Royal Brompton and Harefield hospitals



#### **Focus on innovation:**

#### the latest heart and lung research at our hospitals

**Professor John Pepper** 

## Supporting global research efforts for Covid-19

As the world attempts to deal with the Covid-19 pandemic, clinicians and scientists around the world, including our own at the Trust, are working around the clock to find effective treatments.

Research forms the backbone of the work we do to provide the best possible specialist care for our patients, and in early March over 200 studies were taking place into cardiovascular and respiratory conditions, across Royal Brompton and Harefield hospitals. The majority of these have been put on hold to ensure the safety of patients and volunteers, and to free up staff to focus on Covid-19 research activity.



Several Covid-19 research studies have been approved and are actively recruiting across both hospitals. Some will be testing existing treatments that are already in use for other diseases, others will involve determining any genetic variation between patients and how this affects the development of the disease.

### Trust study shows inhaled nitric oxide may help patients with Covid-19 pneumonia

A <u>recently published study</u>, led by clinicians at Royal Brompton & Harefield NHS Foundation Trust, has shown that inhaled nitric oxide (iNO) given to patients with severe Covid-19 pneumonia, significantly improves oxygen levels.

The majority of patients admitted to intensive care with Covid-19 pneumonia require invasive mechanical ventilation. This is provided alongside ventilation strategies such as placing patients in the prone position (lying on chest), to help improve oxygen levels in the body. However, for some patients with severe Covid-19 pneumonia the usual ventilation strategies do not improve oxygen levels, which led the team to look at how the use of iNO may have helped.



The study, the largest of its kind worldwide, was led at by <u>Dr Laura Price</u>, consultant physician for pulmonary hypertension, and by Dr Benjamin Garfield, consultant in critical care.

#### **Covid-19 and blood clotting**

#### **Trust researchers at forefront of COVID-19 research**

#### 17 May 2020

Specialists at Royal Brompton Hospital's severe respiratory failure service have established a clear link between Covid-19 and blood clotting, by using hi-tech CT scans to take images of lung function in patients most seriously affected by the disease. All of those tested suffered a lack of blood flow, suggesting clotting within the small vessels in the lung.

"It's an unprecedented amount of collaboration and development of a really quite extraordinary story about a virus that we hitherto knew nothing," said Prof Openshaw, a member of the Sage sub-group on clinical information. All the time we are discovering new twists and this intravascular clotting is a really nasty twist that we haven't seen before with many other viruses."

# Covid-19 Ventilator project

- Domiciliary ventilators/CPAP vent O<sub>2</sub> delivered during the expiratory phase to atmosphere
- How to capture and redistribute this 'wasted' oxygen to patients during the expiration phase.
- The team designed and produced an inlet adapter (pictured below), using 3D printing, that would form the basis for new apparatus applied to two commonly available devices for home ventilation.





# Covid-19 Ventilator project

• The findings showed that the modified ventilators were able to successfully capture the oxygen released in the expiration phase that would have otherwise been discarded. As a result, the ventilators then delivered a higher fraction of inspired oxygen (FiO2) – or oxygen-enriched air – compared with the standard use of the devices.



Measured inspired FiO2 as a function of wall oxygen flow rate with vivo two in timed+target volume mode at EPAP 10 cm H2O and an IPAP permitted between 20 and 30 cm H2O at 40 bpm, with Ti 0.7 s. The prescribed target volume was 1000 mL but at this respiratory rate, typical tidal volume was ~800 mL and measured VE 32 L/min, in the normal use (dashed line) and with our modification (solid line). Calculated ideal data (assuming no leak and no dead space/rebreathing) from an intensive care ventilator are shown in grey. EPAP, expiratory positive airway pressure; IPAP, inspiratory positive airway pressure; LPM, litres per minute.

#### **Research at the Trust during Covid-19**



### **Highlights from 2020**

- Covid-19 200 active studies
- Contribution to Covid-19 (UHP)
- Nature of link between Covid-19 and blood clotting
- Increasing O2 supply by a "simple" innovation to ventilators
- Inhaled NO helps patients with Covid-19
- Link between blood vessel disease and Covid-19

#### **CILIA AND ARRYTHMIAS**

#### Research photo competition



#### **Non-Covid research**

- Freezing lung procedure improves symptoms in Chronic bronchitis: Pallav Shah
- App to monitor hearing loss in cystic fibrosis
- Pills as good as interventional procedures in some types of coronary heart disease: Roxy Senior
- Heart rhythm problems (AF) can be treated effectively by ablation: Tom Wong



# Round 1 awardees (2019/20)

Suhani Patel (Top Left)

 Clinical Doctoral Research Fellowship (CDRF) which started in September 2020 - £317k award

Louise Moss (Bottom Left)

 Planning to submit externally funded PhD award on return and completion of project

#### Lisa Nwankwo

 Data generated from the study is forming the basis of Lisa's NIHR Doctoral Research Fellowship (DRF) application due for Jan 2021. The DRF vs CDRF is open to all healthcare professionals hence extremely competitive

# Round 2 awardees (2020/21)



**Charlotte Wells** *Physiotherapist* 

Researching new and different ways of providing physiotherapy services for children with asthma **Timothy Jenkins** Senior physiotherapist

Research on the impact of muscle wasting in patients in intensive care.





**Thomas Burgoyne** Senior paediatric scientist

Research will be looking at the latest machine learning (artificial intelligence) to help diagnose Primary Ciliary Dyskinesia (PCD). Ali Nuh Senior biomedical scientist

Research to determine whether Aspergillus can be diagnosed from sputum samples, instead of the more invasive BAL sample



#### **Clinical Research** Fellowships

- Dr Yu Zhu "Hemodynamic factors associated with progressive aortic dilatation following type A aortic dissection surgical repair"
- Producing data to support a fellowship application to be submitted in April 2021
- Dr Yu Zhu's project will help us to decide what size of operation should be done as an emergency when the patient presents in a cardiac surgery unit



#### **Biomedical Research Centre Preparation**

- Shadow Respiratory theme established with Imperial College London and Imperial College Health Care NHS Trust in November 2019
- Funding has been pooled from all parties to contribute to fund projects which would help form the basis of the BRC application.
- Over 15 projects have been funded across partner organisations in support of this goal
  - Project round 1 Awarded 2019-20 (details here)
  - Project round 2 Awarded August 2020 (details to be published shortly)
  - Project round 3 Advanced therapies (to be awarded Dec 2020)

#### **Covid-19 Award Extensions**

- Many research staff were redeployed during COVID
- As such they could not work on their research projects thus impacting the delivery of their projects:
  - Change in patient pathways
  - Loss of follow-up/ primary end-point data
  - Reduced recruitment rates
  - COVID Restrictions preventing research activity
- In the first instance funded extensions have been applied for, this small fund provides an alternative means of funding this activity.
- Once outcome of funded extension requests is known this funding will be allocated

## **The future: 2021/22**

- Merger February 2021
- Strategic reviews of individual business areas to be undertaken 6-12 months post merger.
- This is likely to include a full review of system; structures; needs to define any strategy as we move forward as part of GSTT.
- R&D is planning 2021/22 as a transition year to undertake the associated reviews and continue in line with our current plans

#### Summary and key changes

Non-Medical research career pathway:

It has proved difficult nationally to establish a research career pathway for this staffing group. Those organisations with the most success have implemented joint clinical research appointments as a means to pilot this approach. The intention of this funding is to pilot potential approaches to address this e.g. joint clinical and research appointments at varying levels and well as materials to support those wishing to progress with a career in research

# **Biomedical Research Centre** (BRC)funding:

As a result of COVID the original BRC submission date has been pushed back from early 2021 to early 2022. This delay means there is an opportunity to continue to refine and develop our BRC application and explore any potential collaboration opportunities with GSTT.

A flexible fund will allow us to invest in programmes of work with the intention of accessing funding via the relevant BRC programme.

#### **AWARDS: Preclinical academic fellowships (PCAF)**

- **5** PCAF awards to Trust staff: 25% of all PCAFs in London and 10% in UK
- 4 staff received funding from the RBHT Charity
- Sandra Scott and Adult ICU team: NWL Clinical Research Network recognized "outstanding research"

#### International Women's Day March 2020

The following were recognized for their outstanding contribution to research:



Professor Claire Hogg, Alla Kashif, Geraldine Sloane, Dr Venella Boyalla, Dr Claire Nolan

#### Research Showcase December 2020 (15<sup>th</sup> year)

- Most innovative
- Greatest patient impact
- Early career researcher
- Director's Choice Award
- Staff Favourite

# How we share our research with patients and the public

- News stories via the hospital website
  - www.rbht.nhs.uk/research/research-news-and-events
- Twitter
  - @RBandH
- Research digital newsletter
  - a quarterly e-newsletter produced by the research office which anyone can sign up to (email <u>research-findoutmore@rbht.nhs.uk</u>)
- Connect: Trust Members' monthly digital newsletter
  - research updates and news stories
- Public events
  - Café Scientifique (informal setting where a researcher shares their research)
  - Research Open Day (annual event open to all where researchers share their work)
  - Podcasts interview style discussions with researchers (SoundCloud, YouTube)
  - Academic Health Sciences Centre seminars (offered jointly with ICL, ICH and Royal Marsden)

#### How we share research with our staff

#### Staff newsletter



#### Twitter

Royal Brompton and Harefield @RBandH

#### Screensaver

1000





Find out how research is changing patient care...

Royal Brompton & Harefield

1000 C



Royal Brompton & Harefield



#### How we share research with our staff (cont.)

Cross site updates



Prof. Michael Polkey – Consultant in Respiratory Medicine

### **Covid-19 research news**

- https://www.rbht.nhs.uk/news/simple-innovation-ventilators-could-increase-oxygen-supplies-hospitals
- <u>https://www.rbht.nhs.uk/research/trust-study-shows-inhaled-nitric-oxide-may-help-patients-covid-19-pneumonia</u>
- <u>https://www.rbht.nhs.uk/research/impact-covid-19-interview-dr-john-wort</u>
- <u>https://www.rbht.nhs.uk/news/trust-research-shows-link-between-blood-vessel-disease-and-severe-covid-19-0</u>
- <u>https://www.rbht.nhs.uk/news/trust-researchers-forefront-covid-19-research</u>
- <u>https://www.rbht.nhs.uk/supporting-global-research-efforts-for-covid-19</u>

Thank you

**Any Questions?**