

Impact case study (REF3)

Institution: Loughborough University		
Unit of Assessment: C13 Architecture, Built Environment and Planning		
Title of case study: Transforming the £83bn NHS built estate to deliver safe and dementia-friendly care		
Period when the underpinning research was undertaken: 2006 – 2018		
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:
Andrew Price	Professor of Project Management	1981 to date
G. Mills	Research Associate	2002-2013
M. Mourshed	Lecturer Building Services Engineering	2007-2013
S. Mahadkar	Research Associate	2007-2013
F. Pascale	Research Associate	2012-2015
E. Pantzartzis	Research Associate	2012-2016
Period when the claimed impact occurred: 2015 – 2020		
Is this case study continued from a case study submitted in 2014? No		
1. Summary of the impact (indicative maximum 100 words)		
<p>NHS England's £83bn estate must deliver radically new services and care for increasing numbers of patients with dementia, but there is a growing £7bn maintenance backlog which threatens users' safety and service continuity. Strategic Asset Management research at Loughborough University demonstrated how to better design, fund, and manage NHS England's estate. By working closely with Department of Health and Social Care and the NHS, research has: 1) transformed the way NHS England spends its annual £3.7bn capital and its £9.5bn estate management budget; 2) improved the quality of life and care for 100,000 people living with dementia, including staff and carers, and 3) following substantial evaluation across a £50 million capital investment programme, been translated into formal national design guidance for dementia-friendly health and social care environments.</p>		
2. Underpinning research (indicative maximum 500 words)		
<p>Healthcare infrastructure spans the complete range of NHS medical provision, from specialist and local hospitals, to community health services and GP-led care centres. Research starting in 2006 by Price, Mahadkar and Mills explored the role of stakeholder consultation within healthcare infrastructure planning and design process, where stakeholders range from patients and their families/carers, to those delivering clinical services [R1]. This research identified a need for improved sustainable (long-term) Strategic Asset Management (SAM) within the NHS and embedding patient-centric solutions in infrastructure changes/improvements. Subsequent research [R5] by Price, Mourshed, Pascale and Pantzartzis examined how the NHS estate should evolve to specifically accommodate the needs of patients with dementia and their carers.</p> <p>The team's research revealed that contemporary SAM approaches were short-term and entailed poor stakeholder consultation, meaning NHS investments were not delivering patient-centric solutions. For example, of the 149 Primary Care Trusts' (PCTs) consultations analysed, only 1% included travel/transport related questions, which are essential to determining service accessibility. The analysis was underpinned by a web-based document review of consultation practices within 149 English PCTs, and participation in a consultation case study with Leicestershire County and Rutland PCT where we designed and performed a detailed content analysis of 876 questionnaire responses and 78 letters to assess regional strategic estate plans and explore the inter-relationships between the planning and consultation processes.</p>		

The research identified gaps within English PCTs' stakeholder consultation practices and a lack of core SAM competencies within the NHS. The work enabled the development of a novel, systematic, coordinated, evidence- and capability-based approach to SAM, which encompassed the three key areas of estates, care services and transport. These were integrated with consultation as a fundamental part of the healthcare infrastructure planning process to realise improved investment decision making by NHS Trusts. The research findings of this study were designed to be directly used by healthcare policy makers to put patients at the heart of SAM [R1]. Our SAM research went on to highlight the issue of maintenance backlog and examined in detail 'critical backlog' which puts patients and service continuity at risk. The research revealed the causes and significant scale of the problem, and that the total backlog had grown to £6.5bn, over half of which was critical, with most residing in a relatively small number of Acute Trusts. Our cost modelling demonstrated that: i) Trusts need to invest ≈1% of income simply to maintain backlog levels; and ii) there is a need for a long-term SAM to estate funding, delivery, and management [R2].

Building on our patient-centric SAM research, we analysed data from the Department of Health and Social Care (DHSC) England's National Dementia Capital Investment Programme and its 115 pilot projects. The research advocates strategies for making care environments more dementia-friendly thereby improving the Quality of Life (QoL) for people living with dementia whilst reducing the associated cost of care provision. The research also identified the healthcare spaces and building elements with the greatest impact on QoL and healthcare costs [R3]. Further research revealed that design standards and guidance, including those for nursing homes, did not take a patient (or care home resident) centric approach and failed to accommodate the proven association of therapeutic lighting with well-being of the elderly. More generally, the need for robust evidence-based design guidance in relation to dementia was identified [R4]. Building on this work, our research explored the built environment elements that make a difference to the quality of dementia care and care outcomes. Working in close collaboration with the DHSC, dementia experts and Pilot Project Stakeholders (including end users), we developed ten design principles and provided case study exemplars of how these could be used to improve safety and dignity whilst reducing confusion, isolation, and anxiety, and help people live well with their dementia [R5].

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

- R1:** Mahadkar, S., Mills, G. and Price, A.D.F. (2012) 'Stakeholder consultation practices within healthcare infrastructure planning: A conceptual approach to strategic asset management', *Built Environment Project and Asset Management*. DOI: 10.1108/20441241211280882
- R2:** Mills, G.R.W., Deka, L., Price, A.D.F., Rich-Mahadkar, S., Pantartzis, E. and Sellars, P. (2015) 'Critical infrastructure risk in NHS England: Predicting the impact of building portfolio age', *International Journal of Strategic Property Management*. DOI: 10.3846/1648715X.2015.1029562
- R3:** Pantartzis, E., Price, A.D.F. and Pascale, F. (2016) 'A built environment response to the rising costs of dementia', *Journal of Financial Management of Property and Construction*. DOI: 10.1108/JFMPC-06-2015-0019.
- R4:** Shikder, S., Mourshed, M. and Price, A.D.F. (2014) 'Therapeutic lighting design for the elderly: A review', *Perspectives in Public Health*. DOI: 10.1177/1757913911422288
- R5:** Pantartzis, E., Pascale, F. and Price, A.D.F. (2015) 'Health Building Note 08-02: Dementia-friendly health and social care environments', Department of Health.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416780/HBN_08-02.pdf

The research was published in leading international journals following rigorous peer review. It was funded by ten EPSRC grants; as part of the Health and Care Infrastructure Research and Innovation Centre Phases 1 (2006-2011, total £7.3M, to Loughborough, £1.3M) and Phase 2 (2011-2013, total £4.7M, LU £1M); two projects funded through LU's EPSRC Impact Acceleration Account (Activity-Acuity-Adaptability-Flow in Emergency Departments, £98,350, (2014-2016); and Optimising Healthcare Infrastructure Value, £95,000 (2011-2012), and four research contracts from the DHSC

(for whom the 179-page report R5 was published), NHS Improvement and the European Investment Bank totalling £393,000.

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

Since 2014, Loughborough University researchers have collaborated closely with DHSC policy makers, NHS Improvement, NHS estate managers, clinicians, nurses, architects, engineers, patients, residents, and providers. The LU team and our expertise have been embedded within NHS regional strategic consultation exercises and hospital design processes. We contributed to policy development through commissioned research and membership of the following strategic and influential groups: DHSC Estates and Facilities Productivity Think Tank; DHSC Dementia Friendly Environment Working Group; DHSC Estates and Facilities Division Advisory Group; and the BIM4Health Task Group [S1, S2]. These led to impact in three areas:

Impact 1: Transformed the NHS's capital funding and estate management practices

Our research into the SAM of healthcare estates changed the way NHS England spends its annual £3.7bn capital and £9.5bn estate management budgets, and in so doing improved the safety, efficiency and efficacy of healthcare services.

With over 1,500 sites, the NHS's £83bn estate is one of Europe's largest. It must meet safety and statutory standards, deliver increasingly complex clinical activities, and support enhanced efficiency and productivity. This is challenged by a legacy of old, unfit for purpose buildings, many approaching the end of their useful life: 18% pre-date the NHS (<1948) and 43% are more than 30 years old.

Following twelve research projects, and frequent direct engagement with DHSC, NHS Trusts, healthcare planners and practitioners, LU was commissioned by NHS Improvement to develop a new SAM plan. This research involved a national survey in conjunction with NHS Improvement of the 217 NHS Trusts (which employ around 800,000 of the NHS's 1.2 million staff); international and cross-sector comparisons; interviews; validation workshop, and analysis of Trusts' annual returns which reported increasing safety failures and shutdowns, with maintenance backlogs growing to £6.5bn, causing significant risk to patients and service continuity. This led to LU's nine evidence-based recommendations which, following their implementation, produced a step-change in how NHS assets are funded and managed.

The DHSC adopted our recommendations within its Health Infrastructure Plan (HIP, '*the biggest hospital building programme in a generation*') including the development of a new, strategic approach to improving healthcare infrastructure. Consequently, NHS capital funding allocations changed from a one-year to a five-year rolling allocation within a 10-year plan, with an effective replenishment, replacement, and disposal strategy for the NHS estate. Furthermore, the capital funding is now linked to short, medium, and long-term incentives and actions which has changed the way that the life cycles of NHS infrastructure and assets are governed, planned, financed, procured, designed, built, managed, and decommissioned [S1, S2].

Our ranking of maintenance backlogs within 223 NHS Trusts provided evidence to NHS Improvement in their discussions with Treasury as to where this funding should target and resulted in substantial new, long-term, investment in the future of the NHS estate, beginning with "*£600 million to reduce backlog maintenance and improve the NHS Estate; and 40 hospitals to be built by 2030 as part of a package worth £3.7 billion*" [S1].

"The research evidence and recommendations informed and strengthened the NHS Innovation's business case development for NHS Estate Funding and discussions with Treasury Without this evidence it is unlikely that the recently announced funding would have been secured." [S1]

The NHS now plans and manages its estate in accordance with LU's recommendations for a long-term approach and improved data quality, with a backlog data collection processes that is now embedded within the NHS Model Hospital and NHS Premises Assurance Model (PAM), with sustainability and estate digitalisation being central to the HIP [S1, S2].

Impact 2: Improved the quality of life and care for people living with dementia

LU research on how the built environment informed the selection, design, and operation of the DHSC England's National Dementia £50 million Capital Investment Programme's 115 England-wide pilot projects, the delivery and impact of which LU were employed to monitor and assess. This was achieved through our extensive knowledge exchange process and strong pathways created with project stakeholders (e.g., design teams and end-users), including a website, workshops, webinars, presentations from experts and 25 detailed case studies, report templates, and impact assessment methodology [S3].

Incorporation of our research findings within the design process by pilot projects delivered innovative dementia-friendly care environments, including the use of supportive technologies and dementia-friendly design details, which provided cost-effective benefits to ≈ 100,000 patients, staff and carers [S3]. Self-evaluation of the changes by the project teams and analysis by LU researchers determined that in acute, social and community settings, sustained improvements in the three areas described below have been achieved over the past four years, and will remain for the foreseeable future [S4]:

- i. People living with dementia benefited from reduced stigmatisation and institutionalisation, increased privacy and dignity, improved quality of life of (e.g., sleeping patterns, eating habits, daily activities, medication, interaction with relatives and staff) and reduced slips, trips, falls and challenging behaviour [S4, S5, S6, S7].
- ii. Staff experienced calmer and safer environments and improved their understanding of the impact of the environment especially when managing complex needs [S4, S5, S6, S7].
- iii. Care providers benefited from reduced costs associated with decreased staff sickness rates and turnover, and reduced interventions, e.g., medication [S4, S5, S6, S7].

There was significant roll-out of our research and pilot project experience into projects outside the DHSC Dementia Capital Programme, including in University Hospital Leicester (UHL) and Cambridge University Hospital (CUH) as testified by Rachel Northfield - Estates and Facilities, Head of Quality and Safety Governance, CUH:

"Principles from the project have been translated into other schemes wherever possible. It acknowledged that environments for those with dementia also support those with other disabilities or other needs" [S10].

The research has, according to the NHS, enabled them to "achieve significant improvements in the quality of life of those living with dementia" [S1].

Impact 3: Produced new national guidance for designing dementia-friendly built environments

LU's multiple award winning [S8] research and real time evaluation [S3] of how the built environment can provide dementia-friendly conditions in the UK's hospitals and 32,000+ care homes has fundamentally changed the way the NHS specifies its new and upgraded facilities and how design consultants deliver them.

Our analysis of the DHSC England's National Dementia Capital Investment Programme and its 115 pilot projects (costing £50 million) which led to improved QoL and care directly led to and shaped the development of *Health Building Note HBN08-02, Dementia-friendly Health and Social Care Environments*. [S9] This is the first HBN covering both health and social care and provides national guidance enabling architects, designers, and care providers to ensure all new or refurbished facilities are dementia friendly. The LU team are named as the only authors of the HBN. The Chief Executive of Care England, Prof Martin Green OBE said, in the Foreword:

"I am extremely delighted with this new guidance document, which has been put together by some of the leading figures in the health and social care sector... This expertise is now available to all those who are running or developing dementia services ... [as] the foundation for all development and refurbishment decisions" [S9].

This guidance has been adopted in England, Scotland, and Wales. It is mandatory for the design of all new and refurbished NHS buildings, including HIP. It has also been embedded within

national annual governance, evaluation, and assurance processes (e.g., NHS PAM and Patient-Led Assessments of the Care Environment: 'PLACE'). This motivated care providers to improve their environments in ways which benefits the 850,000 (projected to increase to 1.6 million by 2040) people living with dementia in the UK [S1, S9]. There were clear and measurable improvements in the assessment scores of how the environment supported the provision of clinical care, assessing privacy and dignity, food, cleanliness, general building maintenance and the extent to which the environment supported the care of those with dementia [S9]. This quantifies and showcases the positive change made through the application of our research, now translated into published national design guidance, HBN08-02.

Finally, Price and Pantzartzis worked closely with the design team for the recently built new Emergency Floor, University Hospitals of Leicester (UHL). Dr Pillai, Head of Service, Emergency Department, used HBN08-02 as the basis for ensuring a frailty and dementia friendly design was achieved:

"UHL staff used the guidance contained within HBN 08-02 which led to better insight into design principles (floor, colour scheme, internal layout, visual impact etc) ... Staff are unanimous in how it has improved the working condition for them and allowed them to provide better care to the patients".

The outcome, and calmer environment, has improved patient care and experience. It has benefitted working environments leading to better staff morale, recruitment, and retention [S10].

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

- S1: NHS Improvement testimonial** on impact relating to three projects: delivery of the £50M dementia capital programme; developing HBN 08-02; and providing evidence and recommendation for the reduction of Critical Backlog Maintenance. Also stating HBN has been adopted by Northern Ireland, Wales and Scotland and how bodies have developed tools to assess compliance with HBN 08-02. Evidence that demonstrates how the research informed dementia metrics used in the NHS PAM and DHSC's PLACE.
- S2: Report to NHS Improvement on NHS Estate Backlog Maintenance and Critical Infrastructure Risk, 2018.** Main report and Executive Summary. Evidence of impacts.
- S3: Final Recommendations Report (FRR) to the DHSC on pilot projects and published evidence on scale of stakeholders' engagement.** Improving the environment of care for people with dementia. Includes Executive Summary to Secretary of State for Health). Authors: Price, Pantzartzis and Pascale. Oct 2015. Report the delivery of 115 PPs funded by the £50M DHSC's Dementia Capital Investment Fund. Also summarises the knowledge exchange processes which took place during the delivery and published evidence of the scale of stakeholders' engagement.
- S4: Responses to recent survey of 8 Dementia Pilot Projects.** Provides evidence of impacts.
- S5: Compilation of individual pilot project summary reports.** Appendix G to the Final Recommendations Report (FRR) by LU for DHSC: comprises a compilation of the individual summary reports produced by the 115 pilot projects. More detailed reports summarise the impacts made by the individual projects (e.g., S6 and S7).
- S6: Two NHS Pilot Projects (Royal Berkshire and Cambridge University Hospitals) Final Reports.** Provides impact evidence.
- S7: Three Local Authority (Social Care) Pilot Project Final Reports.** Impact evidence.
- S8: Dissemination activities and awards for the dementia research and its impact.**
- **Winner** Market Research Society (MRS) Healthcare Research Award 2015.
 - **Finalist** Market Research Society (MRS) Grand Prix for Greatest Impact Award 2015.
 - **Highly Commended Finalist.** Loughborough University (LU) Enterprise Awards 2015.
 - **Shortlisted.** Royal Institute of British Architects, President's Awards for Research 2015.
 - **Best Non-Student Research Project Award** Int. Academy, for Design & Health 2015.
 - **Award of Excellence** paper, 24th International Fed of Hospital Engineering Conf 2016.
- S9: PLACE and HBN 08-02.** Improved dementia care performance of NHS hospitals since the publication of HBN 08-02. Evidence the production of national guidance by the LU team.
- S10: UHL and CUH (Cambridge University Hospital):** Demonstrates longevity of impact and application of HBN 08-02 and our engagement with NHS Trusts.