Developing a technology to enable the rapid diagnosis of urinary tract infection (UTI)

JEAYS-WARD, Katherine, WELLS, Oliver, MCCARTHY, Avril, MORRIS, Nicola, JACOBSON, Kim, HAY, Alastair, BARNETT, Jackie, PIANO, Martina, LUXTON, Richard, KIELY, Janice, HAYWARD, Gail, MICCICHE, Angelo, LOVERING, Andrew, LANGLEY, Joe <http://orcid.org/0000-0002-9770-8720>, PARTRIDGE, Rebecca, ANKENY, Ursula, SKEWS, Rachel, YANG, Yaling, DAHER, Shahd and DRAKE, Marcus

NIHR | Devices for Dignity MedTech Co-operative

Developing a technology to enable the rapid diagnosis of urinary tract infection (UTI)

Katherine Jeays-Ward[1], Oliver Wells[1], Avril McCarthy[1], Nicola Morris[2], Kim Jacobson[2], Alastair Hay[3], Jackie Barnett[4], Martina Piano[4], Richard Luxton[4], Janice Kiely[4], Gail Hayward[5], Angelo Micciche[2], Andrew Lovering[2], Joe Langley[6], Rebecca Partridge[6], Ursula Ankeny[6], Rachel Skews[2], Yaling Yang[5], Shahd Daher[5], Marcus Drake[2],

[1]NIHR Devices for Dignity MedTech Co-operative, Sheffield Teaching Hospitals NHS Foundation Trust, [2]North Bristol NHS Trust, [3]University of Bristol, [4]University of the West of England, [5]NIHR Oxford MedTech and In vitro diagnostic Co-operative, University of Oxford, [6]Sheffield Hallam University

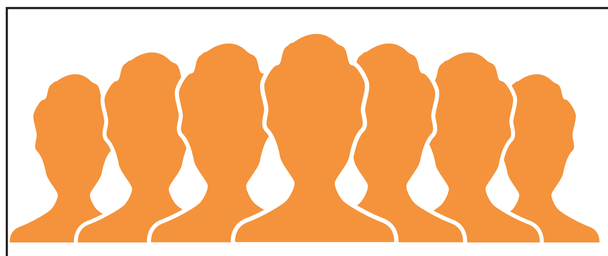
Community acquired UTI is common, and causes considerable morbidity and health expense. The presence of sufficient numbers of bacterial organisms and an inflammatory reaction indicates UTI. Approximately 90% are due to one of three organisms (E.coli, Klebsiella, Proteus). Testing for UTI includes urinary dipstick testing, which is rapid but prone to false positives. Alternatively, urine samples may be cultured, but this requires laboratory facilities and technical staff, and is slow and expensive. Often patients are treated on symptoms alone, and this risks over-treatment, i.e. some patients erroneously thought to have UTI receiving antibiotics inappropriately. GP concerns (inappropriate antibiotics, costs) and patient concerns (delayed treatment) make UTI management a significant issue. Internationally, emerging multi-resistant organisms mandates major public health focus to reduce inappropriate prescribing.

A UTI point-of-care (POC) diagnostic has been identified as the highest priority diagnostic for GPs. We have formed a collaborative team to adapt and exploit a technology developed by the University of the West of England that can be used by GPs, community nurses, pharmacists and others to identify and quantify the presence of the three species of bacteria that are commonly present in urinary tract infections; diagnosis of UTI is being confirmed by the presence of an additional biomarker.

This poster introduces some of the factors we are considering to ensure the diagnostic rigour, clinical applicability, and user-centric design of this product, and the exploitation and adoption routes that we are exploring concurrently with the technology development.

Product Development

Is it needed?
Does it work?
Can we make it?



UTI Point of Care diagnostic high priority for GPs

Pull from pharmacy and other clincial settings

Antibiotics are over-prescribed

Current tests are slow or inaccurate

Competing tech under development does not fulfill the same need

Detect target organisms and biomarkers

Adapt underlying technology

Optimise prototype for testing

How accurate is it?

Plan regulatory approach

Explore commerical exploitation models

Commercial Viability

Can we distribute to users?
Can we make enough?
Cost and price?

How big is the market

Who will pay?

Regulations

Price models and service packages

Design for manufacture

Cost of production

Packaging

Access to supply chain

Purchasing timetables

Logistics

Will it be used in Practice?

Capability
Opportunity
Motivation

Value in clinical pathway

The availability of kit to practitioner

Value to patient

How long does the test take?

Cost and reimbursement

Training

Evidence of function and impact

Included in guidelines

Infection control

Data transfer

Awareness test

Patient expectations of prescriptions

Ability to troubleshoot

Disposal

Successful commercially viable product with tangible benefits to patients and healthcare systems.

This research is funded by the National Institute for Health Research (NIHR)'s i4i Programme, Rapid Diagnosis of Urinary Tract Infection in Primary Healthcare, IL-LB-0417-20004. Views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

D4D