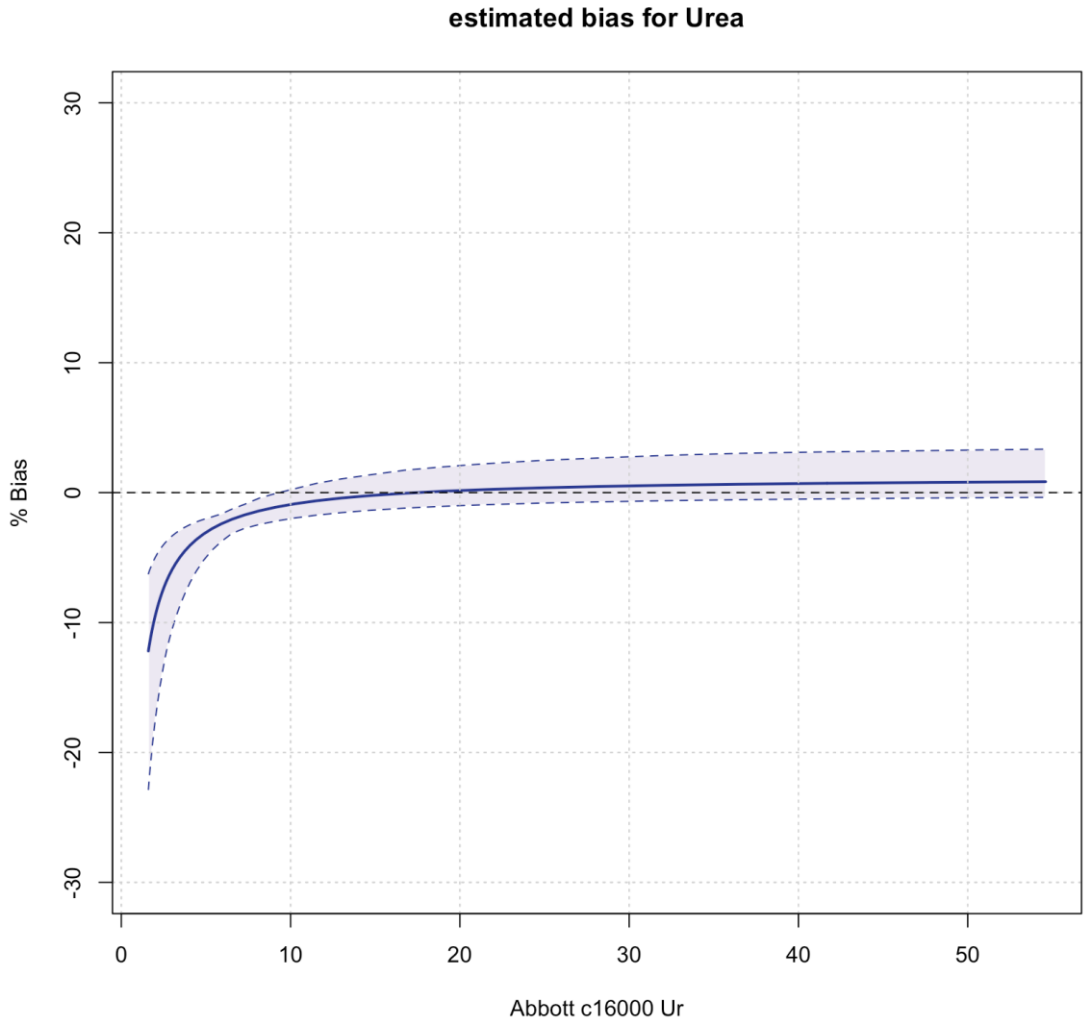

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Which patients are seen in acute ambulatory care in the community?

Table 1. Characteristics of the EMU cohort and subset of the first 67 patients

	All *N* = 533	Subset *N* = 67	*P* value
Age, mean/SD years	75.0/17.5	77.0/15.2	0.31
Gender, female	315 (59)	36 (54)	0.34
Referred by GP	443 (83)	54 (81)	0.68
Referred by paramedic	55 (10)	10 (15)	0.21
Referred other route*	35 (7)	3 (4)	0.35
Resident in care home	71 (13)	7 (10)	0.49
Required EMU transport at least once	152 (29)	26 (39)	0.08
Charlson Comorbidity Index >3	395 (74)	52 (78)	0.48
Barthel Index <20	299 (56)	33 (49)	0.23
Premorbid modified Rankin Scale >2	193 (36)	39 (58)	0.50
Clinical impression of frailty	246 (46)	30 (45)	0.79
Delirium at first assessment	87 (16)	13 (19)	0.47
SIRS>1	159 (30)	18 (27)	0.62
NEWS>4**	102 (19)	11 (16)	0.55
Remained ambulatory at 30 days	315 (60)	37 (55)	0.54
Receiving EMU follow-up (any type)	227 (43)	29 (43)	0.92
Immediate admission after first assessment	152 (29)	22 (33)	0.46
Delayed admission within 30 days	58 (11)	8 (12)	0.81

*There were 4 'walk-in' patients who self-presented and were seen but this was not the standard route of access to the service. **Denominator was 525. For 8 patients, 30-day outcome was unavailable. Numbers are n (%) unless otherwise specified. EMU = Emergency Medical Unit, SIRS = Systemic Inflammatory Response Syndrome. NEWS = National Early Warning Score.

Elias T, Bowen J, Hassanzadeh R, Lasserson DS, Pendlebury ST. *Age and Ageing* 2024; 53:1-8

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Which patients are seen in acute ambulatory care in the community?

- Pathway outcomes at 30 days after referral
  - **61% remained on an ambulatory pathway**
  - 10% initially ambulatory then escalated to acute care
  - 28% initially admitted
    - 9% transfer to acute hospital bed
    - 19% admitted to community hospital bed

Staff experience of POCT enabled acute ambulatory care

"I think it does provide a better experience for patients, it's smoother and …. they obviously get their treatment quicker"

"I don't think we could function at all as a unit without it [POC testing]"

"crucial… integral to running this service"

"for our decision making at the time and to provide a plan for that patient and give them the best treatment we need to have that [POC test] result in our hand there and then"

Jones *et al. BMC Health Services Research* (2016) 16:591
DOI 10.1186/s12913-016-1834-3

BMC Health Services Research

RESEARCH ARTICLE Open Access

Embedding new technologies in practice – a normalization process theory study of point of care testing

Caroline H. D. Jones[1*], Margaret Glogowska[1], Louise Locock[1,2] and Daniel S. Lasserson[1,2]

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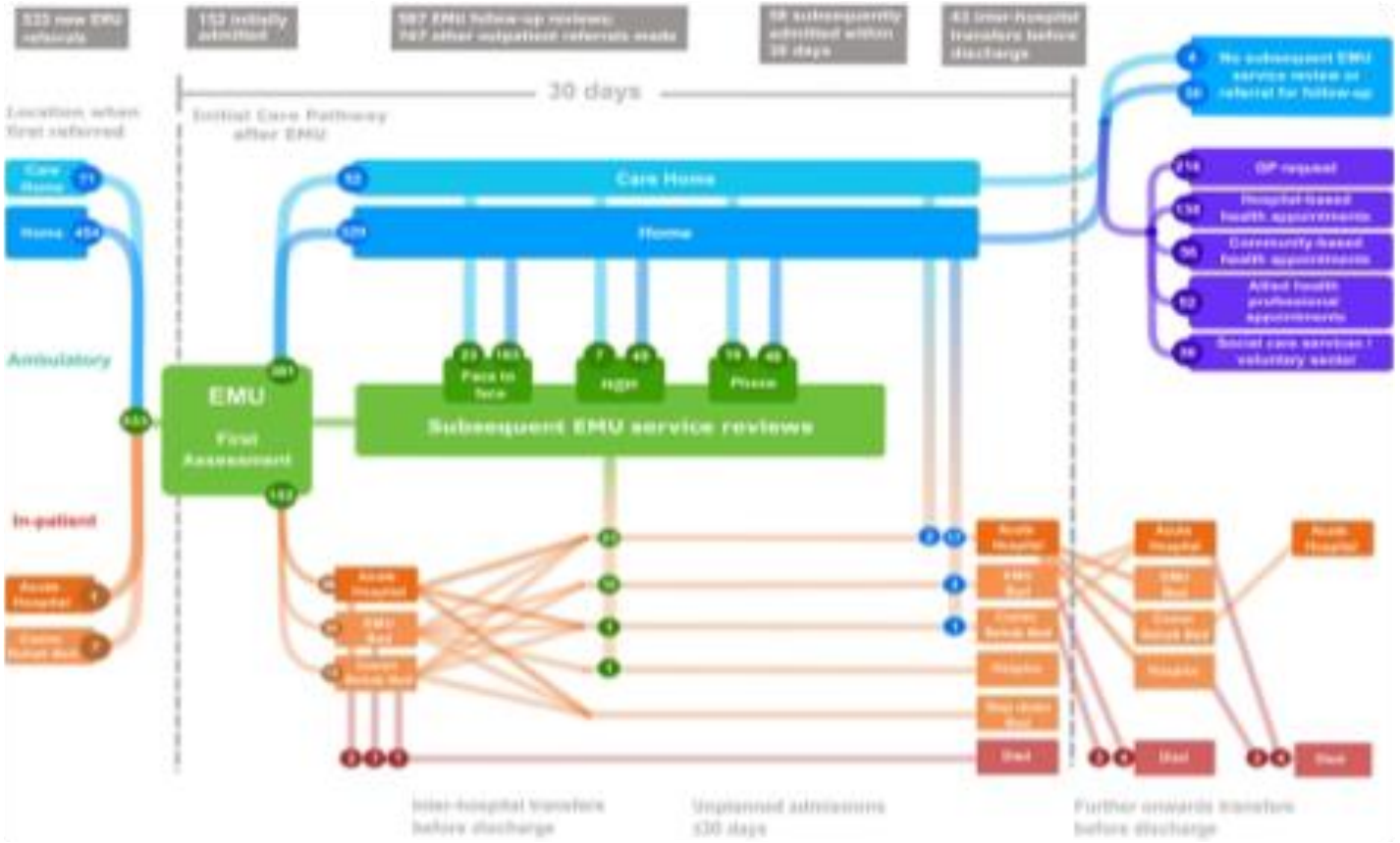
Limitations of Ambulatory Care for older adults



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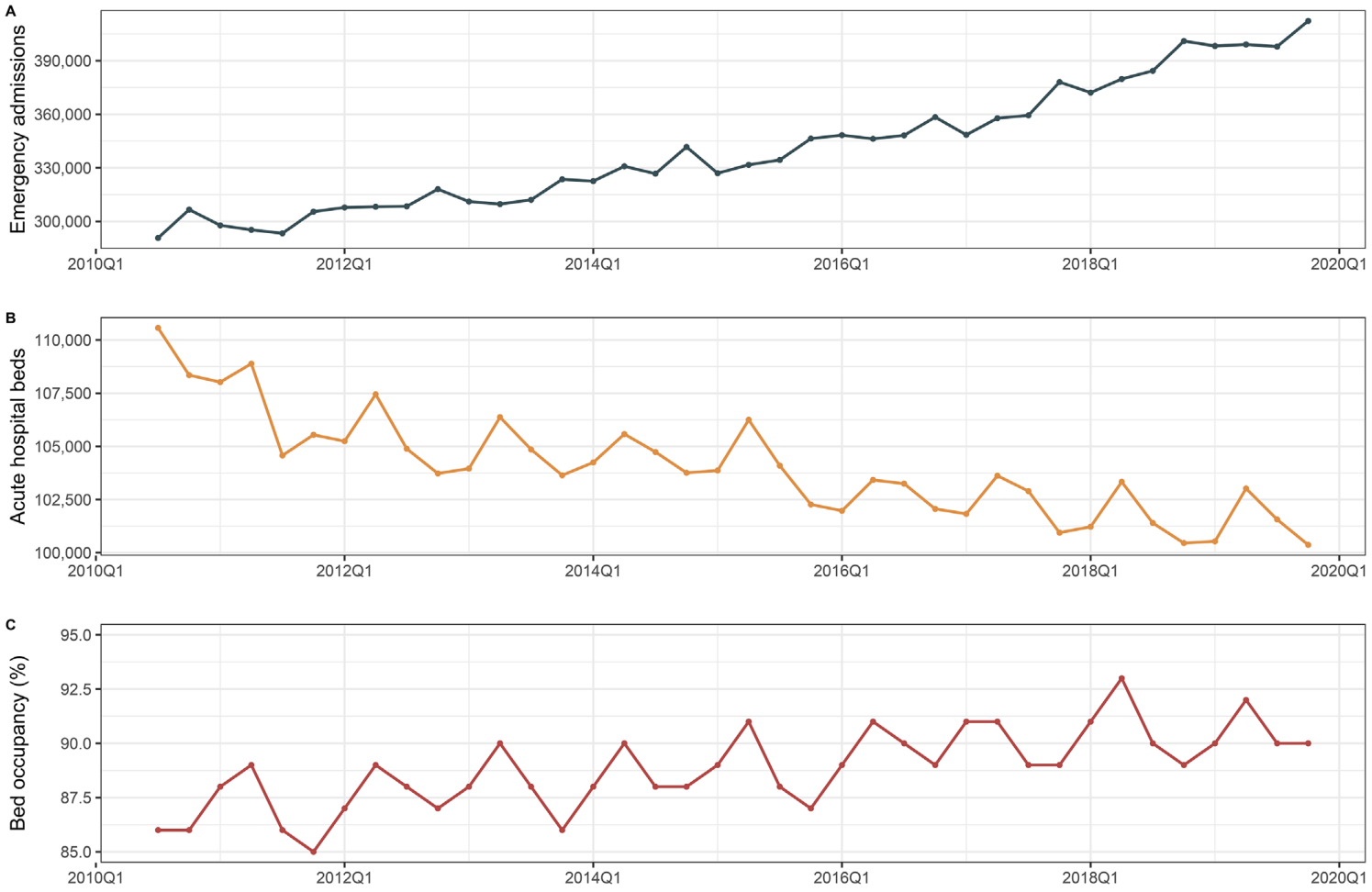
Acute Care Pathway Challenges – 10 years later



Knight T, Lasserson D. Hospital at Home for acute medical illness. *J Intern Med* 2022 Apr;291(4):438-457.

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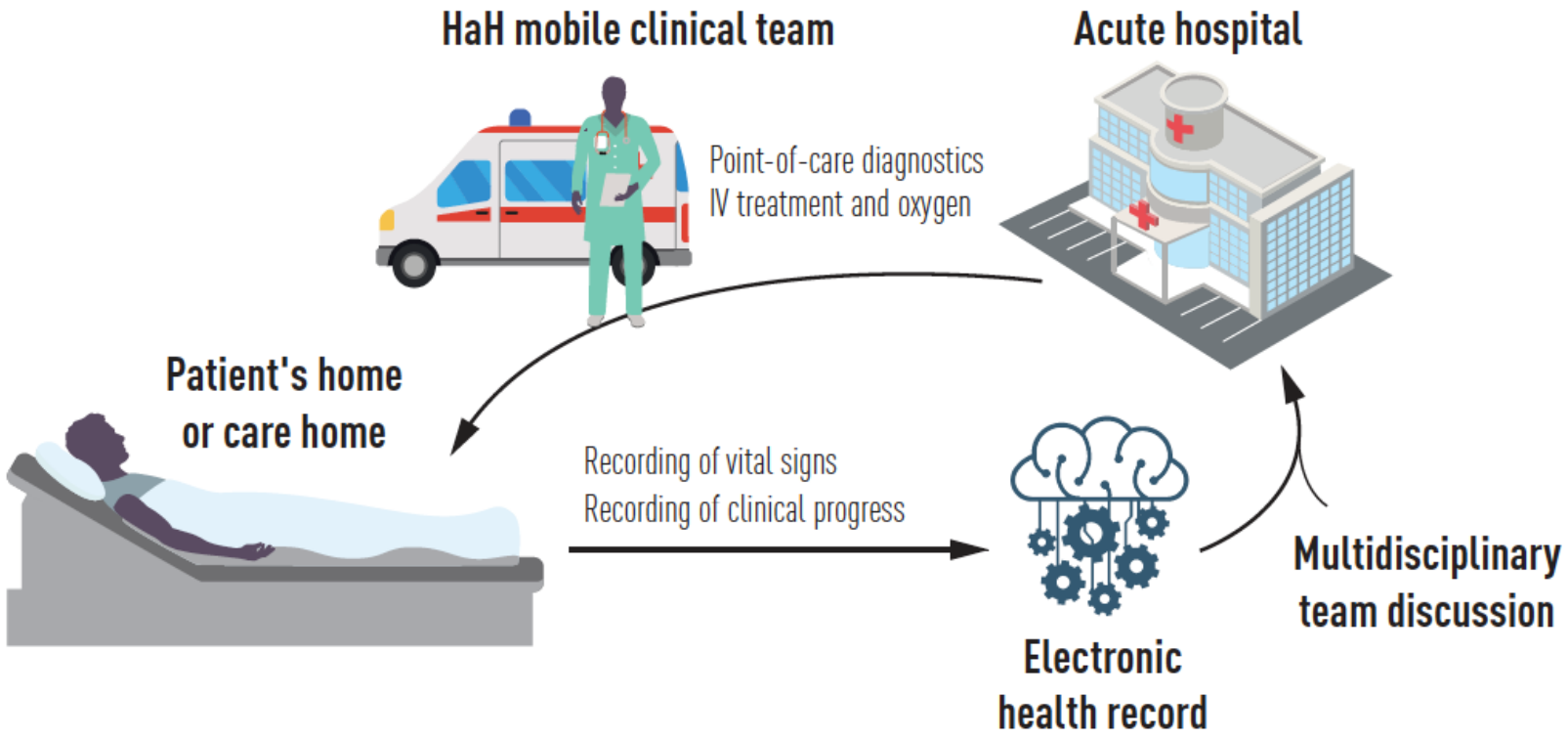
H@H Operating Model



Knight T, Lasserson D. Hospital at Home for acute medical illness. *J Intern Med* 2022 Apr;291(4):438-457.

Evidence for H@H

- Largest ever RCT of Hospital at Home – funded by NIHR[1]
- No difference in mortality
- Reduced delirium
- Reduced % of patients in institutional care at 6 months
- Cost effective – mean £2,265 saved per patient - even allowing for staff travel costs and time

[1]Ann Intern Med. 2021 Jul;174(7):889-898

[2]Age Ageing 2022 Jan 6;51(1):afab220

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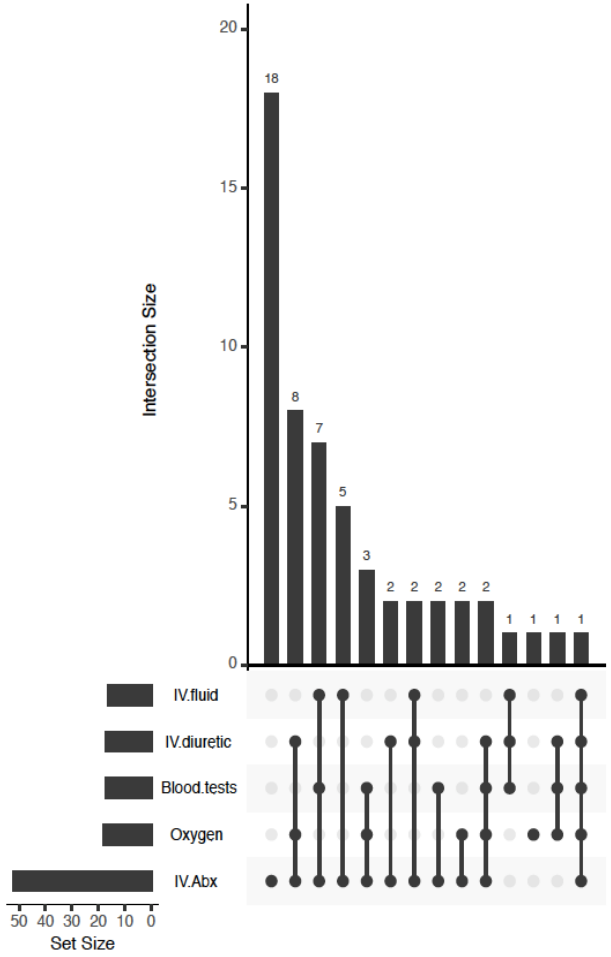
Processes of care in UK H@H services



- What goes on in a Hospital at Home model?
- Large variation in what is being delivered in the home and care home
- Organic ‘bottom up’ development
- No National Service Framework for minimum diagnostics in H@H

Knight T, Harris C, Mas M, Ellis G, Shental O, Lasserson DS. Int J Clin Prac 2021 Sep 12;e14814.

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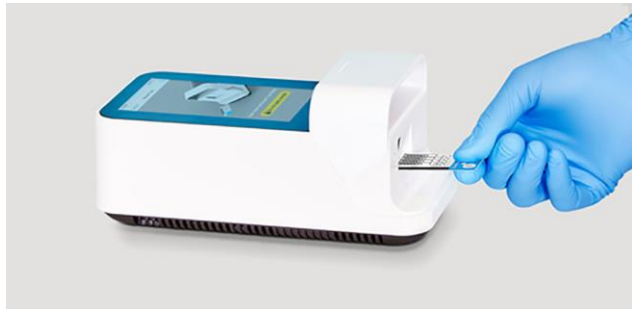
Getting rapid clinical information in Hospital at Home



Hand held portable blood analysis

Abbott Alinity

Lumira Dx

- **Commonly encountered clinical problems**
- **Closed cartridge systems**
- **Uploading results to central laboratory system**
- **Training, quality assurance, governance**

Getting rapid clinical information in Hospital at Home

Hand held portable ultrasound

Butterfly IQ

VScan – GE

- **Commonly encountered clinical problems**
- **Image sharing**
- **Training, mentorship and governance**

Clinical Case

- Man in his late 70s, living in nursing section of care home
- BG: epilepsy, psychosis, dementia.
- Usually walks around home with assistance of wheeled frame

- Screen positive SARS-CoV-2 in outbreak at the home
  - 8 days later becomes more withdrawn, no oral intake
  - Call comes through to Acute Hospital at Home team from on call acute medicine

Clinical Case

- Lying in bed, not eaten or drunk for several days.

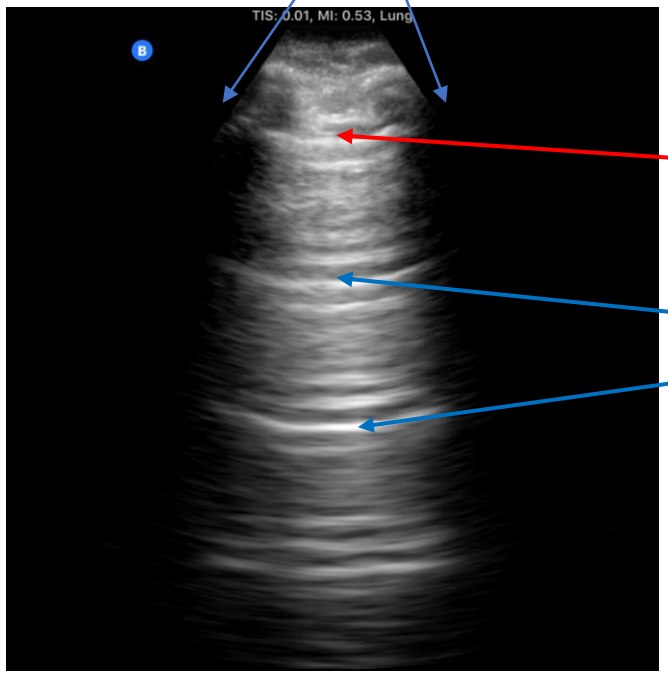
- RR 24, sats 88% on air

Discussion with family - ceiling of care is care home acute treatment

- Na 162, K 4.4, Urea 21, Creatinine 191 (usual creatinine 81)
- Lactate 1.7, pH 7.474

Point of care imaging– normal Lung

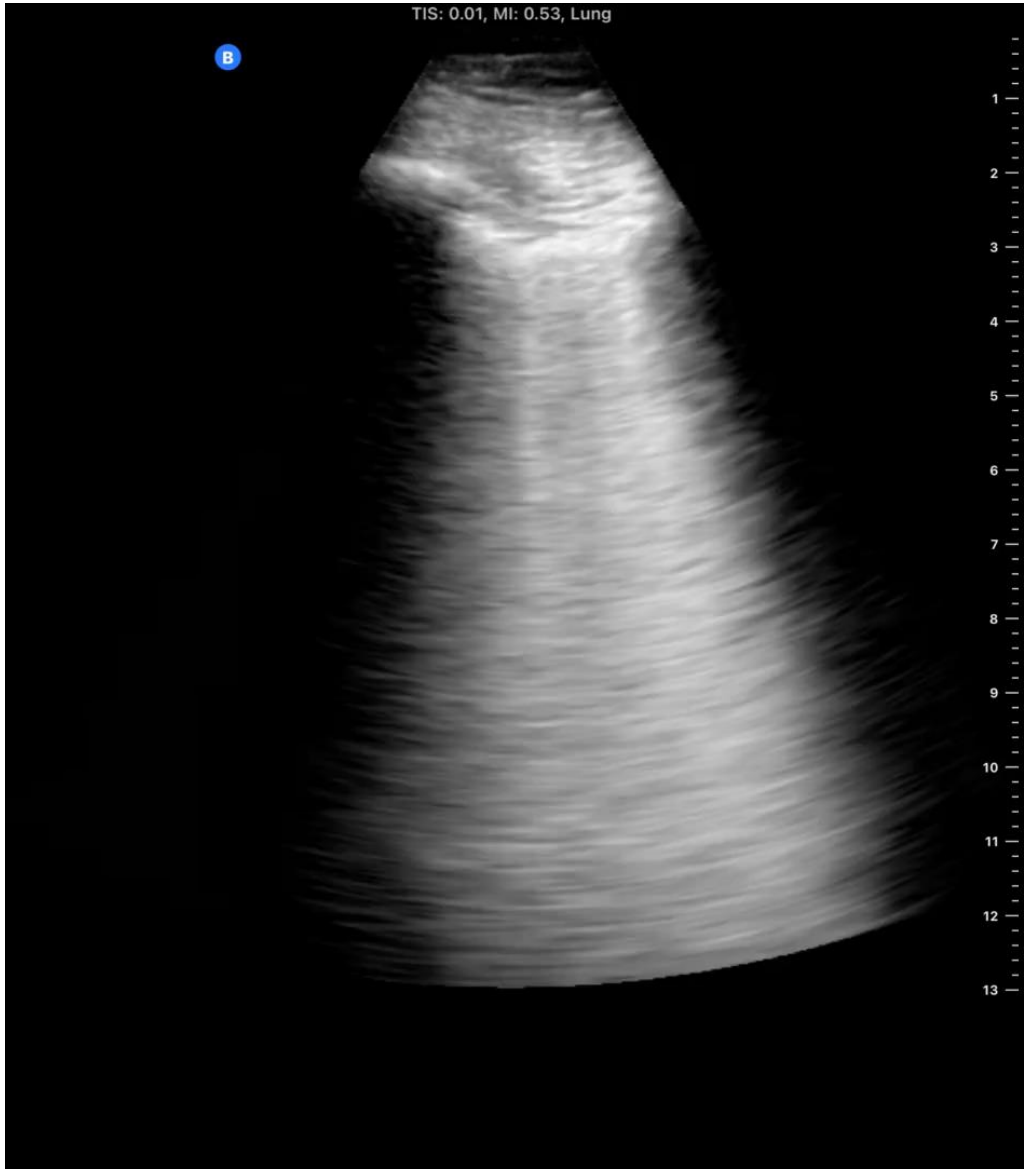
Rib Shadows



Pleural line - movement

A lines –

Horizontal lines generated by reflections between the pleural line and transducer (IF the lung is normal)


TIS: 0.01, MI: 0.53, Lung
B
1
2
3
4
5
6
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10
11
12
13

Clinical Case

- **Dexamethasone 6mg od**
  - Daily blood glucose monitoring from POC blood combination cartridge
- **Oxygen**
  - 4L via concentrator from urgent community oxygen provider
  - Saturation monitoring by care home staff/AHAH review
- **Fluids**
  - IV 5% glucose (set up by AHAH nurses, taken down by care home nurses)
  - Overnight s/c 0.18% saline/4% glucose
- **VTE prophylaxis**
  - Dalteparin 5000 units s/c daily

Clinical Case

- **Progress on O2**
  - D2 Sats 92% on 2L
  - D3 Sats 95% on 2L -> 92% on 1L
  - D4 Sats 93% on air

- **Daily clinical review and istat - mix of IV with overnight s/c**
  - D2 Na 157 urea 18 creat 192
  - D3 Na 154 urea 16 creat 166
  - D4 Na 148 urea 11 creat 136
  - D5 Na 143 urea 8 Creat 117

- **Clinical review day 5**
  - Eating lunch, sat out
  - Cracking jokes
  - Dex stopped (highest glucose 9.3)

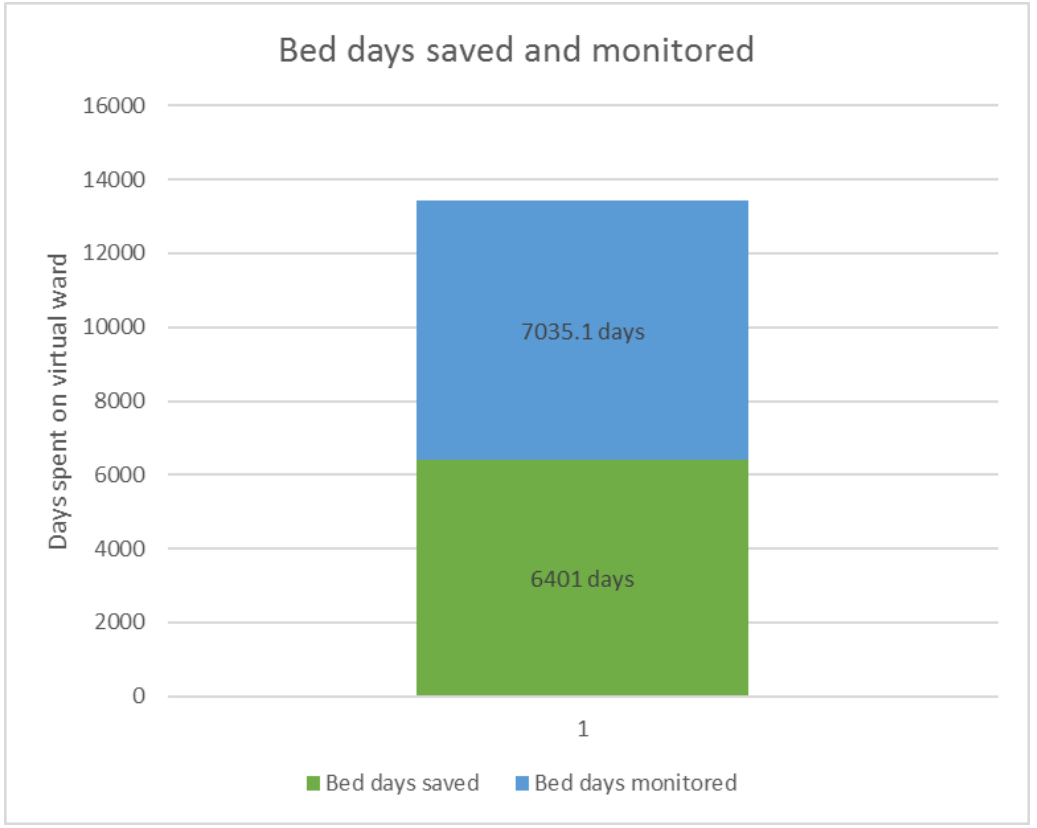
- One week later F/U phone call – Continues to improve, more mobile, eating and drinking, sats 94% on air

What can we give in H@H?

- IV furosemide (high doses + monitoring of renal function)
- IV antibiotics (community placed midlines and elastomerics)
- IV fluid – including slow infusions to treat hypernatraemia
- IV Iron
- IV zoledronic acid
- Oxygen via concentrator
- COVID ‘bundle’ Dexamethasone/oxygen/tocilizumab/dalteparin/baricitinib
- Blood transfusions
- End of life care

What does an Acute Hospital at Home service do?

Number of patients	2952
Age	
Mean	75.9
Range	16-101 years
Standard deviation	15.3
Length of stay	
Mean	4.4 days
Range	0.3-74 days
Standard deviation	10.4



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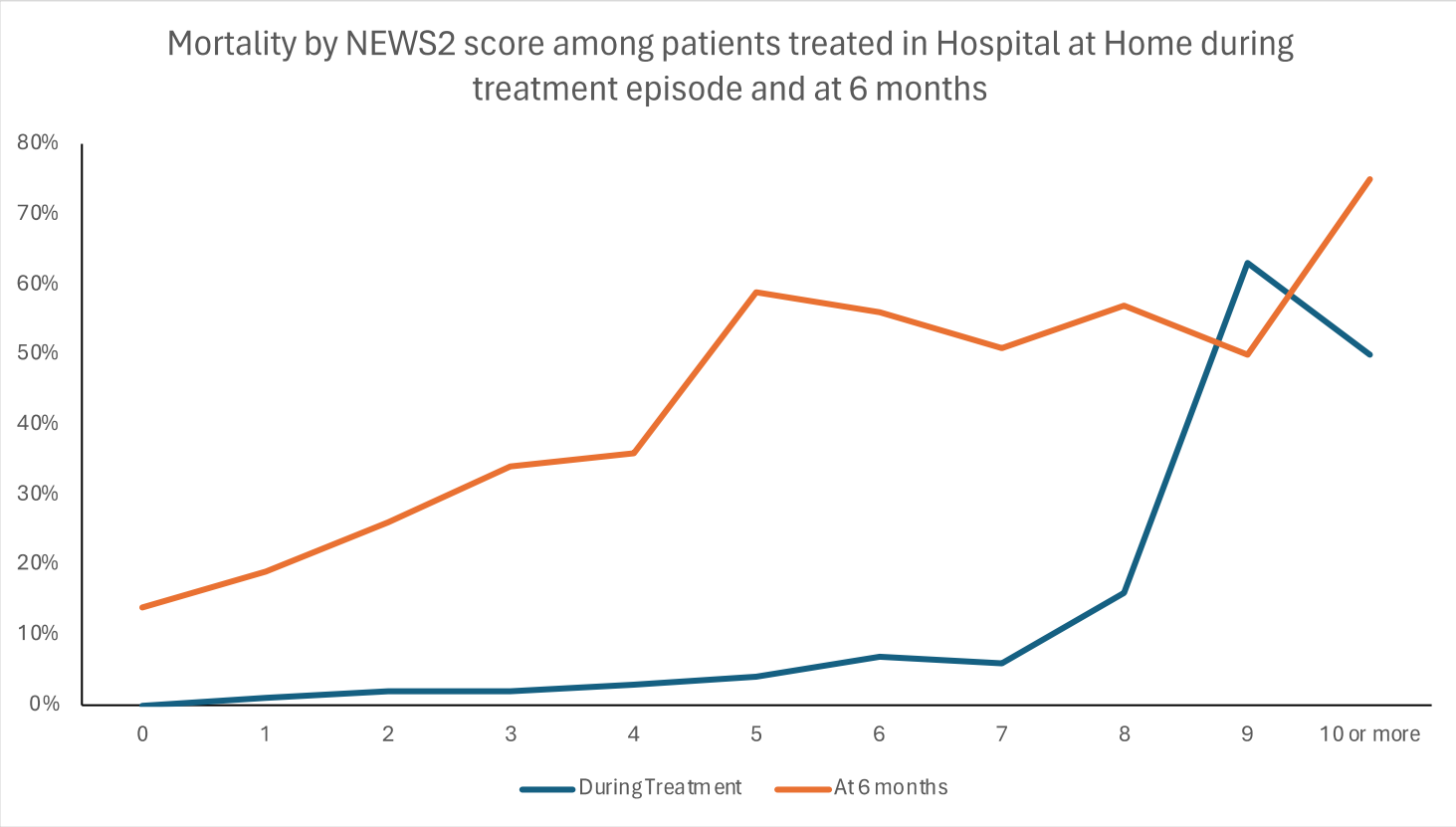
Treatment in the last year of life



A journey of acute medical care innovation completely enabled by POC testing

- POCT gave us the courage to take on acute medical problems in a community hospital and develop ambulatory care
- Propelled us into a whole new care model of acute medical care at home
- Provided us with the rationale to embed point of care ultrasound – to complete our understanding of acute disease outside hospital
- POCT is the key intervention to unlock acute medical care innovation

Winter 2024-25: Time to act for older people

24 October 2024

At the beginning of 2023 the British Geriatrics Society published, with partner organisations, a statement about "Protecting the rights of older people to health and social care."

British Geriatrics Society
Improving healthcare for older people

7. There should be continued investment in a multi-professional urgent community response that provides both intensive short-term hospital level care at home through Hospital at Home and access to goal-oriented homebased and bed-based reablement and intermediate care services.

These must work closely with ambulance, ambulatory care and same day emergency care services as an integrated local network. We have written more about this in *Right Time, Right Place*, our guide to urgent community-based care for older people and *Bringing hospital care home*, which outlines how virtual wards and Hospital at Home services can support older people.

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UK Hospital at Home Society

Hospital at Home provides intensive, hospital-level care for acute conditions that would normally require an acute hospital bed, in a patient's home for a short episode through multidisciplinary healthcare teams.

The UK Hospital at Home Society is for all those with an interest in Hospital at Home, including NHS staff, patients, caregivers, policy makers and the academic community.

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