

Impact case study (REF3)

Institution: Imperial College London		
Unit of Assessment: 02 Public Health, Health Services and Primary Care		
Title of case study: Improving patient care with seven-day services and better working practices.		
Period when the underpinning research was undertaken: 2009-2015		
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:
Paul Aylin	Professor of Epidemiology & Public Health	1997- present
Alex Bottle	Professor of Medical Statistics	2001- present
Azeem Majeed	Chair, Primary Care & Public Health & Head of Department	2004 - present
Derek Bell	Chair in Acute Medicine	2006 - present
Period when the claimed impact occurred: August 2013 – December 2020		
Is this case study continued from a case study submitted in 2014? No		
1. Summary of the impact (indicative maximum 100 words)		
<p>There is variation in quality and safety in the delivery of healthcare. Using large routinely collected NHS health datasets, Imperial researchers quantified variation in hospital patient outcomes associated with the junior doctor changeover, the day of the week and in access to primary care. This research led to real change in how care is delivered in the NHS precipitating changes to medical training including a shadowing programme for new Foundation Year 1 trainees, new clinical standards for seven-day services and extended access in general practice.</p>		
2. Underpinning research (indicative maximum 500 words)		
<p>Imperial College has conducted extensive research into the quality and safety of care associated with the delivery of services across the NHS in both primary and secondary care services.</p>		
<u>Junior doctor changeover</u>		
<p>Research conducted at Imperial in 2009 examined seven-day in-hospital death rates in patients admitted as an emergency on the first Wednesday in August (day of junior doctor changeover) compared with patients admitted on the preceding Wednesday in English NHS hospitals among 299,741 admissions. The results showed 6% higher odds of death (OR 1.06, 95% confidence interval [CI] 1.00-1.15) for patients admitted on the day of the changeover, even after controlling for case-mix (1).</p>		
<u>Seven-day working</u>		
<p>From 2010, Imperial led research on out-of-hours hospital deaths in emergency care (2). This research examined over 4 million emergency hospital admissions in 2005/6 in England, finding overall adjusted odds of death for all emergency admissions was 10% higher (OR 1.10, 95%CI 1.08 to 1.11) or an estimated 3,369 extra deaths in those patients admitted at the weekend compared with patients admitted during a weekday, after adjusting for case-mix (2).</p>		
<p>The Imperial researchers then extended this work to elective surgery, investigating 30-day post-operative mortality for over 4 million NHS elective procedures by day of procedure. The results suggested a higher risk of 30-day post-operative death for those having elective surgical procedures later in the working week (Friday OR 1.44, 95%CI 1.39-1.50) or the weekend (OR 1.82, 95%CI 1.71-1.94) compared with those carried out on a Monday (3).</p>		

The Imperial team also investigated a range of obstetric outcomes and the possible explanations for the findings, including consultant experience and staffing levels. They evaluated 1,300,000 English NHS deliveries, showing higher odds of puerperal infections (OR 1.06, 95%CI 1.01-1.11), perinatal mortality (OR 1.07, 95%CI 1.02-1.13), injuries to neonates (OR 1.06, 95%CI 1.02-1.09) and neonatal readmissions (OR 1.04, 95%CI 1.00-1.08) in mothers admitted and babies born at the weekend, but with no relationship with consultant out of hours obstetric cover (4).

Access to primary care

Further work by the researchers at Imperial showed that general practices that provide better access to patients consistently have lower emergency hospital admission rates, improved clinical outcomes (such as measures of the management of long-term conditions) and patient satisfaction. For example, in a population-based analysis of patients registered with 7,856 general practices (5) we found that practices providing more timely access to primary care had fewer self-referred and subsequently discharged emergency department visits per registered patient (for the most accessible quintile of practices, relative risk=0.90; P<0.001). Drawing on survey data, our research estimated that in 2012/13 there were approximately 5,770,000 attendances at Accident & Emergency as a result of patients being unable to make any appointment or a convenient appointment at their GP practice (6).

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

(1) Jen, M.H., Bottle, A., Majeed, A., Bell, D., Aylin, P. (2009). Early in-hospital mortality following trainee doctors' first day at work. *PLoS One*; 4(9): e7103. [DOI](#).

(2) Aylin, P., Yunus, A., Bottle, A., Bell, D. (2010). Weekend mortality for emergency admissions: A large multicentre study. *BMJ Quality and Safety*; 19: 213-217. [DOI](#).

(3) Aylin, P., Alexandrescu, R., Jen, M.H., Mayer, E.K., Bottle, A. (2013). Day of week of procedure and 30 day mortality for elective surgery: retrospective analysis of hospital episode statistics. *BMJ*; 346: f2424. [DOI](#).

(4) Palmer, W.L., Bottle, A., & Aylin, P. (2015). Association between day of delivery and obstetric outcomes: observational study. *BMJ*; 351: h5774. [DOI](#).

(5) Cowling, T.E., Cecil, E.V., Soljak, M.A., Lee, J.T., Millett, C., Majeed, A., Wachter, R.M., Harris, M.J. (2013). Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. *PLoS One*; 8(6): e66699. [DOI](#).

(6) Cowling, T.E., Harris, M.J., Watt, H.C., Gibbons, D.C., Majeed, A. (2014). Access to general practice and visits to accident and emergency departments in England: cross-sectional analysis of a national patient survey. *British Journal of General Practice*; 64(624): e434–e439. [DOI](#).

Funding:

- NIHR Research Centre for NHS Patient Safety & Service Quality (01 Apr 2007 to 31 Jul 2012), £4,500,000, CoI and theme lead (PA).
- NIHR Imperial Patient Safety Translational Research Centre (01 Aug 2012 to 31 Jul 2017), £7,500,000, CoI and theme lead (PA).
- NIHR Evaluation of a national surveillance system for mortality alerts (01 Mar 2014 to 31 Dec 2018), £627,000, PI (PA)
- NIHR Health Protection Research Unit (01 Apr 2014 to 31 Mar 2019), £3,700,000, CoI PA
- NIHR Collaboration for Leadership in Applied Health Research and Care (01/10/2014 – 30/09/2019), £10,000,000, PI (DB), CoI (AM)
- Dr Foster Intelligence, Explaining variations in outcome in healthcare across England (2006-11), £2,000,000, PI (PA), CoI (AM)
- Dr Foster Intelligence, Explaining variations in outcome in healthcare across England (20011-15), £2,500,000, PI (PA), CoI (AM,AB)

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- Dr Foster Intelligence, Explaining variations in outcome in healthcare across England (20015-18), £1,500,000, PI (PA), CoI (AM,AB)
- NIHR Fellowship. “General Practice in the National Health Service; Patient Experience and its Association with the Utilisation of Acute Hospital Services” (2013-16), £ 237,000, PI (TC).

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

Imperial College has made an important impact in improving the quality and safety of health care, with benefits to the National Health Service, the public, patients and health practitioners.

Junior doctor changeover

The 2009 research at Imperial College on in-hospital mortality following the August junior doctor changeover (1) led to the introduction of a period of shadowing for newly qualified doctors before they start work as Foundation Year (FY)1s in 2012 by the then Medical Director of the NHS. Acknowledging the link between the changeover, transitions in training and patient safety, the influential Greenaway Report on the “Shape of Training” [A], published in October 2013, cites our reference (1) and called for a broader approach to postgraduate training. After an evaluation which suggested that 95% of doctors who responded to the survey agreed that the shadowing period was useful, formal guidance for the Shadowing Programme was published in February 2014 by Health Education England [B] for approximately 7,000 new FY1 doctors a year (based on UK Foundation Programme Reports). In March 2014 the Academy of Medical Royal Colleges published its “Staggering Trainee Doctor Changeover” report [C] which again cites reference (1), with the recommendations implemented as part of the on-going Shape of Training initiative. New staggered dates for training were published by NHS Employers in July 2020 affecting 60,000 doctors in training (based on GMC medical workforce estimates in 2018).

Seven-day working

Imperial research on out-of-hours deaths, particularly at weekends, has been a key driver in moving the NHS towards a 7/7 service, cited by NHS Improving Quality in “NHS services - open seven days a week: every day counts” [D] stating that “*Growing media coverage and evidence has highlighted how the lack of continuity of care over the weekend can have significant consequences ...*” and referencing coverage of the Imperial-led study on weekend mortality for emergency hospital admissions (2) and our elective surgery paper (3) which significantly raised awareness of the issue with the general public. At the same time, NHS England published the “Urgent and emergency care review” [E] citing reference (2).

The research also prompted the Seven Day Services Clinical Standards [F], which cites a number of sources quoting Imperial research. Standards include the requirements that “*All emergency admissions must be seen and have a thorough clinical assessment by a suitable consultant as soon as possible but at the latest within 14 hours from the time of admission to hospital*” and that “*Hospital inpatients must have scheduled seven-day access to diagnostic services*”.

The then Secretary of State for Health for England referred to our obstetric outcomes study (4) during parliamentary debates on a seven-day NHS saying “...*Just before Christmas, a report by Professor Paul Aylin said that the mortality rates for neonatal children were 7% higher at weekends, which underlines just how important it is to get this right...*” [G].

Access to primary care

The work by the Imperial team on access to primary care underpinned government initiatives to improve out-of-hours and weekend working in NHS primary care in England. This work was cited in a number of policy documents to support changes to access to primary care including a 2015 update to NHS England’s “Transforming urgent and emergency care services in England” [H] which cites reference (5) and a Monitor (the regulator at the time for foundation trusts) publication on improving GP services [I] which cites reference (6).

Our work was used by NHS England's National Advisory Group for the National Review of Access to General Practice Services in 2019 [J] and the NHS GP Contract which cites the review under "Improving Access for Patients" agreed between NHS England and the BMA in February 2020. The contract includes additional government investment in delivering an extra 50,000,000 appointments, an improved appointments dataset, a new GP Access Improvement Programme, an expansion of digital services and extended hours access.

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

[A] Shape of training. Securing the future of excellent patient care. Final report of the independent review. Led by Professor David Greenaway. October 2013 (*cites ref (1) on page 29*)
https://www.shapeoftraining.co.uk/static/documents/content/Shape_of_training_FINAL_Report.pdf_53977887.pdf (Archived [here](#)).

[B] [Shadowing for Appointees to Foundation Year 1 Guidance Notes](#). Health Education England 2014. Archived [here](#).

[C] Academy of Medical Royal Colleges – [Staggering Trainee Doctor Changeover 2014](#) (*cites ref (1) on page 5*). Archived [here](#).

[D] NHS Services – Open Seven Days a Week: Every Day Counts 1 Nov 2013 (*cites "growing media coverage and evidence" of ref (4) and Sunday Times coverage of ref (2) on page 7*)
<https://www.england.nhs.uk/improvement-hub/wp-content/uploads/sites/44/2017/11/Seven-Day-Services-Every-Day-Counts.pdf> (Archived [here](#))
<http://www.guardian.co.uk/society/2013/may/28/death-risk-higher-nhs-fridays> (archived [here](#))
<https://www.thetimes.co.uk/article/scandal-of-nhs-deaths-at-weekends-kzcdx3nqx6p> (archived [here](#))

[E] [Transforming urgent and emergency care services in England](#). Nov 2013. (*cites ref (2) page 11, 68 and 81*). Archived [here](#).

[F] [NHS Seven Day Services Clinical Standards 2017](#) (archived [here](#)) includes reference to the 2012 Academy of Medical Royal Colleges report "Seven Day Consultant Present Care" and the RCS "Emergency Surgery: Standards for unscheduled care" https://www.rcseng.ac.uk/-/media/files/rcs/about-rcs/regional/rcs_emergency_surgery_2011_web.pdf which both cite Imperial College Research *ref (2)*. 7 day hospital services self-assessment results available at <https://www.england.nhs.uk/publication/7-day-hospital-services-self-assessment-results/>

[G] [Hansard 2016 Volume 605](#): debated on Thursday 11 February 2016 – Secretary of State for Health (*cites ref (4)*). Archived [here](#).

[H] NHS England, [Transforming urgent and emergency care services in England](#). November 2015. (*cites ref (5) on page 28*). Archived [here](#).

[I] Monitor. [Improving GP services: commissioners and patient choice](#). June 2015. (*cites ref (6) on page 11*). Archived [here](#).

[J] National Review of Access to General Practice Services in England. Produced for NHS England National Access group. 2019. (*cites a number of papers from our group including ref (5) on page 73*). This review is then cited under the "Update to the GP Contract Agreement 2020/21-2023/24" under Improving Access for Patients on page 25. <https://www.england.nhs.uk/wp-content/uploads/2020/03/update-to-the-gp-contract-agreement-v2-updated.pdf> (archived [here](#)).