Institution: Swansea University
Unit of Assessment: 3a Allied Health Professions
Title of case study: Reducing unnecessary attendance at hospital emergency departments by improving care out of hospital

1. Summary of the impact

Care provided to patients by emergency ambulance services is changing nationally and internationally. For example the proportion of 999 calls in England resulting in conveyance to hospital fell from 68% in 2007-8 to 55% in 2012-3. Professor Snooks of Swansea University and colleagues have collaborated with clinicians, policy makers and academics to identify approaches more cost-effective than routine conveyance to Emergency Departments (EDs) for many patients. International application of Snooks's evidence that telephone advice, decision support and referral pathways are safe and effective has reduced unnecessary attendance at EDs and costs without compromising patient experience, safety or quality of care.

2. Underpinning research

Calls to emergency health services continue to rise internationally. In England there were 9.1 million calls in 2012-13 – 80% more than in 2002-03. Most calls are neither life-threatening nor serious: in 2002 a review led by Snooks, Senior Lecturer in Health Services Research at Swansea University since the start of 2000 (Professor from 2006), reported that 40% of calls to emergency health services world-wide did not need an emergency ambulance [R1]. This unnecessary workload jeopardises timely responses to those with urgent needs, thus causing avoidable morbidity and mortality across the spectrum of need.

Between 2000 and 2013, Snooks and her team at Swansea University have undertaken a programme of applied research in collaboration with ambulance service providers, policy makers and academics to identify safe and cost-effective alternatives to ambulance dispatch and conveyance to ED. Supported by over £4 million in research grants from peer-reviewed national programmes [R10-R12], the research has included systematic reviews, cohort studies and randomised trials aimed at improving triage and decision-making in emergency care out of hospital, including new protocols and pathways for referrals to non-emergency healthcare providers. The work has included three main internationally relevant themes:

A Observational studies by Swansea University (2003-6) analysed existing UK emergency care practice and outcomes to inform future development. Analysis of outcomes in people aged 65 or over who were left at home by an ambulance crew after a fall showed that current practice is unsafe for patients, with about half making at least one further emergency healthcare contact within 2 weeks, and fivefold increases in risk of emergency admission and of death [R2]. These findings were reinforced by reviews and focus-group studies [R3].

B Swansea University led, or made major contributions to, experimental evaluations of ***alternatives to ED conveyance*** that enable paramedics to leave patients at home with referral to a non-emergency health care provider. In 1999-2001, ending after Snooks arrived in Swansea, we developed and tested 23 'Treat and Refer' protocols for ambulance crews to assess patients on scene and, when appropriate, use alternative pathways of care to avoid hospital admission. Findings from this controlled before-and-after study were encouraging but not definitive: the intervention was generally acceptable to 250 intervention patients and crews but the conveyance rate to ED remained unchanged [R4]. The Paramedic Practitioner Older People Study (2003-5) was a randomised trial showing that paramedics with extended clinical skills (e.g. suturing) could avoid standard ambulance transfer to ED for patients aged over 60 with acute minor conditions, and improve both subsequent emergency contacts and patient satisfaction [R5, R10]. The SAFER 1 randomised trial (2006-11) evaluated the effect of a computerised clinical decision support tool on the care of older people who had fallen; it found that the new model of care was safe, doubled referrals to community falls services, and was potentially cost-effective [R6, R11].

C Experimental evaluations by Swansea University and collaborators of ***alternatives to ambulance dispatch*** at initial telephone contacts with the health service included a randomised trial of computerised decision support for 999 call takers (1998-2000, ending after Snooks arrived

in Swansea). This showed the safety of telephone assessment and advice in place of sending an ambulance to patients with problems triaged as non-serious [R7], and stimulated reductions in emergency ambulance dispatch rates without increasing risk: 330 of 635 intervention group patients (52%) were triaged as not requiring an emergency ambulance [R8]. A further study (2002-2006) showed the safety and potential effectiveness of provision of advice to callers to the emergency ambulance service by nurses through National Health Service (NHS) Direct: in only 4 of 1552 cases identified could delay in sending an ambulance have been clinically important [R9].

3. References to the research

Journal Impact Factors (JIFs) and Scopus citations accessed in October 2013

R1. **Snooks H** *et al*. NHS emergency response to 999 calls: alternatives for cases that are neither life threatening nor serious. *BMJ* 2002;**325**:330. DOI:10.1136/bmj.325.7359.330 (JIF = 17.2; 34 citations).

R2. **Snooks H** *et al*. Emergency care of older people who fall. *Qual. Saf. Health Care* 2006;**15**:390-2. DOI:10.1136/qshc.2006.018697 (JIF = 2.8; 25 citations).

R3. Porter A, **Snooks H** *et al.* 'Should I stay or should I go?' Deciding whether to go to hospital after a 999 call. *J. Health Serv. Res. Policy* 2007;**12** (Suppl. 1):32-8. DOI:10.1258/135581907780318392 (JIF = 1.6; 7 citations).

R4. **Snooks H** *et al.* Towards primary care for non-serious callers to emergency ambulance service: results of controlled study of 'Treat & Refer' protocols for ambulance crews. *Qual. Saf. Health Care* 2004:**13**:435-43. DOI:10.1136/qshc.2003.007658 (JIF = 2.8; 14 citations).

R5. Mason S, **Snooks H** *et al.* Effectiveness of paramedic practitioners for older people: results of a cluster randomised controlled trial. *BMJ* 2007:**335**:919-23. DOI:10.1136/bmj.39343.649097.55 (JIF = 17.2; 31 citations).

R6. **Snooks H** *et al. Support & Assessment for Fall Emergency Referrals (SAFER 1): evaluation of costs & benefits of computerised decision support for emergency ambulance personnel to plan appropriate care for older people who have fallen.* London: Department of Health; 2011. http://tinyurl.com/nye4v7k.

R7. Dale J, **Snooks H** *et al.* Computer assisted assessment and advice for "non-serious" 999 ambulance service callers: the potential impact on ambulance despatch. *Emerg. Med. J*. 2003;**20**:178-83. http://tinyurl.com/oq8b2wt (JIF = 1,6; 23 citations).

R8. Dale J, **Snooks H** *et al.* Safety of telephone consultation for 'non-serious' emergency ambulance service patients. *Qual. Saf. Health Care* 2004;13:363-73. DOI:10.1136/qshc.2003.008003 (JIF = 2.8; 29 citations).

R9. Turner J, **Snooks H** et al. *The costs and benefits of managing low priority 999 ambulance calls by NHS Direct nurse advisors.* London: NIHR Service Delivery and Organisation Research Programme; 2006. http://tinyurl.com/oqrnxg6.

Selected peer-reviewed research grant support

R10. Randomised trial to evaluate the effectiveness of Paramedic Practitioners managing Older People calling 999 with minor conditions. Private Patients Plan Foundation, 2002–5, £260,000; Snooks co-applicant.

R11. Support and Assessment for Fall Emergency Referrals (SAFER 1): evaluation of costs and benefits of on-scene computerised decision support for emergency ambulance personnel to assess and plan appropriate care for older people who have fallen. Department of Health, 2006-11, £570,000; Snooks lead applicant. http://tinyurl.com/oqlpthm.

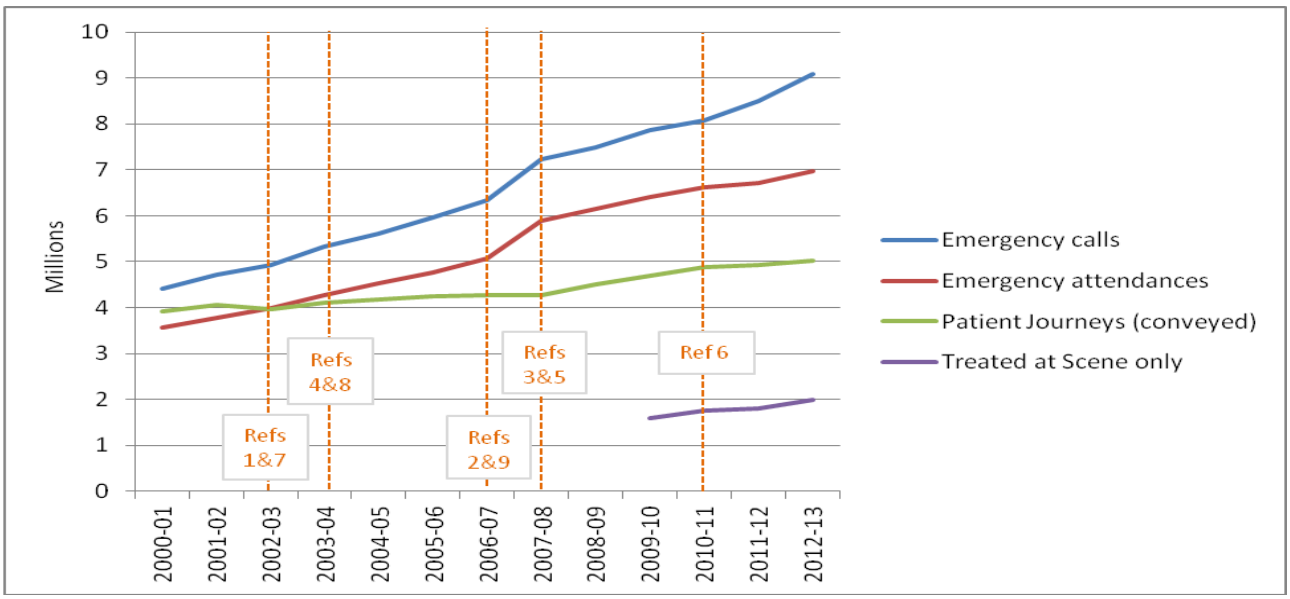
R12. Evaluation of cost-effectiveness of passing non-serious 999 calls to NHS Direct for management. NHS Executive Service Delivery and Organisation research programme, 2002–6, £380,000; Snooks co-applicant and lead for Welsh site.

4. Details of the impact

The programme of research, dissemination and service support by Swansea University and collaborators has provided scientific foundation for major changes in conveyance to hospital by emergency ambulances. In England, for example, the proportion of emergency calls leading to hospital conveyance has fallen from 68% (4.3 million of 6.3 million in 2007-8 to 55% (5.0 million of 9.1 million in 2012-3 (Figure 1). Though causal inference in this multifactorial field is difficult, we estimate that hospital conveyances in 2012-3 were some 1.2 million fewer than expected if the

pattern of 2007-8 had continued. If the cost of these avoided ambulance journeys alone is calculated, at £20 per journey (source: NHS unit costs), we estimate the marginal benefit of the journeys avoided as £24 million. These reduced attendances at ED are very likely to yield even more savings for the NHS, but the value of these is more difficult to estimate.

Figure 1: 999 calls and consequences 2000-13 (source NHS Information Centre)



Snooks's leadership in this field is exemplified by her initiation of, and continued engagement with, the 999 Emergency Medical Services Research Forum and the Thematic Research network for emergency, UnScheduled and Trauma care (TRUST) (http://www.trustresearch.org.uk/en/); both link service providers and researchers in setting emergency care research priorities and promoting evidence-based policy and practice.

Swansea University and collaborators have achieved impact on patient care, service efficiency and staff development not only in the UK but also internationally, notably across Australia and Canada. The results of our research have been used during the development of strategies, guidelines and standards issued by governing bodies including the Department of Health, Welsh Government, NHS Scotland and authorities in Victoria, Australia and Alberta, Canada [C6-C11]. That this research has achieved impact on policy, service delivery and patient experience over 2008-13, is also recognised by key people in this field:

> *"Professor Snooks's work was used in the strategic review of NHS Ambulance Services in England [C7], the catalyst for transforming ambulance services over the last seven years ... to modernise services, professionalise staff, and provide care that is more efficient for the NHS and appropriate for patients, whilst maintaining safety standards."* [C1]

> *"Snooks's studies, at the forefront of pre-hospital research, have significantly influenced the development of new models of ambulance service care ... including the development of alternatives to ambulance conveyance, telephone triage, and the safe management of falls. This work in turn has influenced national policy on reorganisation of delivery models for ambulance and pre-hospital health care."* [C2]

Ambulance service providers across UK have implemented phone-based advice in accordance with recommendations from the Department of Health in response to our research. For example NHS Direct nursing staff at several sites now provide advice to Category C emergency callers, the least urgent. In 2012-13 over 360,000 emergency calls in England were resolved through telephone advice, avoiding ambulance dispatch (source: NHS Information Centre).

Our work on the development and evaluation of 'Treat and Refer' protocols and extended paramedic roles has prompted all UK ambulance services to introduce pathways for ambulance crews to assess patients for alternatives to hospital admission. We are aware of similar service models being adopted internationally, for example in Australia and Canada:

"Snooks's work, including evidence of caller satisfaction and very few adverse events from referrals instead of conveyance, supported implementation of a point-of-call referral service in Victoria. The model is being rolled out across Australia." [C3]

"The change from routine dispatch of an ambulance for every call resulted in the referral of 40,000 callers in the state of Victoria to alternative care in 2012-3, thus increasing availability of ambulances to respond to emergency calls." [C11]

"In Alberta, Canada we have developed and implemented models of care that avoid automatic transportation of 911 patients, based on Snooks's innovative work on 'Treat and Refer' and we have introduced extended training for paramedics to make decisions about who goes to hospital and who is best left at home with a community-based care referral." [C4]

"Professor Snooks's study findings have been used to support the development and implementation of new services including: (1) Since 2009 paramedic-nurse teams have staffed rural EDs, assessing and treating patients overnight with on-call physician support;
(2) Since 2009 advanced paramedics and nurses have staffed our dispatch center, providing advice to field paramedics, and coordinating emergency calls and inter-facility transfers;
(3) Since 2011 advanced paramedics have responded to calls at nursing homes, delivering emergency care at the bedside & avoiding unnecessary transport to emergency depts." [C5]

Hence translating the research by Swansea University and our collaborators into practice has achieved impact across many countries, with benefits to patients, their families, and healthcare providers by identifying safe alternatives to conveyance to hospital by emergency ambulance for those without immediate care needs [C12].

5. Sources to corroborate the impact

Personal corroboration / statement

C1. Chief Executive, St John, New Zealand. (Formerly) National Ambulance Director, Department of Health (2004–2012); Chief Executive, London Ambulance Service (2000–2012) and National Advisor to Department of Health for Ambulance Services.

C2. Associate Clinical Director and Research Lead, East Midlands Ambulance Service NHS Trust; and Chair National Ambulance Research Steering Group.

C3. Senior Intensive Care Paramedic, Ambulance Victoria, Australia.

C4. Senior Performance Strategist, Alberta Health Services Emergency Medical Services; and Chair of Alberta Health Services Emergency Medical Services Research Committee, Canada

C5. Research Leader, Nova Scotia Emergency Health Services, Canada.

Relevant policy documents

C6. Department of Health. *Taking healthcare to the patient: transforming ambulance services*. London: DH; 2005. http://tinyurl.com/p4zkz87 [underpins Statements 1, 2]

C7. NHS England. *High quality care for all, now and for future generations: Transforming urgent and emergency care services in England. The Evidence Base from the Urgent and Emergency Care Review*. DH:2013.http://tinyurl.com/mw9bn2t. [underpins Statements 1, 2]

C8. Welsh Assembly Government (WAG). *Guide to good practice: emergency care – tools and techniques to enable the NHS and Social Services to improve the delivery of health and social care.* Cardiff: WAG; 2004.

C9. NHS Scotland. *Shifting the balance of care: good practice and research*. http://tinyurl.com/p6r797j.

C10. Ambulance Victoria. *2012-2013 Annual Report.* http://tinyurl.com/nrjmmjw [underpins Statement 3]

C11. Government of Alberta and Alberta Health Services. *Becoming the best: Alberta's Health Action Plan 2010-2015.*; 2010. http://tinyurl.com/2dmlthb. [underpins Statement 4]

Publication

C12. Snooks HA. *et al.* New models of emergency prehospital care that avoid unnecessary conveyance to Emergency Department: translation of research evidence into practice? *The Scientific World Journal* 2013;182102. dx.doi.org/10.1155/2013/182102