The proven dimension in remote patient assessment
in the critical weeks after orthopaedic surgery

Product Description
Introduction

The NHS is under significant pressure from central and devolved governments to improve efficiency and productivity, empower patients to shape and manage their own health and care and to improve health outcomes.

The number one priority of the NHS' 10 Point Efficiency Plan is to free up between 2,000 and 3,000 hospital beds by accelerating the discharge of patients who are otherwise fit and whose care would more appropriately be delivered in other settings. With around 200,000 hip and knee replacement procedures performed annually in the UK and demand set to rise due to lengthening life expectancy and growing obesity rates, any reduction in the typical in-stay duration of 2-4 days would have a significant, positive impact on NHS efficiency and productivity.

Enhanced recovery programmes are, however, leading a paradigm shift in the post-operative physical rehabilitation of orthopaedic patients. With BPMpathway, patients can be discharged as early as the day of their surgery with the confidence to continue their rehabilitation at home under self-direction, with clinicians remotely assessing their recovery. This has the potential to improve patient flow, freeing up beds by reducing the length of a patient’s hospital stay and cost to as little as a single day. Furthermore, there is the additional benefit of minimising patients’ exposure to the additional complication of hospital-acquired infections.

BPMpathway is a cost-effective remote patient assessment platform that supports orthopaedic patients through their preparation for surgery at enhanced recovery joint schools, during the acute hospital phase and crucially supports them throughout their rehabilitation, whilst at the same time providing clinicians with the vital data needed to assess their on-going recovery progress.

‘BPMpathway could be a way of taking pressure away from the NHS and have a massive impact on physiotherapy demands as well’

Mr. Balasundarm Ramesh, Consultant Orthopaedic Surgeon & Clinical Lead, NHS Wales Glan Clwyd Hospital

Why BPMpathway?

BPMpathway uniquely offers cost-effective, reliable and patented award-winning technology in support of remote patient assessment undertaken by clinicians:

- Reliable - certified CE Class 1 Medical Device, FDA listed, piloted across the NHS since 2016 and tested to EN 60601-1
- Validated against the OrthoPilot® - the gold standard in orthopaedic measurement - and the BIOPAC twin-axis digital goniometer
- Patented - IP protected by multiple international patent applications granted and pending
- Award-winning technology named winner of the Best Digital Health Platform Award 2018
- Cost-effective deployment using a low-cost, single-patient, disposable sensor
- In partnership with B. Braun, one of the world’s leading manufacturers of medical devices

No other remote patient assessment system has the same credentials as BPMpathway – the original remote patient assessment platform for patient-centric enhanced rehabilitation.

How BPMpathway works

Before a patient leaves hospital or during the pre-operative period, the clinician uses BPMpathway to create a personalised post-operative support programme to meet the patient’s individual needs, which they can undertake in the comfort of their own home. The programme is a combination of tests to determine pain, range and quality of motion and physiotherapy exercises to help with rehabilitation.

During a test, a sensor worn on the limb under test streams data to the BPMpathway app on the patient’s tablet displaying the results on a live animated avatar, recording them for immediate on-screen graphical comparison. The data is also simultaneously transmitted automatically via the Cloud to the clinician to review progress and recovery trends.

Easy-to-understand instructions and test set-up and exercise videos help the patient with their programme as the software progresses them through a defined path of what they need to do throughout the rehabilitation process. The patient-centric system is simple to use without any connection cables or needing to be connected to a TV.

Advanced mathematics enable the use of a single sensor with a simple strap attachment and compensate for slight placement inaccuracies. The patient UI has been designed to be highly-intuitive and includes instruction videos, automated test start/stop and pain reporting.
BPMpathway - Credentials

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Reliable

For any remote assessment tool to work, clinicians must be able to trust the data upon which they base their decisions. This data has to be accurate, repeatable and timely, gathered in a manner that is simple and requires no technical expertise on the part of the patient. It is self-evident that important care decisions can only be made based on the output of a medical-grade device, subjected to rigorous, clinical validation.

BPMpathway is uniquely qualified as being:

- Certified as a CE Class 1 Medical Device, FDA listed and tested to EN 60601-1
- Manufactured to ISO 13485:2016 medical standards
- Validated against the OrthoPilot® - the gold standard in orthopaedic measurement - and the BIOPAC twin-axis digital goniometer
- Piloted across the NHS since 2016

In order to undertake a fully-informed assessment of patient progress or otherwise, clinicians cannot rely solely on single data point, but rather requires a combination of data sets and trend information. BPMpathway is the only remote assessment platform to gather the following comprehensive progress data covering:

- **Range of Motion (ROM):** Deterioration in ROM can be indicative of an emerging issue requiring intervention to prevent escalation and readmission.

- **Quality of Motion (QoM):** Gives feedback on the fitness of a joint and neuromuscular coordination, important where ROM is apparently unchanged, but, in reality, joint fitness is actually improving.

- **Patient Incident Points (PIPs):** During a test, the patient can mark pain points which are recorded against the test data sent to their clinician to inform where in their ROM pain is occurring. This capability is unique to BPMpathway and patented in the UK ref. GB 2551238.

- **Pain scores:** After doing their tests, the patient records a Wong Baker FACES® pain score, providing the clinician with important PROMS reference data.

Patented

BPMpathway technology is protected by UK patent 'Mapping the trajectory of a part of the anatomy of the human or animal body' ref. GB 2530754 granted in May 2017, with over 40 unique claims relating to the measurement of the human body. International patents are pending in the US, Japan and EU. A second UK patent ‘Mapping trajectories of the anatomy of the human or animal body for comparative analysis’ ref. GB 2551238 was granted in March 2019 with international patents also pending.

A further six patents granted or pending, including the Spinal Module UK patent application no. 1704825.7 filed in March 2017 and covering differential movement analysis, are being progressed.

Award-winning

BPMpathway was named as winner of the Digital Health – Best Platform Award at the 2018 Juniper Research Future Digital Awards for Innovation and Commerce.

The awards honour companies at the forefront of new developments across an array of leading technological categories believed to have made outstanding contributions to their sector year and poised to make a considerable market impact. Previous winners include Microsoft, Google and IBM.

Cost-effective

BPMpathway requires little upfront investment other than the cost of providing each patient with a BPMpro sensor.

Thanks to world-class engineering and high-volume production techniques, the sensor has been developed as a low-cost, single-patient, disposable device. The fact that BPMpathway software runs on over 6,500 different tablets and laptops means that it can be easily downloaded free of charge onto the patients’ own Android and Apple devices. Operating costs are further controlled through the servers, upon which the platform runs, achieving the highest levels of data efficiency available.

This combination of low sensor cost and pathway efficiency not only reduces the initial platform deployment cost, but the opportunity afforded by BPMpathway to reduce in-stay time, costs and readmission rates and to eliminate unnecessary physiotherapy and consultation sessions also suggests that the potential ROI could be substantial.

In partnership with B. Braun

One of the world’s leading manufacturers of medical devices, B. Braun, have invested in BPMpathway as part of their strategy of securing access to key future technology.

Their TOTAL pathway concept analyses, assesses and reshapes clinical processes and delivers tailored solutions for the critical phases prior to, during and after the surgery. It is intended to accelerate and enhance patient recovery, and simultaneously reduce costs and enhance efficiency for the care providers. From the initial patient consultation to rehabilitation, it provides progress in patient safety, process workflow, patient satisfaction and health outcomes.

BPMpathway forms an integral part of the TOTAL pathway concept and is being sold worldwide by B. Braun.
Key Features & Benefits

BPMpathway is designed to address the needs of both the clinician and patient with their different, but congruent goals, through two separate, distinct interfaces.

Via the Professional UI, the clinician has an overview of their patients and individual programmes. The professional software is designed not only to provide the clinician with a means of designing a personalised rehabilitation programme for their patient, but also to assess the patient’s on-going recovery progress against it, adjusting their rehabilitation routine if appropriate.

The Patient UI has been designed with ease of use in mind to encourage patient engagement by clearly explaining what has to be done at each stage of their recovery, which is especially important in providing reassurance during the first few days post-surgery. All the patient sees are the tests and exercises accompanied by instruction videos that they have to do as they are gently progressed through their programme with ever-increasing phased test targets as they achieve their goals. After they complete their daily routine, they are presented with a clear depiction of their progress and recovery trends and receive a message of encouragement associated with the phase achieved.

A two-way messaging system means that patients can stay in touch with their medical team throughout the recovery period. This constitutes a reassuring communication link for patients who find themselves in an unfamiliar situation, unsure about what to expect. Should they have any questions or concerns, they can simply send a message from the software, just like an SMS. Patients, and their families alike, are encouraged to know that they are making progress and reassured by the fact that they can communicate directly with their clinician.

Patient motivation has frequently been cited as being of key importance to the post-surgical rehabilitation process. BPMpathway has been developed to empower patients to take an actively role in their rehabilitation and has been specifically designed around the patient experience to make it quick and easy to use, wherever and whenever they want.

An NHS study showed that patients using the technology exhibited heightened engagement with their rehabilitation, often continuing beyond the normal 12-week period, and were keen to engage with the intuitive, easy to understand technology and fascinated by the clear visualisation of their recovery. This increased engagement encourages patients to complete their rehabilitation programme, another key factor in reducing readmission rates, improved health outcomes and can contribute to an improvement in PROMS scores.

To save time, BPMpathway enables the clinician to set up Default Programmes – pre-populated tests, limits and exercises by joint. This eliminates the need to create tailored programmes for each individual patient and makes patient set-up swift and simple. To ensure that a programme still meets the patient’s specific needs, however, they can be assigned a Default Programme, which can then be modified as required.

Phasing - For each test, the clinician specifies a comfortable starting position, a start target ROM, an end target ROM and a number of phases. The targets the patient sees are gradually, systematically increased upon successful completion of phases. For each phase, a message of encouragement can be included. Once the patient completes all the phases in a test, they are automatically progressed onto their next test and accompanying exercises, if they have one assigned.

Alerts appear against patients who have failed to progress through their programme or have repeatedly missed tests, thereby highlighting those potentially struggling with their recovery. The clinician can then investigate and establish whether they need to be prioritised for outpatient support.

Prioritisation of post-operative resources - The approach adopted by many hospitals is to provide all orthopaedic patients with the same post-operative support package, but like any other area of healthcare, the resources to support this care pathway are under intense pressure and need to be prioritised. Should the clinician decide that a patient is progressing well at home based on the data gathered by BPMpathway, they may elect to spare them an unnecessary trip to hospital, thereby freeing up resources that would otherwise have been allocated to them to other patients who need them more.

Identification of potential issues - The first outpatient appointment to check on progress post-discharge is typically 4-6 weeks following surgery. During this initial phase of their recovery, potential complications may go unnoticed by the patient, resulting in the risk of further hospitalisation and surgery.

The clinician reviews the progress data through multiple methods of data visualisation, graphical and tabular, to assess how the patient is recovering. Supported by BPMpathway, the clinician can identify subtle deterioration in the comprehensive progress data, which the patient might otherwise dismiss as a blip, but may be indicative of a developing issue that requires intervention. Similarly, an escalation in reported pain would alert the clinician to an area for concern. Swiftly identifying and dealing with such matters can avoid escalation to the point of further surgical intervention, with all the costs and distress to the patient that it entails.

To ensure that the patient's software is linked to the sensor via a unique system identifier that means it automatically downloads the updated settings. The BPMpathway system architecture ensures that patient results data is restricted to being shared between the clinician and the patient him- or herself, meaning that the patient can only ever see their own results data. Where a patient programme needs adjusting, this is done via the professional software and transmitted over the air to the patient.

Data Protection - BPMpathway has multiple security layers to protect confidential patient data. Every hospital data file is uniquely-keyed to stop data being transferred to other locations or inappropriately accessed. No PHI is stored by BPMpathway. No PHI is stored on the web or transmitted via the internet. All PHI is stored and controlled by the hospital in line with their own regulatory requirements.

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‘What this device would enable us to do is continual assessment on a daily basis and we could pick up patients that are having problems earlier’

Consultant Orthopaedic Surgeon Mr. Findlay Welsh, Golden Jubilee National Hospital
About the Developers

Founded in 2011, 270 Vision are developers of simple-to-use, highly accurate body analysis technology for use in injury prevention and rehabilitation in the medical, employee welfare and elite sports sectors.

With four UK patents granted, including two in the US, and pending internationally, and seven further applications being processed, multi-award winning 270 Vision are internationally-renowned as the market leaders in motion sensor design and development, with Martin Gossling, Chief Executive Officer, frequently invited to speak at conferences.

Recognised for their work in the industry, the Founders of 270 Vision are Senior Associate Members of the Royal Society of Medicine. In 2018, 270 Vision won the prestigious Outstanding Achievement Award at the national Medilink UK Healthcare Business Awards, which celebrate outstanding innovative breakthroughs made in healthcare technology across the UK.

Having developed their advanced, medical-grade BPMpro sensor technology and undertaken commercial pilots with elite sporting organisations and orthopaedic surgeons, 270 Vision developed BPMpathway (www.bpmpathway.com) - the proven dimension in remote patient assessment in the critical weeks after orthopaedic surgery - named Best Digital Health Platform in the 2018 Juniper Research Future Digital Awards. BPMpathway technology is protected by UK patents ‘Mapping the trajectory of a part of the anatomy of the human or animal body’ (GB2530754) and patent GB2551238 ‘Mapping trajectories of the anatomy of the human or animal body for comparative analysis’ covering Incidence Points with international patents pending.

B. Braun Melsungen AG, one of the world’s leading manufacturers of medical devices and pharmaceutical products and services, invested into 270 Vision as part of their long-term strategy of securing access to key future technology in e-health.

With its third-generation sensor technology, 270 Vision have developed WPMpro, a simple, cost-effective system at the forefront of the next generation of wearable sensor technology with multiple, smart, autonomous sensors detecting excessive joint range of motion to help prevent musculoskeletal disorders in the workplace. The innovative technology uses a ground-breaking wireless RF-based charging solution that can charge up to 25 sensors simultaneously. The smart EDGE-based autonomous WPMpro sensors have advanced firmware which means that only exception data is recorded and transmitted, thereby reducing the volume of data stored and increase processing speed by an estimated 95%. UK patents covering a tumble dryer safety (GB2573058) and sensor orientation (GB2573057) have been granted and patent applications covering the charging environment and data transmission protocols are currently awaiting grant in the UK.

In addition to BPMpathway and WPMpro, 270 Vision are actively developing sensor-based solutions for elite sports, long-term medical care and other sectors.

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References

1. The Government’s Revised Mandate to NHS England for 2017-18
2. Next Steps on NHS 5 Year Forward View – Funding and Efficiency
3. Scottish Arthroplasty Project Annual Report 2018

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