King's College London

King's College Hospital NHS
NHS Foundation Trust

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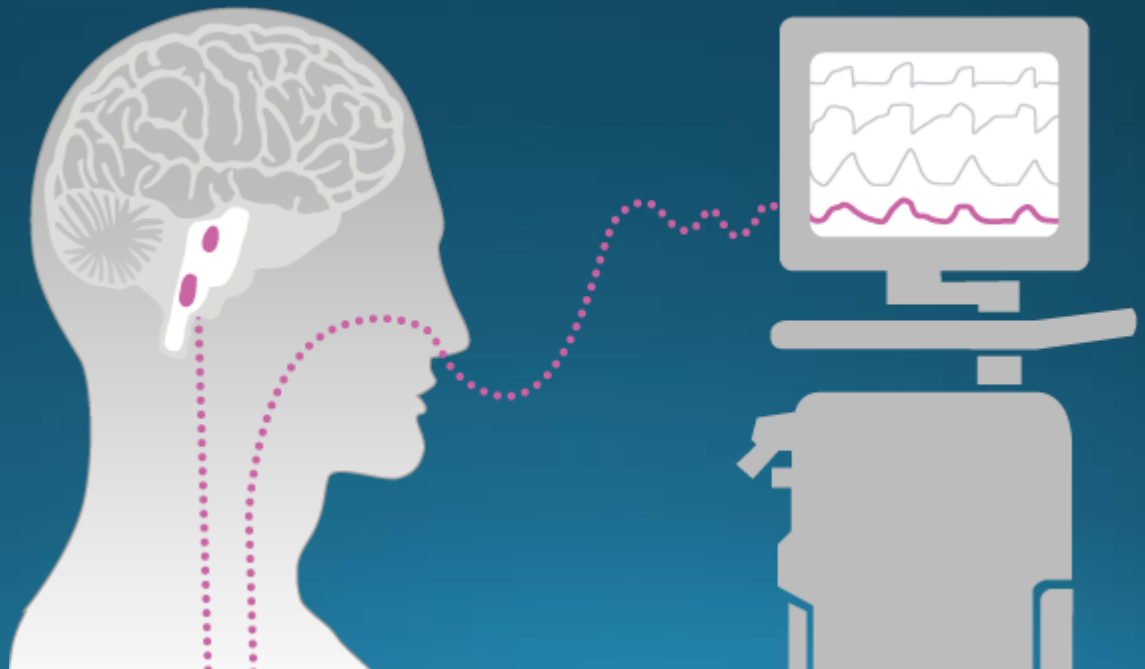
National Institute for Health Research

Neurally Adjusted Ventilatory Assist in prolonged ventilation

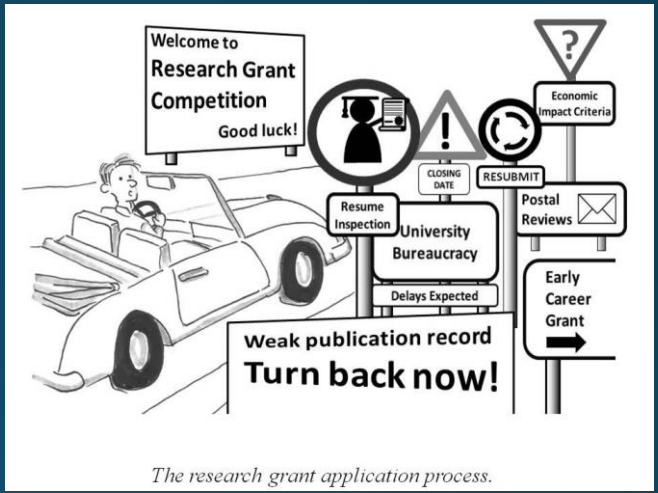


Daniel Hadfield

Critical Care Nurse
NIHR / HEE Clinical Doctoral Research Fellow
King's College Hospital

Route to NIHR Fellowship

• 2010/11	Research nurse, early project Various NAVA abstracts and project development	
• 2012	NIHR DRF NIHR GSTT BRC	unsuccessful successful
• 2013	NIHR DRF NIHR CAT	unsuccessful unsuccessful
• 2014	NIHR DRF Moulton NIHR CAT	unsuccessful successful successful!!!
• 2015	Fellowship commenced	



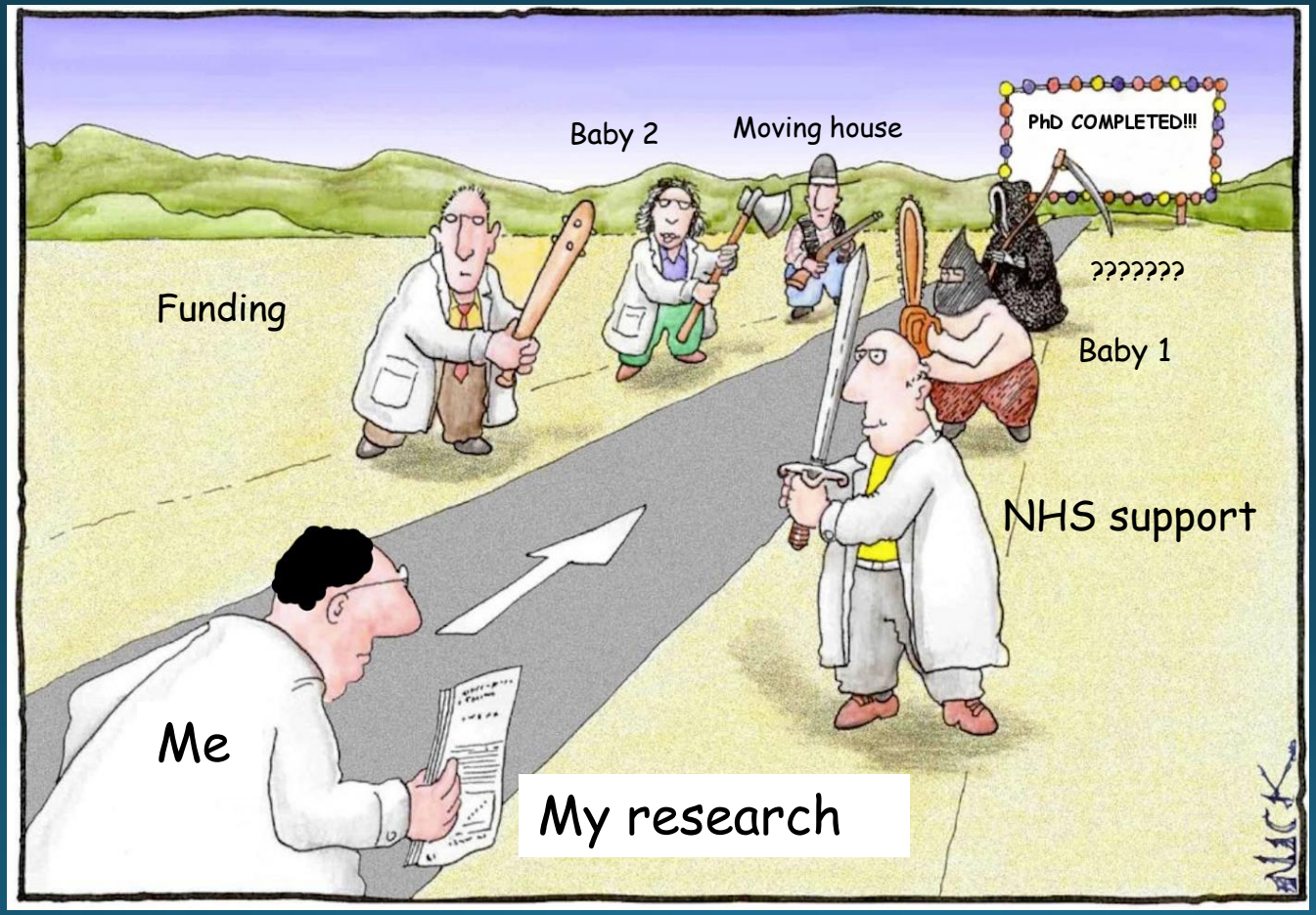
The research grant application process.

- 5 NIHR Fellowship applications
- 4 NIHR interviews

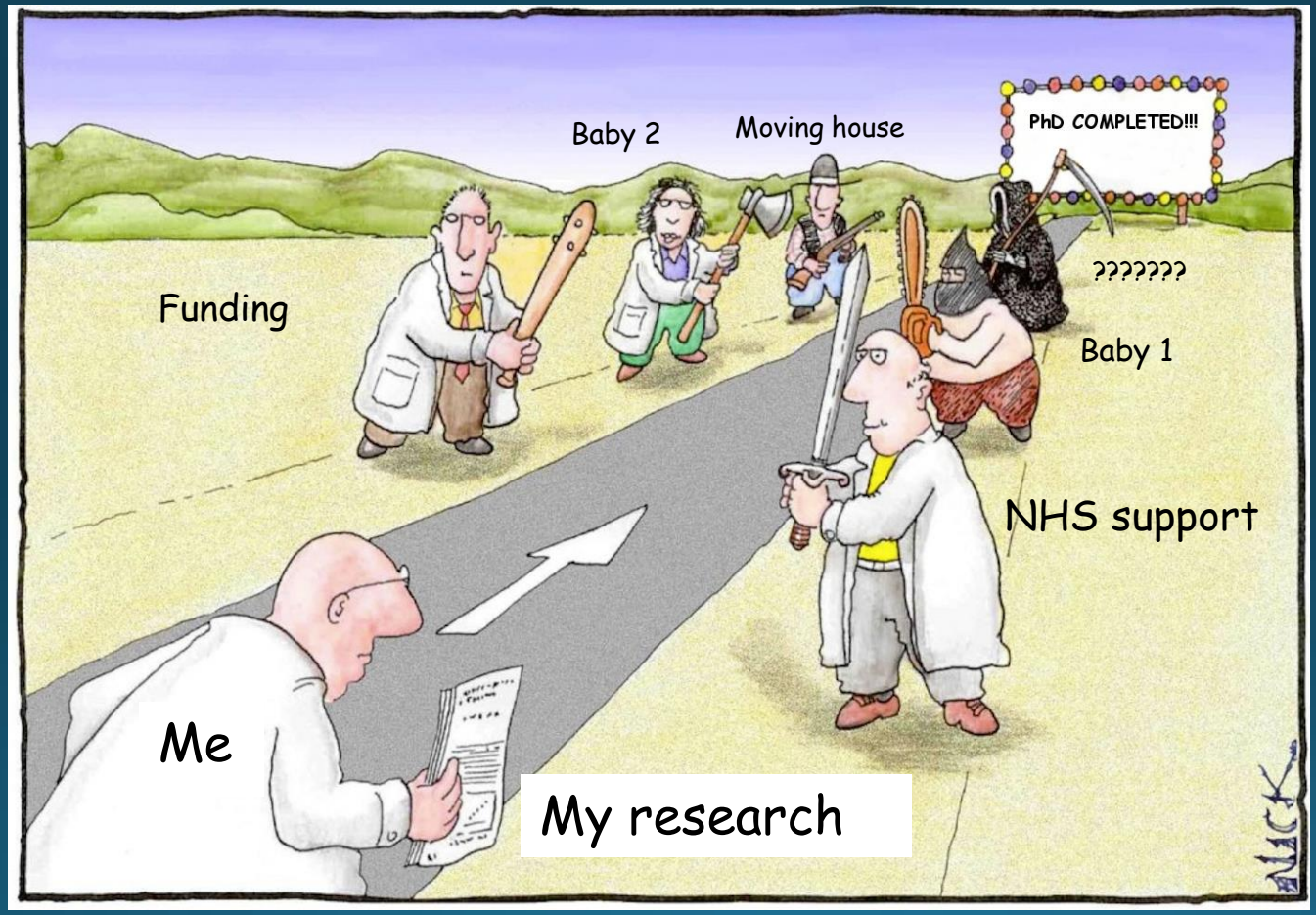
MAIN TIPS

- *Peer review as much as possible*
- *Broad collaboration*
- *Persistence!*

PhD & Fellowship journey



PhD & Fellowship journey

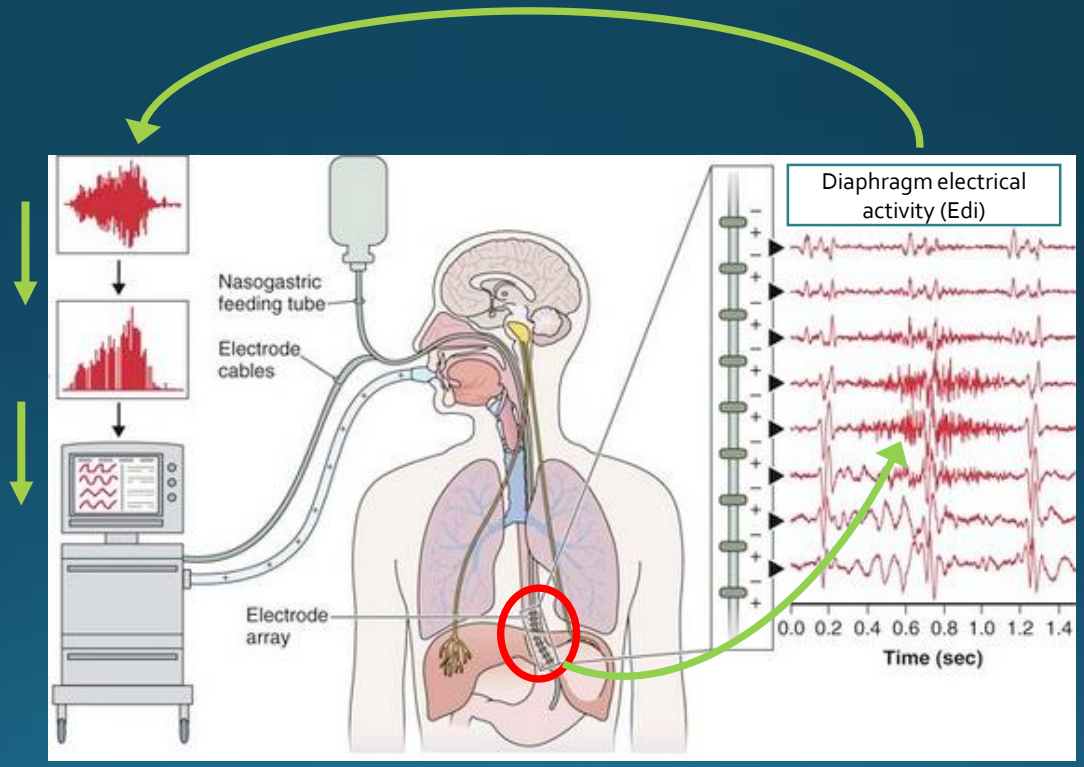


NAVA - what is it?

Neurally Adjusted Ventilatory Assist

1. A monitor of electrical diaphragmatic activity (Edi)
2. A proportional mode of ventilation

- Edi is amplified, filtered and processed
- Multiplied by a proportionality factor (NAVA level)
- Used to trigger and shape pressure supported breaths



Modified from Sinderby C, Navalesi P, Beck J, et al: Neural control of mechanical ventilation in respiratory failure, Nat Med 5:1433–1436, 1999

NAVA - what is it?

Neurally Adjusted Ventilatory Assist

1. A monitor of electrical diaphragmatic activity (Edi)
2. A proportional mode of ventilation

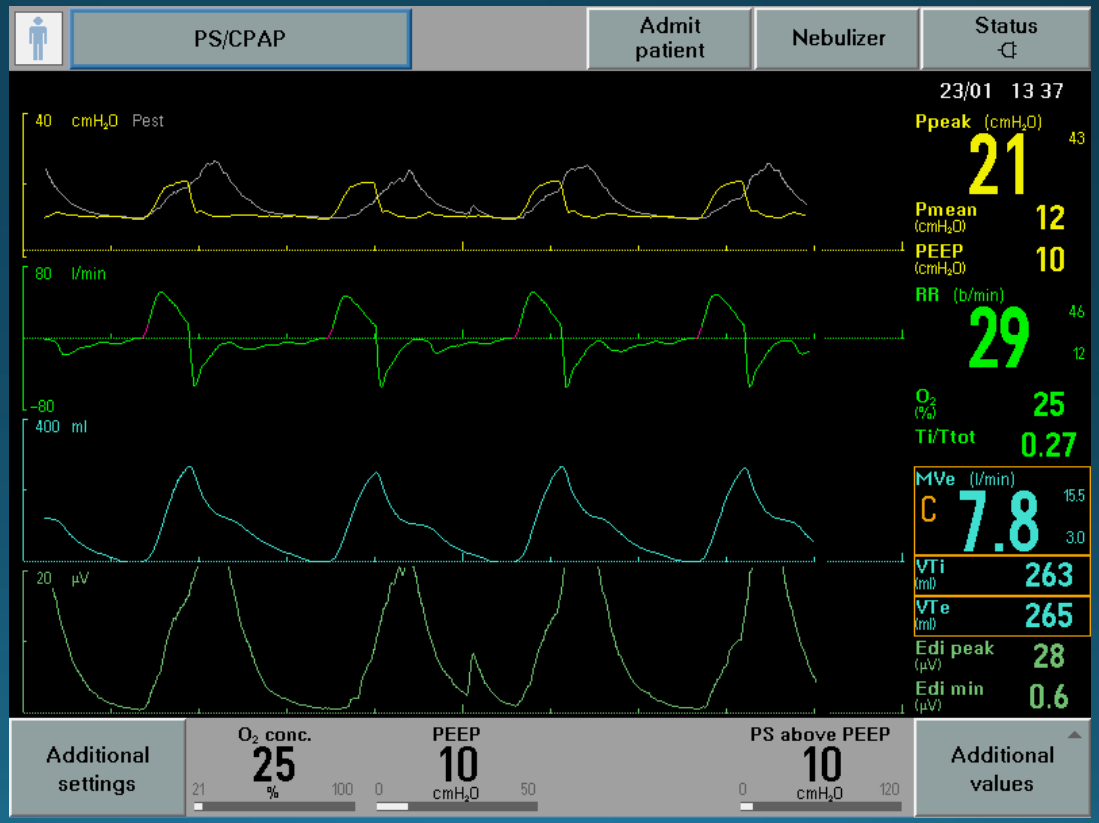
Here, used as a monitor in PSV mode, highlighting dysynchrony

Pressure (yellow)
Expected NAVA pressure (white)

Flow

Volume

Diaphragmatic electrical activity



NAVA - what is it?

Neurally Adjusted Ventilatory Assist

1. A monitor of electrical diaphragmatic activity (Edi)
2. A proportional mode of ventilation

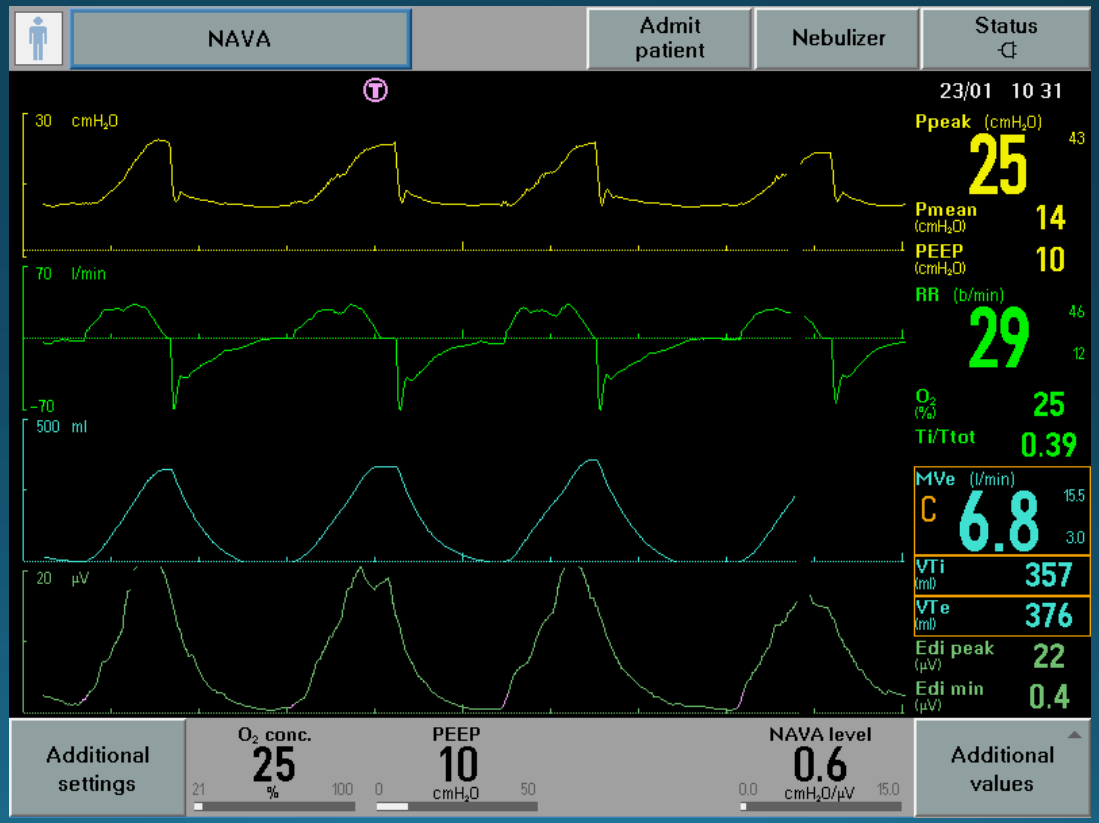
Here, used as a mode, delivering synchronous, proportional pressure support

Pressure

Flow

Volume

Diaphragmatic electrical activity



NAVA - what is it?

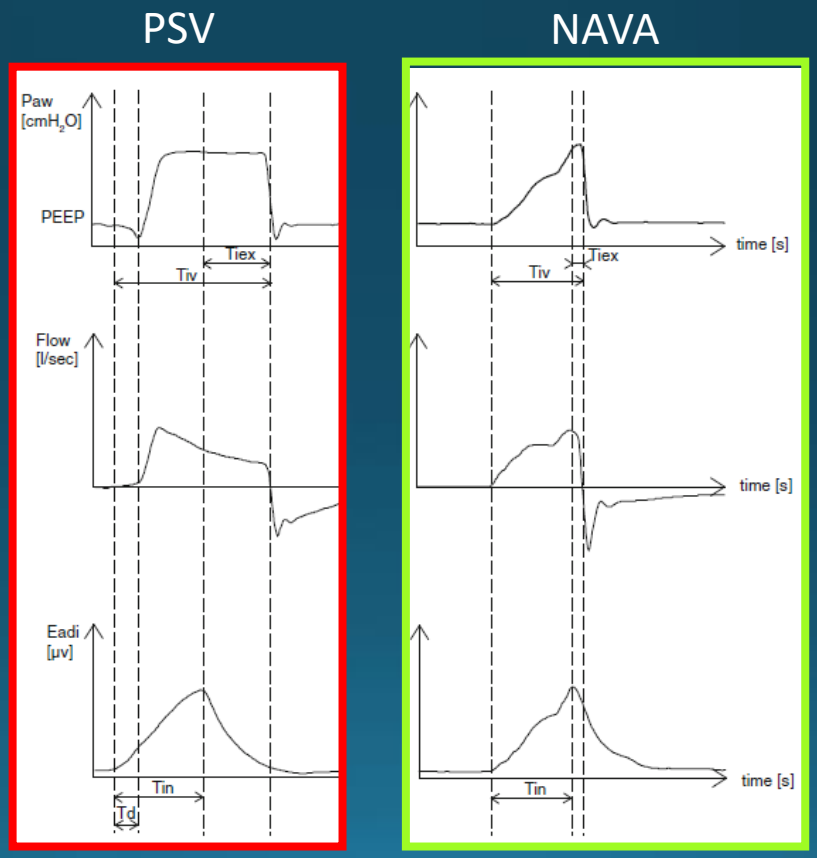
Neurally Adjusted Ventilatory Assist

1. A monitor of electrical diaphragmatic activity (Edi)
2. A proportional mode of ventilation

Pressure

Flow

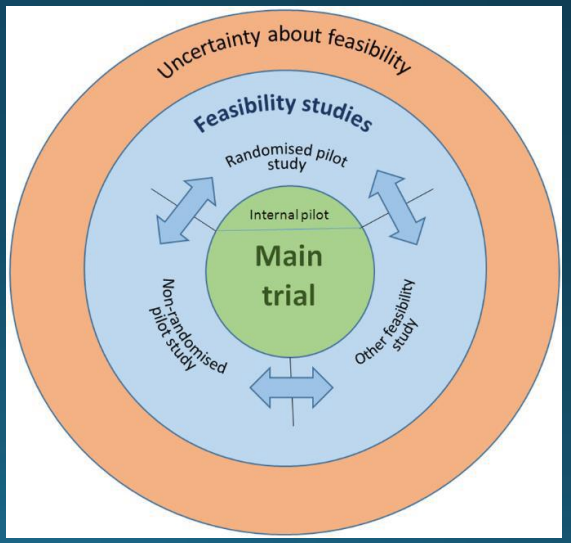
Diaphragmatic electrical activity



NAVA – evidence

Neurally Adjusted Ventilatory Assist

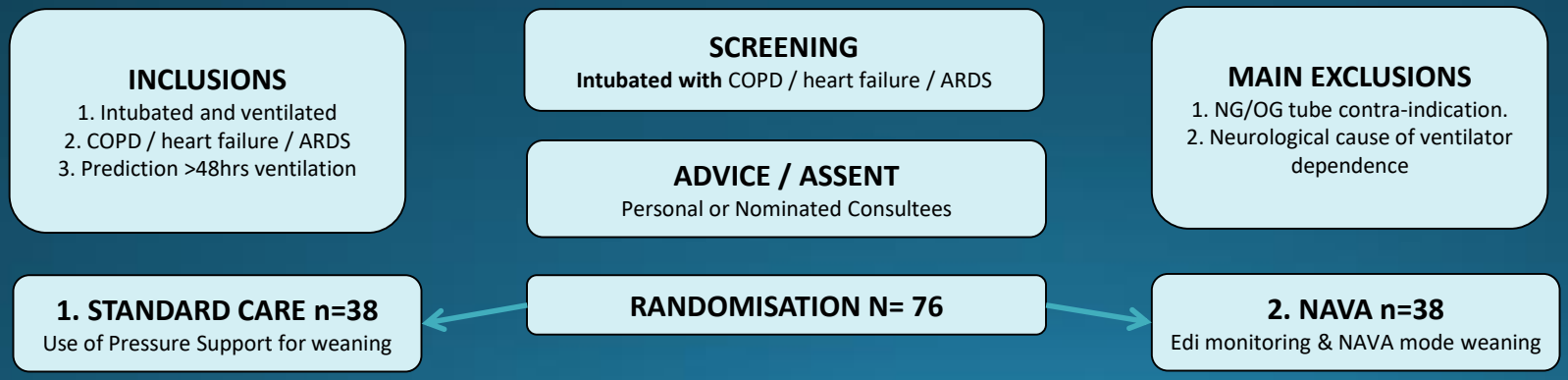
Known benefits	→	Improved synchronisation Greater 'natural' breathing variability Physiologic prevention of over-assistance
Theoretical benefits	→	Monitoring Reduced time on ventilation Reduced sedation
Current clinical use	→	Not widely adopted (clinical effectiveness not yet demonstrated)
What is needed		Large multi-centre RCTs



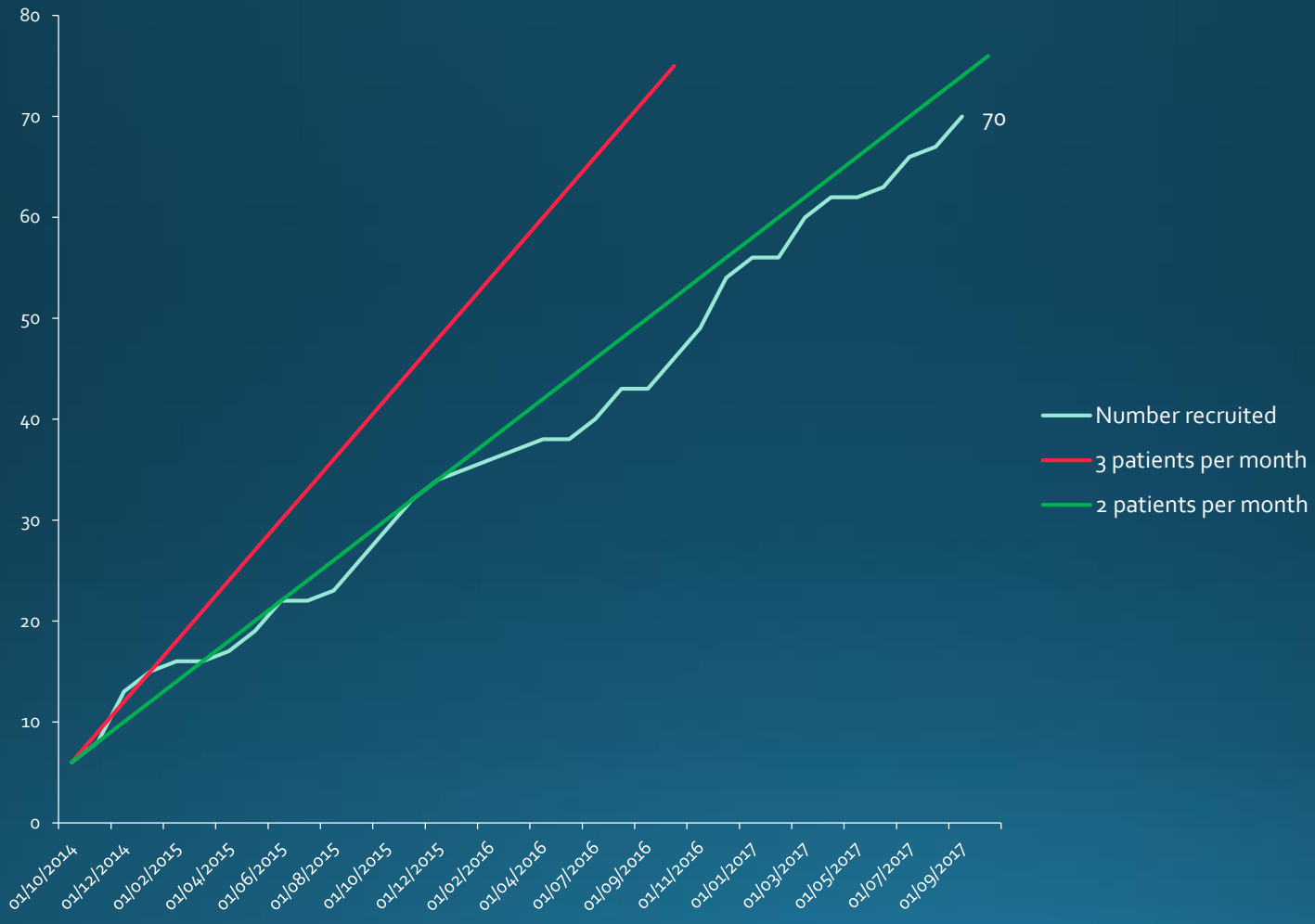
1. Eldridge, S.M., et al., *Defining Feasibility and Pilot Studies in Preparation for Randomised Controlled Trials.* PLoS One, 2016. 11(3): p. e0150205.
2. Eldridge, S.M., et al., *CONSORT 2010 statement: extension to randomised pilot and feasibility trials.* BMJ, 2016. 355: p. i5239.

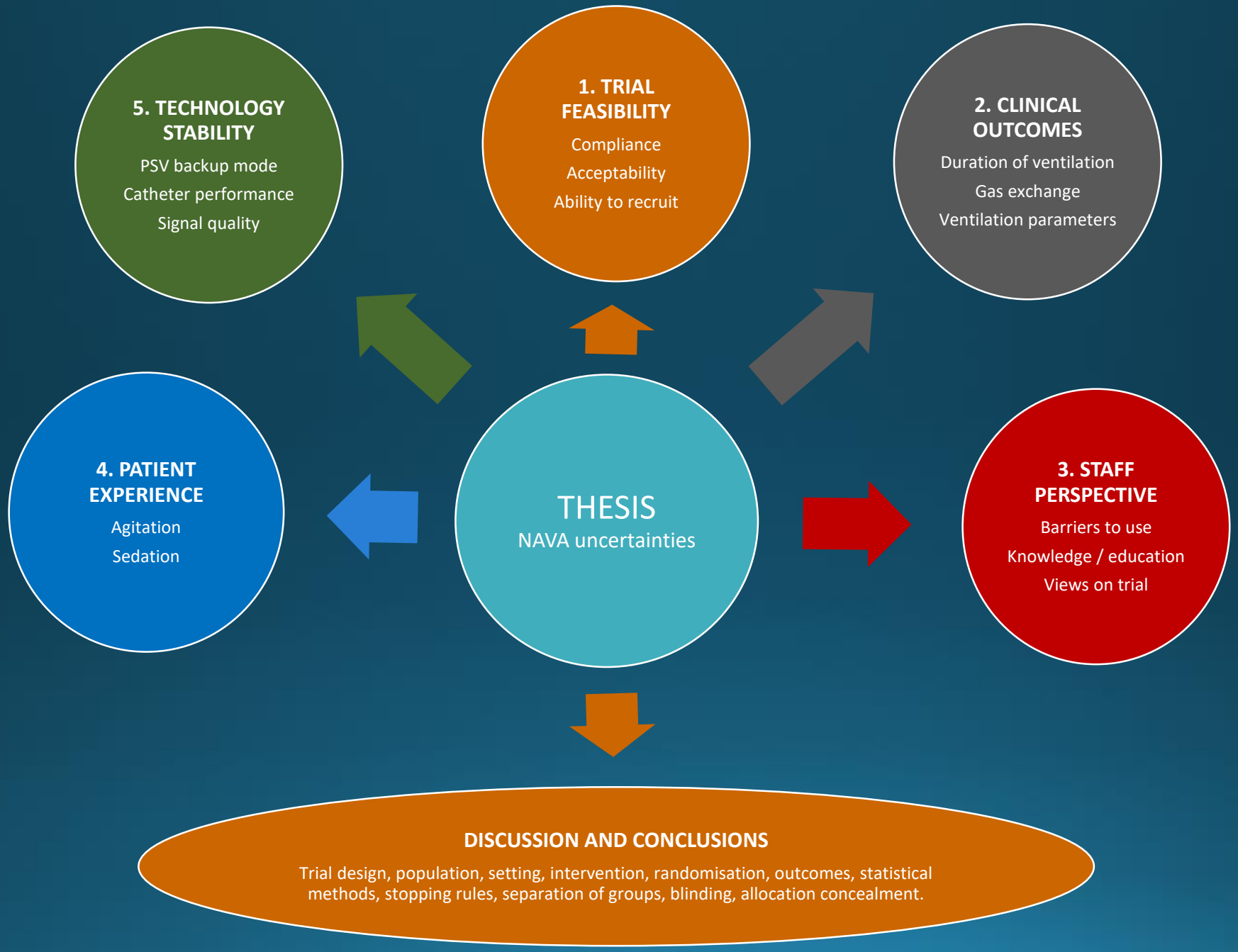
Study plan

- Question: Can we conduct a randomised controlled trial to assess the affect of NAVA on the duration of mechanical ventilation?
- Objectives: 1. To evaluate the feasibility of conducting a randomised controlled trial
  2. To evaluate the feasibility of using NAVA technology in PMV
- Design: Randomised controlled feasibility/pilot study
- Outcomes: Adherence to NAVA mode, reasons for non-compliance, recruitment rate, acceptability



RCT recruitment to 30/08/2017




5. TECHNOLOGY STABILITY
PSV backup mode
Catheter performance
Signal quality
1. TRIAL FEASIBILITY
Compliance
Acceptability
Ability to recruit
2. CLINICAL OUTCOMES
Duration of ventilation
Gas exchange
Ventilation parameters
4. PATIENT EXPERIENCE
Agitation
Sedation
THESIS
NAVA uncertainties
3. STAFF PERSPECTIVE
Barriers to use
Knowledge / education
Views on trial
DISCUSSION AND CONCLUSIONS
Trial design, population, setting, intervention, randomisation, outcomes, statistical methods, stopping rules, separation of groups, blinding, allocation concealment.

Thank you…

Acknowledgements

Dr Gerrard Rafferty
Dr Phil Hopkins
Prof Nicholas Hart
KCH ICU Research Team
KCL Muscle Lab

Please contact me if you have any questions:

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MINERVA ANESTESIOLOGICA

Minerva Anestesiologica 2013 Jul 01 [EPUB ahead of print]

Mechanical and electrical equipment interference provokes a misleading Neurally Adjusted Ventilatory Assist (NAVA) EAdi signal. A technical note

Somers Y., Verbrugghe W., Jorens P. G.

Antwerp University Hospital, University of Antwerp, Department of critical care medicine, Wilrijkstraat 10, B-2650 Edegem, Belgium

Conclusions:

NAVA is a safe and innovative mode of ventilation; however, our clinically relevant data demonstrate that interpretation of the EAdi signal necessitates not only correctly positioning the catheter near the crural diaphragm but also eliminating interference by other muscular activity and excluding the interference by other ICU equipment.