Impact of Robotic Surgery on Data-driven care delivery

Mr. Rajesh Sivaprakasam FRCS

Robotic Renal Failure Surgeon and Med.Entrepreneur

Bartshealth NHS trust. London. UK

NHS
Barts Health
NHS Trust

Positions

Consultant Robotic Renal Failure Surgeon, Lead for Robotic Renal Failure Surgery, Research and Education

Educator & Mentor - Year-5, Queen Mary University of London & Surgical Trainees

Examiner & Director - Royal College of Surgeons (Intercollegiate)

Ambassador for Patient charities and groups

Member of All Party Parliamentary group for health equality

Enable integration of innovation-based solutions into care delivery

Advisory Board for Healthcare technology companies

Our projects

Hardware

Alio Smart Patch for remote renal care (CI)

Point of care ultrasound (CI)

ACCESS- 2 Sirolimus Patch (CI)

Enhance Robotic & Micro-surgical training (CI)

Software

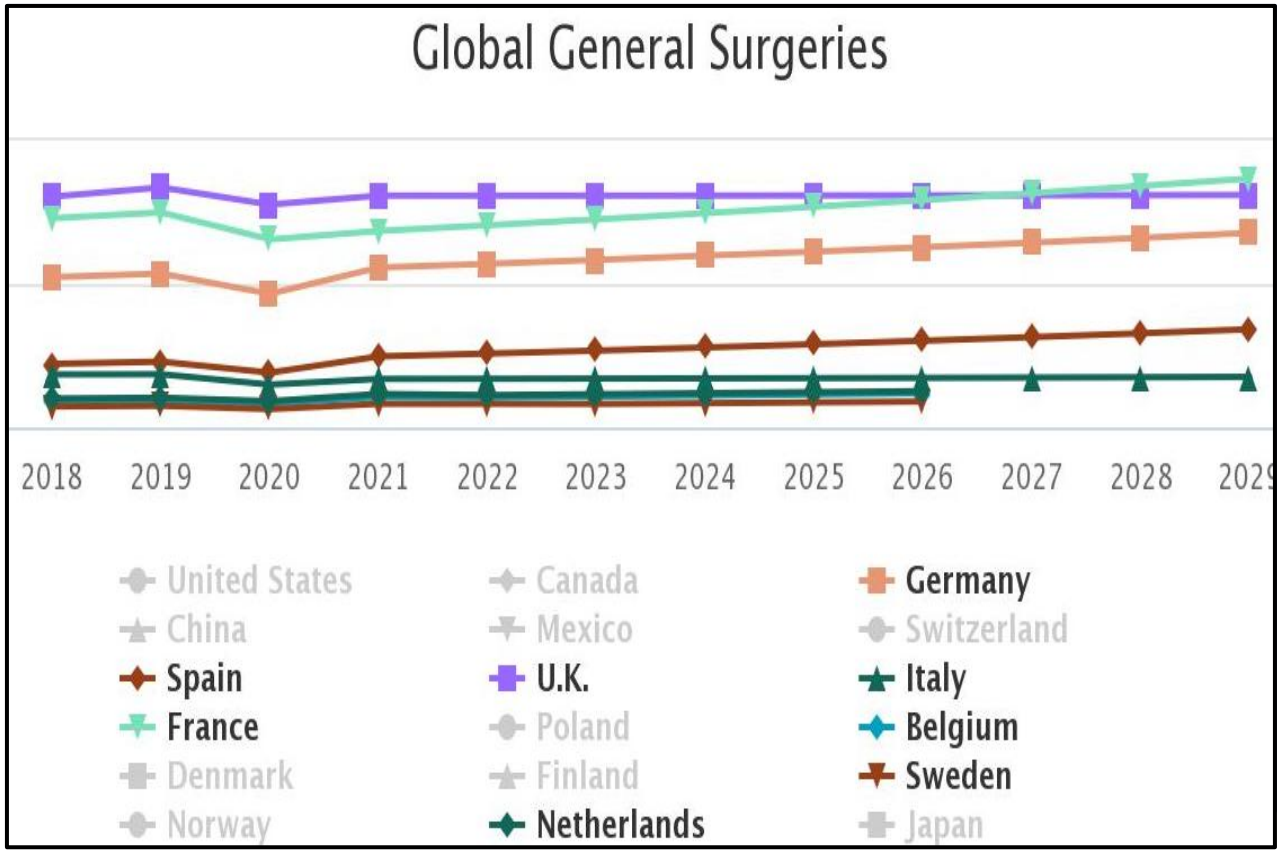
Siri/Alexa for Renal failure (PI)

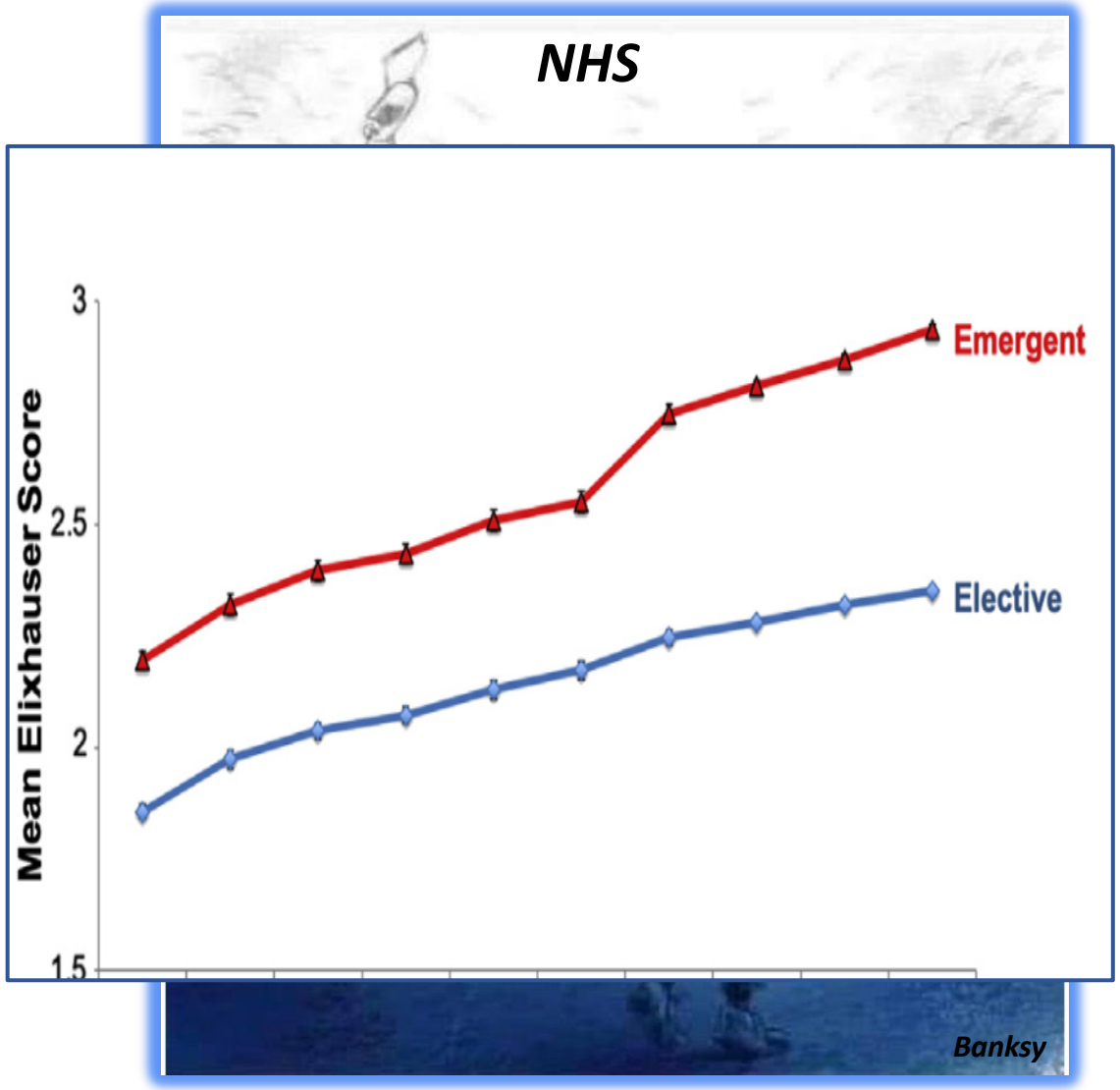
VR/Metaverse-based Staff & Patient Education (PI)

Enhanced Teleconsultation (CI)

i-BOX : Kidney transplant follow-up (PI)

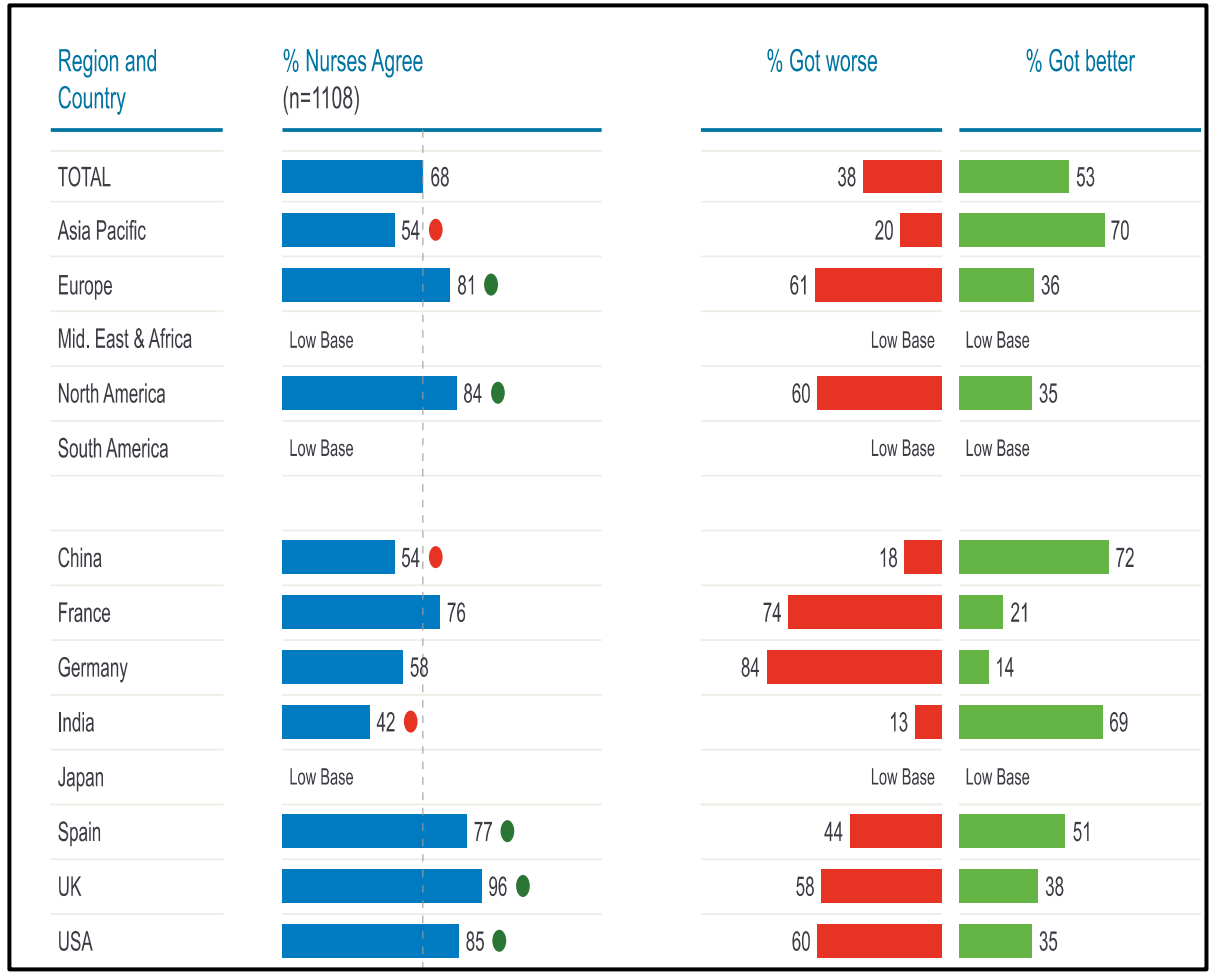
How are we ?


Global General Surgeries
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
United States
Canada
Germany
China
Mexico
Switzerland
Spain
U.K.
Italy
France
Poland
Belgium
Denmark
Finland
Sweden
Norway
Netherlands
Japan


NHS
Mean Elixhauser Score
3
2.5
2
1.5
Emergent
Elective
Banksy

Changing roles

Nurses



Doctors

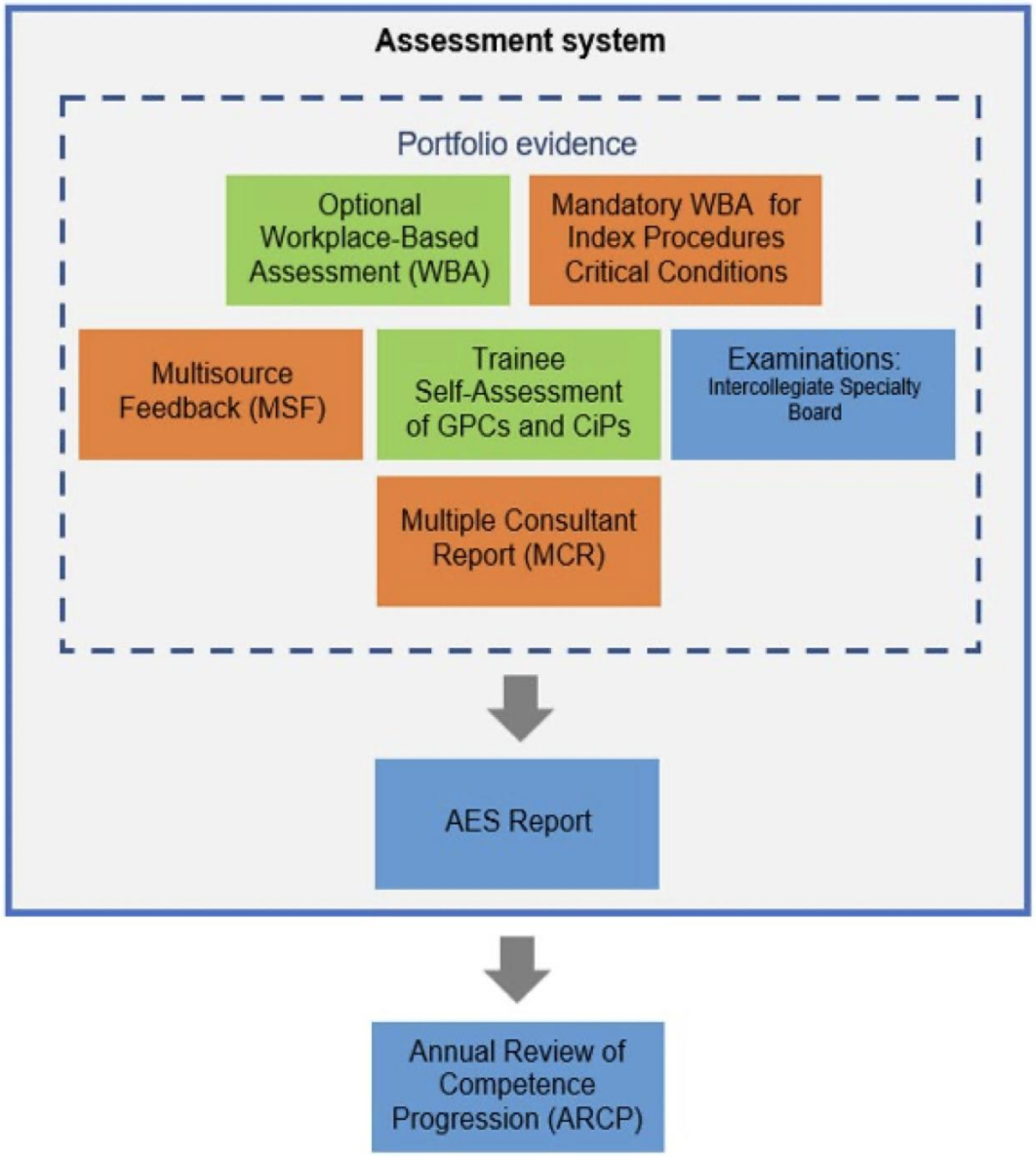
Training – Present status

Strengths

- Structured
- Well-organised
- Approved assessment process
- A national approach
- Easy to benchmark

Challenges

- Single time point assessment
- Number based & Time-consuming
- Mostly Subjective
- Less focus on wellbeing



Care delivery

- Broad target led
- Mostly static than agile
- Limited Recognition of the need and opportunity of data-driven measures
- Lack of continuity and less inclusive

Robotic Surgery

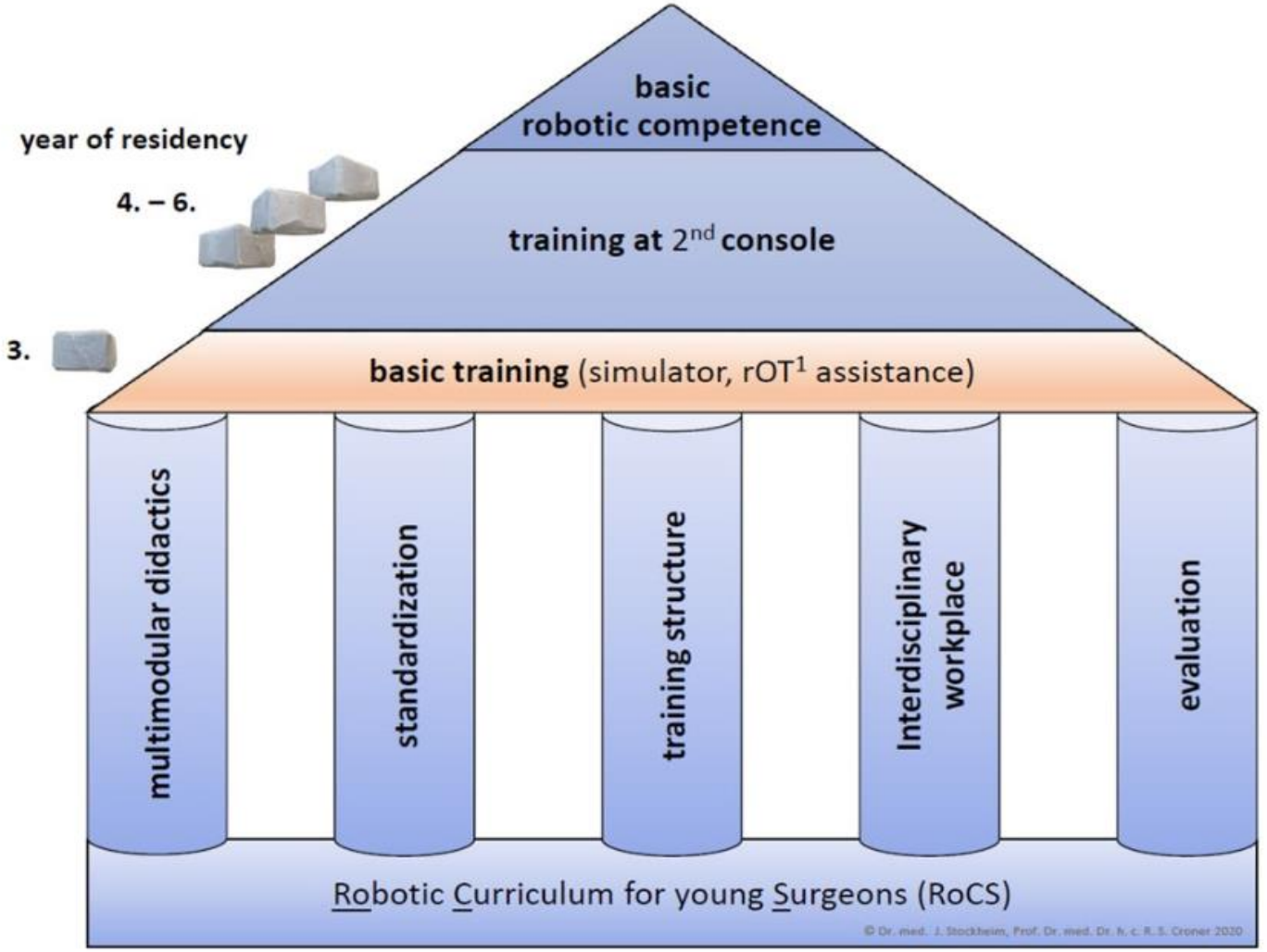
Staff competency

Technical skills
Soft skills

Progression

Organisation

Patient safety
Scheduling
Theatre efficiency
Human factors



Bartshealth Multispeciality Robotic Programme

- 4.5 years old
- Seven teams
- Gynaecology, Urology, thoracic, Colo-rectal, HPB, ENT and Transplant.
- Developed many combined surgical care delivery models

- Clinical
- Research & Innovation
- Training
- Efficiency

The need

Recognise

Understand

Enhance

Integrate & Future proof

Dynamic Patient care

Old world
Current monitoring

All-in-one, noninvasive, clinical grade, RPM

★ FDA Cleared*

- Heart rate (BPM)
- Skin temperature (°C/°F)
- Auscultation
- Hemoglobin (g/dl)
- Hematocrit (%)
- Potassium Indicator – World's frist

Detects AVF/G

Flow rates (< 1L/min)- 100% sensitivity & 75% specificity.

Stenosis (>50%) - 100% sensitivity & specificity.

Robot assisted surgery- refine surgical training

Data collected:

Patient demographics, BMI, Previous surgery, Complexity of the procedure, Duration of the procedure ,30 days outcome following surgery

Use of device:

Setting up - Time to set & dock the device

Ease of use - Duration of surgery & time to undock

Team training

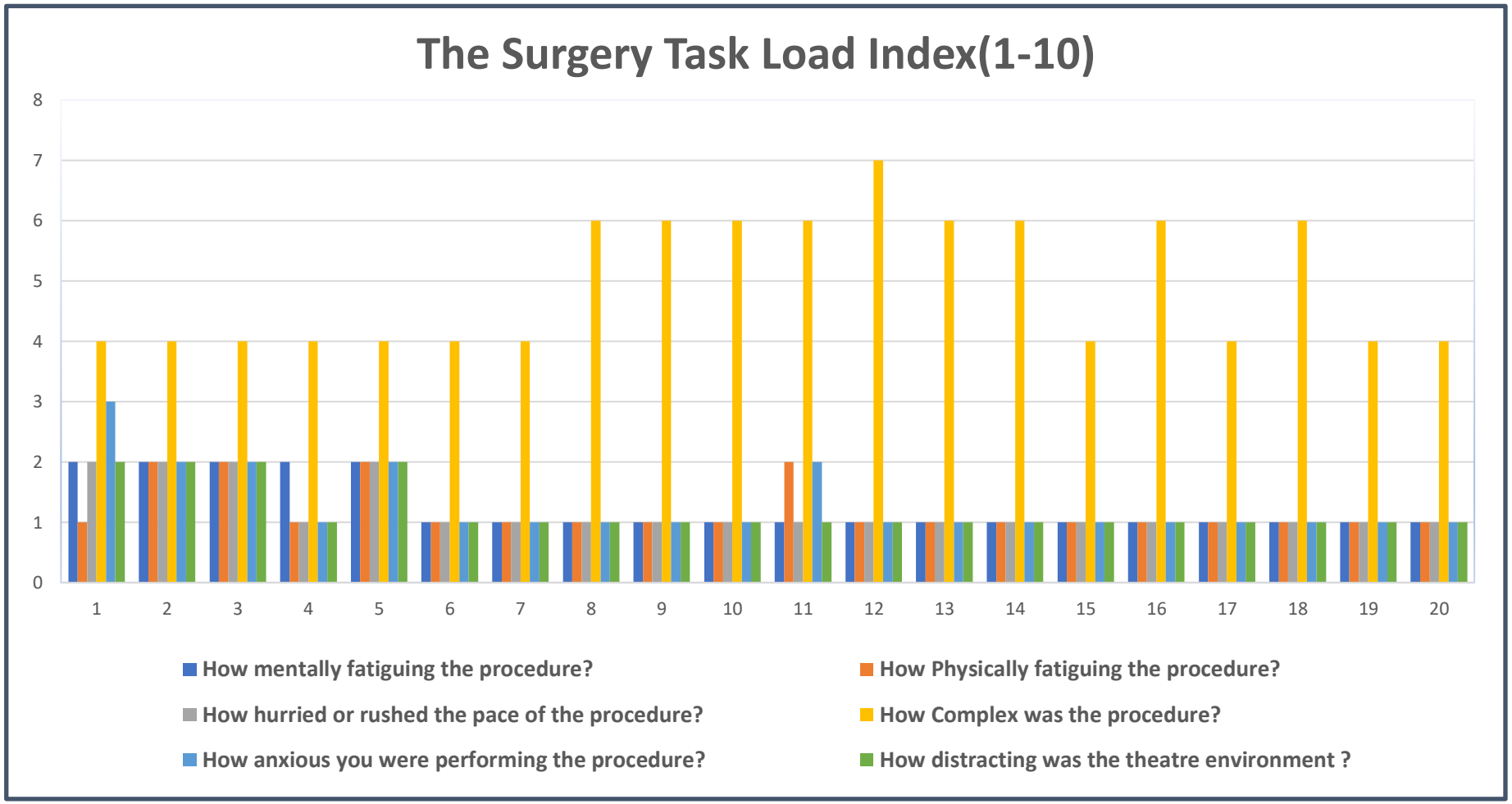
Impact of the device on the surgeon was measured using *The Surgery Task Load Index (Low to high)*

Results

Use of the device	With Freehand assist	With Surgical assistant
Setting up **Time to set (mean)**	3.5 minutes	2.5 minutes
Time to dock (mean)	2.6 minutes	1.8 minutes
Ease of use **Time to undock (mean)**	14.5 minutes	21.5 minutes
Duration of Surgery	20.6 minutes	25.8 minutes
Total duration of procedure	24.5 minutes	31.5 minutes

Despite the need for setting up the device, the **total operating time is shorter.**

Results - Impact of the device on the Surgeon



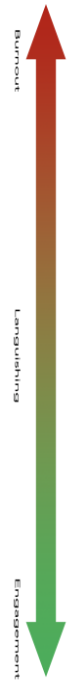
With <u>three exercises</u> with this robot (single arm) all team members were proficient to use the device.

Wellness - pilot work (non-invasive)

Tests			
Heart rate & HRV			
Respiratory rate			
Pulse-Resp Quotient	4-5 (normal)		
Stress Level (Beversky index)	low, normal, mild, high, very high		
Response to stress	Low	Normal	High
Recovery ability	Low	Normal	High

Overall score

1 Bad
2
3
4
5
6
7
8
9
10 Good



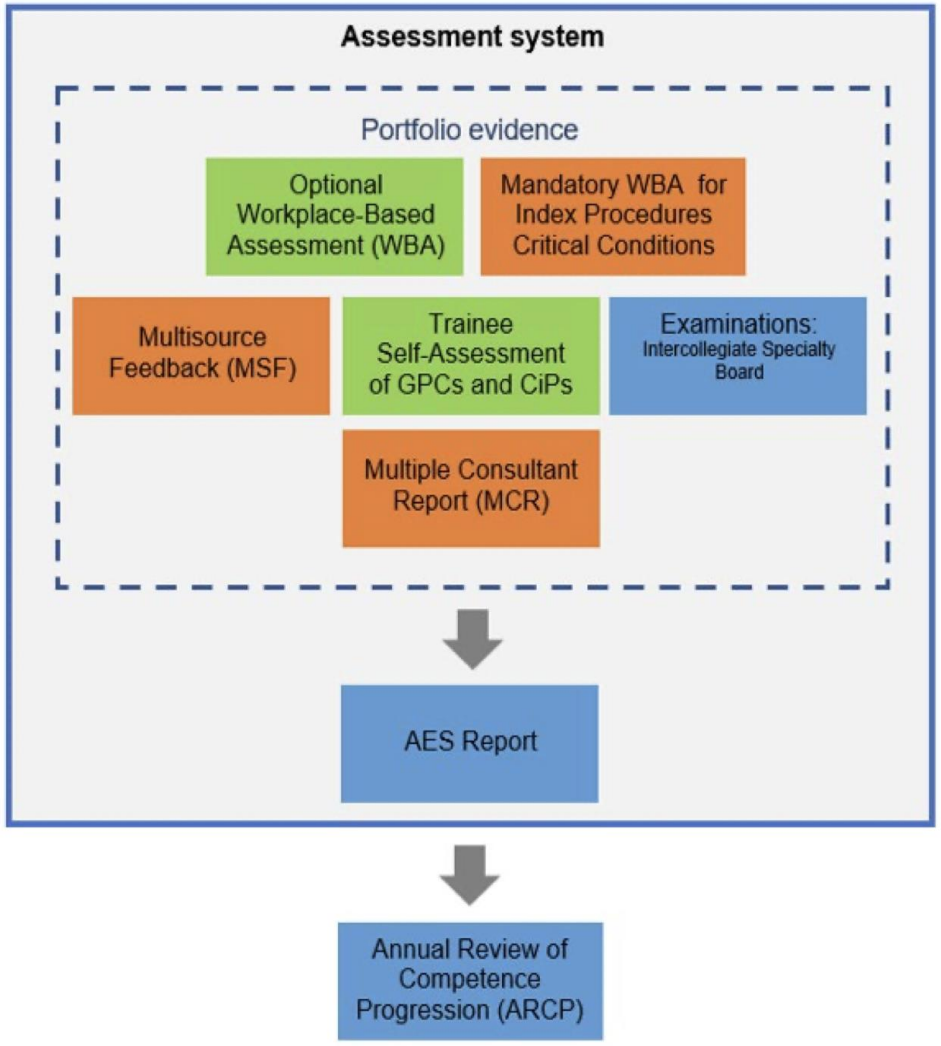
Samples –Renal Transplant

Overall score	**7**	**7**	**6**
Tests			
Heart rate	73	86	82
Respiratory rate	14	17	18
Pulse-Resp Quotient	4	5	5
Stress Level (Beversky index)	Low	Normal	Normal
Stress response	Normal	Normal	High
Recovery ability	Normal	High	Low
	Supervising	**Tx at 02:00am**	**With a new team**

Samples : non-surgical

Overall score	**7**	**7**	**8**
Tests			
Heart rate	73	86	82
Respiratory rate	14	17	18
Pulse-Resp Quotient	4	5	5
Stress Level (Beversky index)	Low	Normal	Low
Stress response	Normal	Normal	Low
Recovery ability	Normal	High	Low
	MDT	**Feedback**	**Team Dinner**

Refined Surgical training



urses, exams

sments, courses, Digitally aided feedbacks etc.

human factors, team management, Well being etc.

Inclusive

Objective

Targeted

Benchmark against themselves and peers

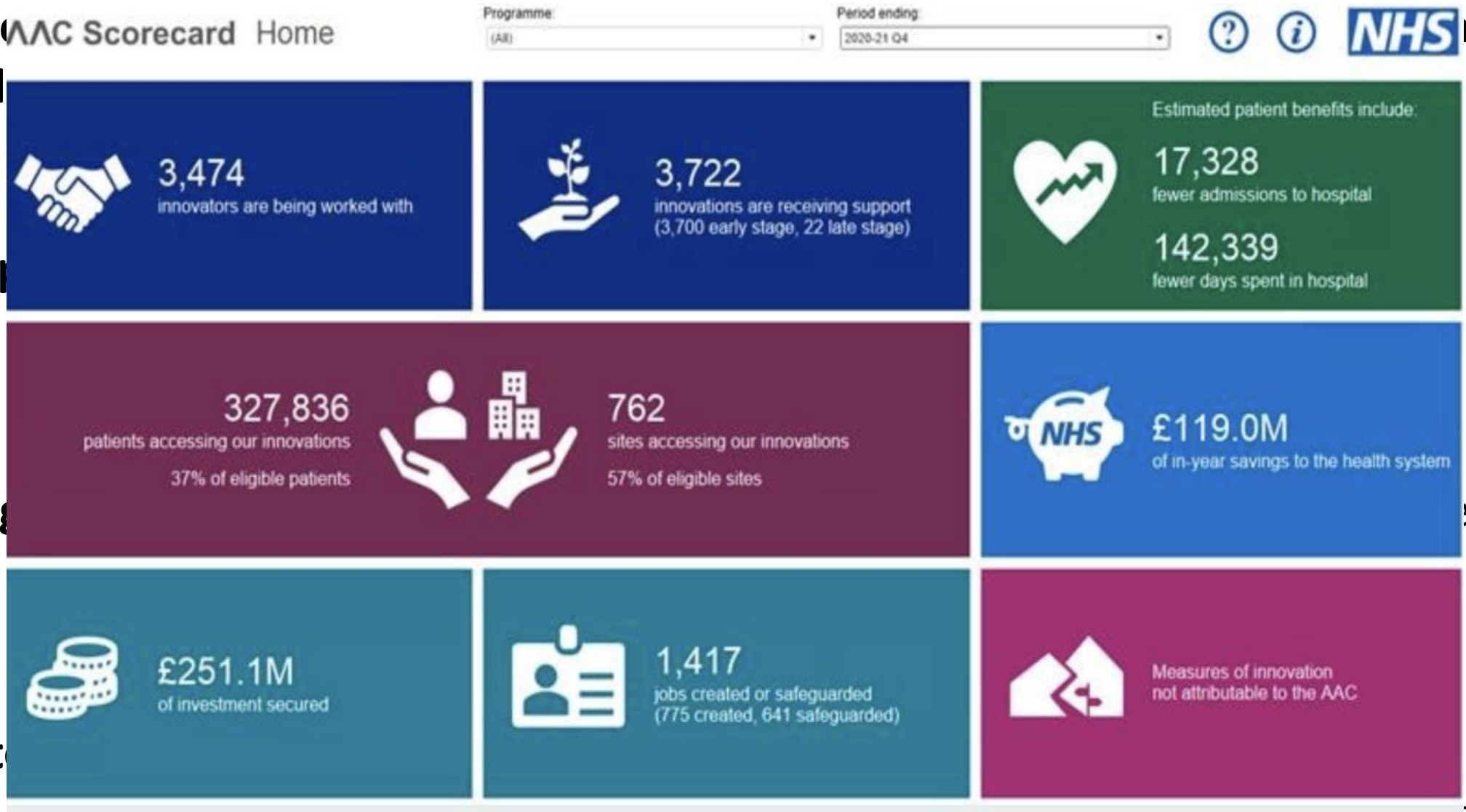
Governance and Integration

Re **nd**
sol

Su **hnology**

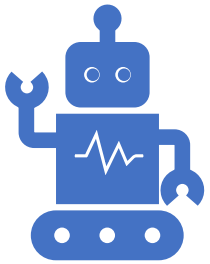
Reg **eport and**

Int

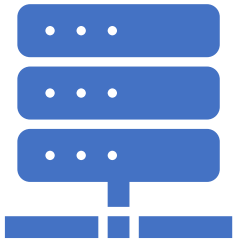


(COVID tracing app, Portus AI-GOSH, Virtual ward-Tavistock & portman Trust etc)

Summary



Robot assisted surgery is transforming patient care, training and operational performance.



Facilitates Integration & delivery of a data-driven service.

Improves engagement patients & all stakeholders towards technology inclusive clinical care.