

SOAPBOX

Surrogate Of Adequate Perfusion: Bladder tissue Oxygen monitoring

First in-human study of novel device to aid early detection of poor perfusion

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BACKGROUND

The **main role of the circulation is to deliver oxygen to body tissues**. Inadequate oxygen delivery is a main cause of multi-organ failure and death. **Timely resuscitation of the circulation reduces these complications¹**, but the ability to detect poor perfusion is limited with current systems; **we rely on crude, non specific surrogates** – BP, urine output, cerebraation, lactate - which we **approximate to oxygen levels** in the tissues. Current technology gauges how much blood the heart pumps, but **we need better monitors** to assess if this is sufficient to meet the body's needs. We developed a bladder tissue oxygen sensor to continually measure the amount of oxygen in the bladder wall, reflecting the balance between oxygen supply and demand at the tissue level. Monitoring **bladder tissue oxygen tension (PtO₂)** may be able to detect early imbalances between oxygen supply and demand, with pre-clinical trials indicating it also reflects oxygen supply-demand balance in vital organs.

THE SOAPBOX CATHETER

RESEARCH QUESTION

What's the safety, reliability and diagnostic capability of the SOAPBOX Wellbeing Catheter with PtO₂ sensor

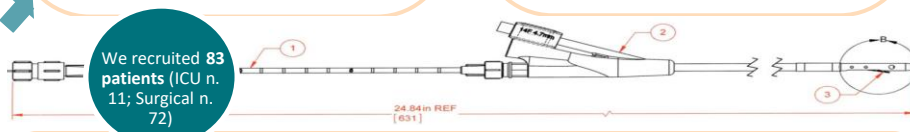
AIM

To evaluate the utility of bladder tissue oxygen monitoring as a marker of adequate perfusion

- TISSUE OXYGEN TENSION (PtO₂)
- DIAGNOSTIC CAPABILITY
- RELIABILITY
- SAFETY

THE DESIGN

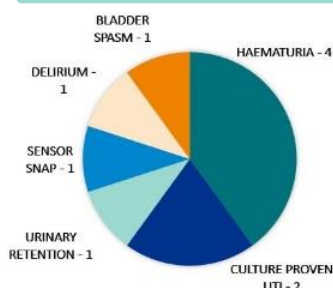
Every patient admitted to Critical Care or undergoes major surgery routinely has a urinary catheter placed; it's a ubiquitous, minimally invasive procedure *and* may offer an easily accessible means of achieving our aim. The Wellbeing Catheter is an adapted 3-way Foley catheter with an extra lumen housing a flexible, fibre-optic sensor that continuously monitors oxygen levels in the bladder wall. Participants were catheterised with the device and the PtO₂ continuously recorded. We also examined the relationship between PtO₂ and other indices and how they changed with oxygen challenges, fluids, and drug administration.



METHODS



RESULTS – IS IT SAFE?

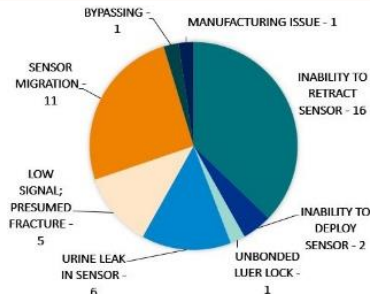


10 non-serious adverse events in total

- most were anticipated given the nature of the intervention

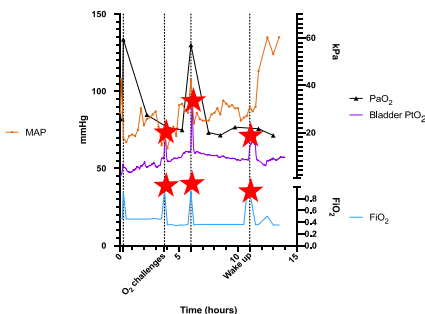
- similar to AE rates with other commonly used catheters

43 device deficiencies

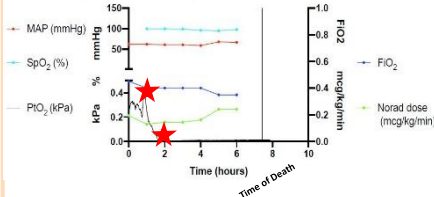


RESULTS – WHAT ARE ITS DIAGNOSTIC CAPABILITIES?

We performed an oxygen challenge test to assess the change in bladder oxygen levels when a patient is briefly given 100% oxygen.



Acute liver failure secondary to malignant infiltration: final hours.



PtO₂ was seen to decrease prior to serious deterioration in two patients; this decrease preceded any change to other routinely measured variables

DISCUSSION

For the **first time, we showed it's possible to measure bladder PtO₂** and that this reflects cardiovascular change

It's **safe and compares well** to other urinary catheters in terms of patient comfort

LIMITATIONS

Design limitations inhibit its use in its current form

Reliability of device was poor

CONCLUSION

We've taken these limitations on board and are now looking at **subcutaneous tissue monitoring as a more viable alternative**

For more information and contact details please use the QR code

