Institution: University of Cumbria		
Unit of Assessment: UOA20: Social Work and Social Policy		
Title of case study: The introduction and adoption of 'Teleswallowing' and 'Fetal Telemedicine' to improve patient access to specialist services.		
Period when the underpinning research was undertaken: 2013-2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Alison Marshall	Professor of Innovation & Entrepreneurship	2012 – Present
Elaine Bidmead	Senior Research Fellow	2014 - Present
Period when the claimed impact occurred: 2015 – 2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact (indicative maximum 100 words)

Research undertaken by Bidmead and Marshall at the University of Cumbria (UOC) facilitated adoption of two telemedicine services (remote clinical consultations via video) at a number of NHS Trusts. The research developed a methodology to understand stakeholder engagement with digital innovations and overcome barriers to adoption.

Teleswallowing fast-tracks assessment and treatment for patients with dysphagia (swallowing problems). The service was adopted by Blackpool NHS Foundation Trust, a provider to 445,000 residents, and later by two other providers: Isle of Wight NHS Trust (140,000 residents) and Hobbs Rehabilitation (specialist service across the south of England). NHS England recommended Teleswallowing as the default approach for swallowing assessments under the Covid-19 control measures in April 2020.

Fetal Telemedicine enables remote, shared consultations for fetal ultrasound. Its adoption facilitates local access to specialist expertise for pregnant women and staff in North Cumbria, serving a population of 500,000 people. Fetal Telemedicine was adopted by the collaborating Trusts and the service extended to another rural hospital, improving services for patients.

2. Underpinning research (indicative maximum 500 words)

In 2013, Marshall developed an approach to investigate stakeholder engagement with technological innovations (R1). Combining theoretical perspectives from sociology, innovation management and innovation design, the approach aimed to produce evidence to assist the decision to adopt digital innovations. Many pilot evaluations produce evidence that is not appropriate to decision-making and neglect the perspectives of clinicians, which are frequently at the root of barriers to implementation and adoption (R2). Our approach sought to understand the social impacts of the technology; exploring reasons for non-acceptance, or resistance, and then resolving points of difference between stakeholders (including clinicians, service users, suppliers, internal support services, senior executives and commissioners) through iterative and integrative negotiation. Several research studies were undertaken using this approach. Teleswallowing (R3; R4) and Fetal Telemedicine (R5; R6) were novel, clinician-led innovations in which Marshall and Bidmead collaborated as researchers. Findings demonstrated benefits for clinical staff and service users but also identified challenges which threatened sustainability.

Teleswallowing enables timely assessment of dysphagia (swallowing difficulties). Dysphagia impedes sustenance; delayed assessment can lead to malnutrition, poor rehabilitation, aspiration pneumonia and emergency hospitalisation. In 2013, Speech and Language Therapy (SLT) services at Blackpool NHSFT were experiencing severe pressures, resulting in delayed assessment. In summer 2014, UOC collaborated with Veronica Southern, a lead SLT therapist at Blackpool NHSFT, to develop a successful bid to the NHS Regional Innovation Fund to undertake a Teleswallowing adoption study. Southern developed the Teleswallowing protocol and Marshall devised the pilot study.

The study validated the Teleswallowing approach and demonstrated benefits. Patients experienced quicker assessment times, (< 2 weeks, compared to pre-pilot waiting times of 6-12 weeks) resulting in less distress, less deterioration, and reduced emergency admissions. Nursing home nurses were upskilled, leading to earlier recognition of dysphagia, improved referral and better management. The SLT Service experienced reduced assessment times (mean standard assessment time 90 minutes, Teleswallowing 26 minutes) and reduced costs/travel times (R2). SLTs raised concerns about their professional accountability, the competencies of nursing home staff; and readiness of the technology: some resisted the new way of working. Our research developed a methodology to create a dialogue with therapists, work through blockages and overcome problems. Our report provided evidence of benefit to senior management which led to initial uptake of Teleswallowing in Blackpool (R2).

Fetal Telemedicine removes the need for pregnant women to travel long distances for scans. The underpinning research involved collaboration between the Fetal Medicine Unit (FMU) at Newcastle upon Tyne Hospitals NHSFT (NUTH) and North Cumbria Integrated Care NHSFT (NCIC). NCIC provides health services to half a million people with tertiary support provided by NUTH; the FMU is the centre for highly specialist fetal care in the North East and North Cumbria. North Cumbria is a large and remote rural area where some communities face journeys of >2 hours to local health services, and with pockets of high deprivation. Pregnant women routinely attend local District General Hospitals (DGH) for obstetric ultrasound. Where scans reveal fetal anomalies, all women attending the West Cumbria DGH are referred to the FMU in Newcastle. Many women found this stressful and inconvenient; others did not attend, preventing pre-natal diagnoses and specialist fetal management.

Funding was awarded by Academic Health Science Network – North East and North Cumbria (AHSN-NENC) to assess the viability of Fetal Telemedicine, in a collaboration between the DGH, the FMU, Newcastle University, and UOC. Professor Marshall and Professor Robson (FMU) conceived the pilot study; FMU staff assessed the viability of telemedicine; Newcastle University conducted a survey of patient satisfaction and a qualitative patient study; and Bidmead undertook an adoption study with clinical stakeholders.

Patient data revealed high satisfaction and acceptance, but the clinical stakeholder study revealed concerns. DGH staff appreciated being upskilled through direct contact with specialists; their management of high-risk pregnancies improved consequently. Sonographers reported significant early challenges relating to their professional practice and identity; Fetal Telemedicine disrupted routine practices and altered interactions with patients. There were also concerns about staff capacity. Our stakeholder engagement process enabled negotiated solutions to each barrier. Patient benefits were quickly apparent; these were communicated back to sonographers and facilitated their acceptance. UOC submitted a pilot report to senior management which led to adoption of the service (R5).

3. References to the research (indicative maximum of six references)

R1. Marshall, A. (2013). Designing telemedicine apps that health commissioners will adopt. *Proceedings of the 14th Conference of Open Innovations Association FRUCT*, IEEE, November, pp. 63-68, ISSN: 2305-7254, doi: 10.1109/FRUCT.2013.6737946. https://fruct.org/publications/fruct14/files/Mar_15.pdf

R2. Marshall, A., Bidmead, E. (2018). Using telemedicine in practice: implications for workforce development. *International Journal of Practice-based Learning in Health and Social Care*, 6 (2). pp. 111-124. doi.org/10.18552/ijpblhsc.v6i2.433

R3. Bidmead, E., Marshall, A., Reid, T., & Southern, V. (2015). *Blackpool Teaching Hospitals NHS Foundation Trust, Speech and Language Therapy, Teleswallowing Innovation Adoption Study. Final Research Report*. (Available on request).

R4. Bidmead, E., Reid, T., Marshall, A., & Southern, V. (2015). Teleswallowing: a case study of remote swallowing assessment. *Clinical Governance: An International Journal.* 20 (3), pp.155-168. doi.org/10.1108/CGIJ-06-2015-0020.

R5. Bidmead, E., Marshall, A. (2016). Pilot and Service Evaluation for a Fetal Telemedicine Service at West Cumberland Hospital Final Research Report. (Available on request).

R6. Bidmead, E., Lie, M., Marshall, A., Robson, S., & Smith, V.J. (2020). Service user and staff acceptance of fetal ultrasound telemedicine. *Digital Health.* 6(1-12) pp1-12. https://doi.org/10.1177/2055207620925929.

R2, R4 and R6 have been published in peer reviewed academic journals. R3 and R5 are substantial reports (available on request), commissioned by two NHS Trusts, and underpinned by a research grant from the NHS Regional Innovation Fund. Reference R1 is a peer reviewed conference proceedings.

4. Details of the impact (indicative maximum 750 words)

Remote video consultations (telemedicine) are seen as a solution to the growing demand on services, reflected by a succession of policy documents, most recently the NHS Long Term Plan (2019). Yet digital innovation in health has proved challenging and many good innovations fail to be adopted. The Teleswallowing and Fetal Telemedicine studies demonstrated the viability of telemedicine as a clinical tool to facilitate improved patient access to specialist services and improved clinical management of patients. As a result of the systematic approach to stakeholder engagement and negotiation of barriers, services have now been adopted at scale across the country.

Impact 1: Adoption of teleswallowing services to improve patient access to services

The main beneficiaries of Teleswallowing are**:** dysphagic patients, nursing homes, and SLT services. Teleswallowing enables a swallowing assessment to be undertaken remotely, by an SLT, on a patient in a nursing home. This means that diagnosis is timely, suitable therapy can be provided without further exacerbation and disruptive hospital attendance can be avoided. For nursing homes, it supports and upskills nursing staff to deal with problems on site, provides greater staff efficiencies and reduces distress for patients. For providers of SLT services, it reduces travel time and costs for specialist staff, enabling efficiencies and reducing waiting lists. For all concerned, teleswallowing reduces infection risk.

The greatest impact from Teleswallowing came with the Covid-19 control measures. On 1 April 2020, NHS England advised SLT departments across the country to segment and prioritise urgent care needs; to cease delivery of services to medium and low priority cases; and to prioritise Teleswallowing assessments for Speech and Language Therapy with high priority patients (S1). Consequently, where Teleswallowing was available, patients continued to be assessed without risk of infection.

Following the pilot research, the lead SLT for the study was appointed Digital Health Clinical Lead within Blackpool NHS Trust, responsible for rollout of telemedicine to other services (winning the Nursing Times award for Data and Technology 2019), and is now leading the development of videoconferencing for outpatient services in Blackpool. The UOC study findings were used to develop and refine the Teleswallowing protocol and to subsequently establish Teleswallowing Ltd which offers training and resources for adoption, citing R3 as part of its evidence base (S2). Teleswallowing is being delivered by two other providers: Hobbs Rehabilitation SLT team (commissioned by West Hampshire CCG April 2018) (S3) and Isle of Wight NHS Trust Community Adult SLT team (December 2018) (S4). The Digital Health Clinical Lead for Blackpool NHS Trust commented: "*the research done by University of Cumbria facilitated adoption in the Isle of Wight and West Hampshire, as commissioners could see the approach had been independently and rigorously evaluated and validated"* (S5).

Prior to Covid-19 a total of 11 nursing homes were participating in Teleswallowing so impact was modest. However, both providers report extensive use following the UK's first lockdown; having Teleswallowing in place was advantageous and enabled innovative approaches to care delivery. The lead therapist at Hobbs rehabilitation commented that: *"The main benefit … was that service users were assessed promptly throughout lockdown and beyond. Our team, who were confident to use video as a means to assess the patients because of our experience with Teleswallowing, has also benefited as we have been able to keep our waiting lists to zero during this stressful time"* (S6).

Impact 2: Improved access to specialist expertise for pregnant women

The main beneficiaries of fetal telemedicine are: pregnant women, obstetricians and sonographers. The fetal telemedicine protocol enables a shared consultation to take place across two locations. A sonographer attends the pregnant woman, supported by obstetricians, midwives or other professionals, and carries out the scan. The fetal medicine consultant joins the consultation remotely, working with the sonographer to guide the scanning process, as well as interacting directly with the pregnant woman. Shared consultations are provided only when an anomaly has been identified. These anomalies range from the presence of twins to a more major health risk. If it is expected that specialist treatment may be required, conventional referrals are made instead.

The main benefit is to the woman (and family), who avoid travel to a location potentially many hours away. The Consultant obstetrician at the DGH stated that *"the largest impact is on the women who now don't need to travel up to 3 hours there and back to Newcastle"* (S8). Fetal Telemedicine means less travelling, expense and discomfort for referred women, and also means they do not have to take extended time off work (with income implications); nor make complicated childcare arrangements (for dropping off and picking up children from school or nursery or having relatives take days off to look after children). During the first and second Covid-19 lockdowns the service has been particularly valued, as travel should be limited to the local area. Other difficulties with home schooling have also been a constraint for many women, making the local telemedicine option particularly attractive.

By June 2020, 381 telemedicine scans had been undertaken; 346 of these with women in West Cumbria (S7). The patient study calculated that 76.47% of journeys from West Cumbria had been undertaken by car, and an estimated, mean journey time saving of 420 minutes (S7). Calculations using these figures, and the 97.7-mile distance between sites (the DGH and the FMU), demonstrates accrued travel savings of 51700.5 miles by car; 162 journeys by public transport, and 100 days and 22 hours in time since October 2015. If a woman is accompanied by spouse, partner, friend or family member, that person often has to take time off work with potential childcare costs (£30-70). It should be noted that the service covers a mixed area, but one including ex-industrial and coastal towns, which have low social and economic wellbeing in the UK compared to commuter areas, market towns, new towns and university towns. Whilst our research did not directly study the effect of inequalities, it was noted anecdotally that the costs of travel were particularly significant for this population and that access to the remote service contributed towards reducing this inequality. The service has now been running for a further three years since the study and has been extended to Northumbria Specialist Emergency Care Hospital in Cramlington.

Staff at the DGH have also experienced benefits including having greater knowledge to monitor and manage high risk pregnancies and to respond to patients' concerns; resulting in better continuity of care for women. The Consultant obstetrician stated that *"The sonographers, midwives and myself have learned a lot about monitoring high risk babies, as well as dealing with women with abnormal results or babies with congenital abnormalities. The skill of the sonographers in particular have improved enormously, so they are able to do diagnostic tests in high risk women and we all are better able to answer the woman's questions and support them when things are not going as well as they had hoped"* (S8).

New ways of working collaboratively were developed during the study, using an iterative, negotiated process. This led to other, unintended benefits to the service. With the physical kit in place, DGH staff have made use of it to consult specialists more informally on other issues. Advanced training in the acquisition and interpretation of uterine artery (UA) and middle cerebral artery (MCA) Doppler has meant that sonographers are now able to provide these services locally, reducing referral costs for the DGH. In addition, the DGH has acquired greater understanding about the need to support front line health workers to implement a new telemedicine service. The sonographers were provided with a pre-training manual and remote guidance via the telemedicine link from an experienced midwife sonographer based at the fetal medicine centre.

Corroborating the impact of remote medicine in this context the Fetal Medicine Consultant at NUTH stated: '*The qualitative component of our Academic Health Science Network funded project, conducted by the University of Cumbria, was key to our understanding of the local workforce barriers and facilitators to the implementation of a unique new telemedicine service. This provided valuable insights for academic partners, local managers/commissioners as well as the manufacturers of the equipment…This has been transformational in supporting service delivery during the COVID pandemic''* (S9).

5. Sources to corroborate the impact (indicative maximum of 10 references)

S1. See Section 2. Service 8. NHS England & NHS Improvement (2020) *Publications approval reference: 001559 COVID-19 Prioritisation within Community Health Services*. NHS England. https://teleswallowing.com/wp-content/uploads/2020/05/C0145-COVID-19-prioritisation-within-community-health-services-1-April-2020.pdf.

S2. Evidence of R3 forming this company's evidence base: Southern V (2020) *Evidence*. Teleswallowing Ltd. https://teleswallowing.com/evidence/.

S3. Evidence of teleswallowing adoption by Hobbs Rehabilitation: Hobbs H, Ellis N (2020), *Teleswallowing.* Hobbs Rehabilitation: https://www.hobbsrehabilitation.co.uk/hobbsrehabilitation.co.uk/teleswallowing.htm.

S4. Evidence of teleswallowing adoption at NHS Isle of White NHS Trust: NHS Isle of White NHS Trust (2020) *NHS supports Island Care and Nursing Homes to protect vulnerable residents.* News & Publications> News Local. https://www.iow.nhs.uk/news/Local-NHS-supports-Island-Care-and-Nursing-Homes-to-protect-vulnerable-residents.htm.

S5. Testimonial correspondence from Digital Health Clinical Lead, Blackpool NHS Foundation Trust, regards the research leading to teleswallowing adoption on the Isle of Wight and in West Hampshire. [Corroborator 1].

S6. Testimonial correspondence from Specialist Speech and Language Therapist, Hobbs Rehabilitation, on adoption and benefit during the Covid-19 pandemic. [Corroborator 2].

S7. Testimonial correspondence from Fetal Telemedicine Pilot lead, Faculty of Health and Life Sciences, Northumbria University, on reductions of time spent travelling for pregnant women requiring a specialist. [Corroborator 3].

S8. Testimonial letter from Consultant obstetrician, West Cumberland Hospital, North Cumbria Integrated Care NHS Trust on benefit to local pregnant women and to sonographers. [Corroborator 4].

S9. Testimonial correspondence from Consultant in Fetal Medicine, Institute of Cellular Medicine, University of Newcastle on benefit to patients during the Covid-19 pandemic. [Corroborator 5].