Institution: University of Leeds

Unit of Assessment: UOA1 Clinical Medicine

Title of case study:

Case Study 9. Changing cancer services and improving patient outcomes in the UK

1. Summary of the impact

Research in Leeds showed, conclusively for the first time, improved outcomes for cancer patients managed in multidisciplinary specialised cancer care teams. Our research and systemic overview provided the evidence for a new government policy to reconfigure cancer care services into Cancer Networks, Centres and Units. This required radical evidence-based changes including centralisation of many cancer surgical services. A rigorous implementation plan based on research evidence, was initiated under Leeds leadership and sustained in subsequent government policies. It changed clinical guidelines and professional standards, altered practice for all UK cancer patients and contributed to improved cancer survival.

2. Underpinning research

In the early 1990s, cancer survival in the UK was shown to be poor compared with other developed countries. There was a recognised need for radical change and an Expert Advisory Group (EAG) was convened in 1994 by the Chief Medical Officers Sir Kenneth Calman and Dame Deirdre Hine, with **Peter Selby**, (Leeds 1989- , Professor of Cancer Medicine), as Consultant Advisor, and **Bob Haward** (Leeds 1995-, Professor of Cancer Studies), as the Public Health representative. While it was clear that cancer services needed to improve, both the EAG and the Department of Health (DH) were determined that policy should be evidence based. Work in Leeds, published in 1995, highlighted the relationship between high clinician workload, a crucial surrogate for specialisation, and multidisciplinary patterns of treatment on survival from breast cancer. This evidence and a key systematic review on the benefits of specialised care also conducted in Leeds and published in 1996 (2) informed new DH policy - the Calman Hine plan - to provide multidisciplinary specialised care in a system of Cancer Networks, Centres and Units.

The systematic review of all available evidence (2) drew strongly on data from Leeds and similar work on consultant workload from Glasgow, but also evaluated evidence worldwide. Evidence to support various aspects of specialisation such as training, caseload, and the formation of multidisciplinary teams was strongest for breast cancer, ovarian cancer, and some haematological malignant diseases. The largest number of patients referred to in the review were included in Leeds studies. The review concluded that there was evidence that some specialised care can be successfully delivered by a network of district hospitals and main general or teaching hospitals and does not always require referral to cancer centres, which strongly influenced the recommendations of the EAG and subsequent policies. The review, authored by Selby, was incorporated into the Calman-Hine Plan in 1995 [A].

Haward, David Forman (Leeds 1994-2010, Professor of Cancer Epidemiology), **Phil Quirke** (Leeds 1990- , Professor of Pathology), **Eva Morris** (Leeds 1999-, Principal Research Fellow) continued to research the relationship between specialised care for colorectal and gynaecological cancers and better survival (3-5). Analysis of cancer-registry data from 12,861 patients with breast cancer treated in Yorkshire showed that patients of surgeons with higher rates of multidisciplinary care indicated by use of chemotherapy and hormone therapy, had improved survival. There was considerable variation between surgeons, 26% of which could be explained by rates of use of chemotherapy and hormone therapy. Had the practice of the surgeons with the best outcomes been followed by all treating clinicians, 5-year survival would have increased by about 4-5% (1-3). Analysis of the differences in survival as a function of consultant caseload showed poorer results amongst those surgeons treating less than 30 new cases of breast cancer per year. Similar Leeds studies on cervical cancer and on colorectal cancer showed variation in outcomes that strongly suggested improved outcomes could be achieved by specialisation and multidisciplinary care (4,5). This work continued to inform DH policy.

3. References to the research

(1) Sainsbury R, Haward B, Rider L, Johnston C, Round C. Influence of clinician workload and

patterns of treatment on survival from breast cancer. Lancet 1995; 20: 345: 1265-70.
This study provided compelling evidence to support multidisciplinary team working and specialisation of care with substantial patient volumes per team to improve patient outcome.
(2) Selby P, Gillis C, Haward R. Benefits from specialised cancer care. Lancet 1996; 348: 313-18.
This systematic overview provided the evidence framework underpinning the Calman/Hine (Expert Advisory Group) Report, 1995 and a shortened version was included in the Report.
(3) Stefoski Mikeljevic J, Haward RA, Johnston C, Sainsbury R, Forman D. Surgeon workload and survival from breast cancer. Br J Cancer 2003; 89: 487-91.
This study confirmed with long follow up the importance of surgeon workload in predicting outcomes from breast cancer.
(4) Downing A, Mikeljevic JS, Haward B, Forman D. Variation in the treatment of cervical cancer patients and the effect of consultant workload on survival: a population-based study. Eur J Cancer 2007; 43: 363-70.
Analysis showing specialised teams managing substantial numbers of patients with cervical cancer generated better outcomes for patients.
(5) Morris E, Quirke P, Thomas JD, Fairley L, Cottier B, Forman D. Unacceptable variation in abdominoperineal excision rates for rectal cancer: time to intervene? Gut 2008; 57: 1690.
Study showing the variation in outcomes for patients undergoing major surgical resection for rectal cancer was substantial and dependent on surgeon workload.

4. Details of the impact

Leeds research into the factors which determine better outcomes for cancer patients identified multidisciplinary specialised care as important and proposed networks of care as a suitable means to deliver this. This evidence, directly included in the 1995 Calman-Hine report [A], underpinned new government policies, which were systematically implemented, changing guidelines, NHS systems and healthcare practice and leading to improved survival for cancer patients.

Creating the impact: an active programme of implementation (1995-2007)

Prior to the evidence-based Calman-Hine report which drew heavily on Leeds research, cancer services were fragmented with care often delivered by generalists working in isolation in a single discipline, such as surgery, medicine or radiotherapy. The research at Leeds underpinned the development of the new policy of networks of multidisciplinary teams with specialist services provided at fewer centres. The implementation of this strategy was actively supported and funded by the DH with leadership provided from Leeds (**Haward, Mark Baker**, Yorkshire Cancer Network Director and **Sean Duffy**, Leeds 1990- and Yorkshire Cancer Network Director). The plan reconfigured services into Cancer Centres, Cancer Units and Cancer Networks covering specific geographical areas. It involved the designation of appropriate hospitals, consultants and teams to provide specialised services, including major surgery, for patients with rare and intermediate frequency cancers. Cancer Units with adequate patient volumes to provide sufficient multidisciplinary care were identified.

This strategy radically changed services in England and Wales affecting over 250,000 new patients every year. Selby and Haward were involved in designing the new services and planning their implementation. A series of service guidance documents developed by Haward determined how services for all the main types of cancer should function and how the component parts fitted together. Improving outcomes guidance, subsequently national cancer guidance, was prepared first for breast cancer and then sequentially in all cancers (from 1995-2006) [B]. These documents make multiple references to Leeds-based research. In breast, colorectal and lung cancer, specialists moved to multidisciplinary team working; in upper GI, urological and gynaecological cancers guidance led to changes in hospital treatment, required multidisciplinary and specialised treatment and defined the minimum caseload necessary for surgeons. Patients with rare cancers were all referred to Cancer Centres. The established principles in the Calman-Hine report were supported by further Leeds research and were incorporated in subsequent policy documents and service guidance [C]. The evidence-base was vital to gain support for radical changes which had the potential to be unpopular. This is likely to have been the first time that volume/outcome evidence was used in a systematic way to radically change a health system. The result of this systematic evidence-based implementation has been a sustained and ongoing improvement to services and patient outcomes in the impact window 2008-2013.

Impact on cancer care services

There has been a radical overhaul of the way multidisciplinary care for cancer is delivered and the configuration of services, a national strategy which has remained as a cornerstone of service provision. Since 2008 up to 2013 this has ensured that across England and Wales, appropriate teams are in place with adequate degrees of service centralisation and specialised workload. A rolling programme of peer review has been established for each service. Designated requirements are in place for the membership of multidisciplinary teams, the referral of cancer patients and their review in multidisciplinary team meetings, with clear criteria for the service volume requirements for a specialised multidisciplinary team in a Cancer Centre or a Cancer Unit. The National Cancer Peer Review (2010-2013) database [D] records these service changes for all cancer care in England and Wales ensuring these improvements reach all cancer patients and are sustained.

Impact on patient survival

All cancer patients now receive expert, peer-reviewed, multidisciplinary specialised care. This has been a major factor in the increase in median survival from three years in 1995 to five years for patients diagnosed in 2008. The proportion of all cancer patients who survive for five years has increased from 40% in 1995 to over 50% in 2008. This impact is ongoing with survival figures continuing to improve [E,F]. Cancer Research UK have analysed one, five and ten year survival for England prior to Calman-Hine (1991-1995) and in five year cohorts up to 2010 for the 21 most common cancers [F]. Substantial increases in survival of over 5% at 5 years are seen in 16 cancer sites including the common cancers of breast (13% increase), colorectal (12% increase) and prostate (over 15% increase). Important exceptions are cancers of the pancreas (2% increase), lung (4% increase) and brain (4% increase) where even specialised treatments have not led to substantial improvements; testicular cancer where 5 year survival is 97%; and bladder cancer which has not changed. Although other factors have contributed substantially including novel therapies, epidemiological studies and expert opinion have attributed a significant proportion of that improvement to the changes in policy and care practices described here [G,H,I,J]. Multidisciplinary specialised care, Cancer Networks, Centres and Units and peer review driven service delivery and healthcare practices are regarded as important factors in improved patient outcomes [H,I]. If best multidisciplinary specialised practice results in improvements of 5% in 5 year survival as was shown in Leeds research (1,3) a conservative estimate of the impact of specialised multidisciplinary care on 5 year survival across all cancers at 1-2% increased survival on average, would imply many thousands of lives saved every year in England alone before, during, and continuing after the Impact period, 2008-2013.

Sir Kenneth Calman, Chief Medical Officer (1991-1997), himself a cancer specialist said: *"The reform of cancer care to ensure all patients were treated by specialists who were working in multidisciplinary teams was of great importance. Dame Deirdre Hine and I were absolutely committed that it should be firmly based on research evidence to ensure the best care and use of resources and to give us an evidence-based platform to persuade clinicians to change their practices. These changes included radical reconfiguration of surgical services for major cancer operations. Leeds oncology/public health research was critical to our plan and to its successful implementation.* [H]

Sir Michael Richards, National Cancer Director (1999-2012) said: *"The evidence-based plans for multidisciplinary specialised cancer care and the radical reconfiguration of cancer services have resulted in improvements in care and survival for cancer patients which continue to this day. Leeds research informed the first plan and changes were sustained in the National Cancer Plan of 2000 and the subsequent strategies in 2007 and 2011 and this theme continues up to 2013. The strong evidence base provided by Leeds, incorporated into the planning process, was a critical element of its ongoing success."* [I]

The international impact of the evidence generated by the Leeds team is confirmed from Australia and New Zealand [J]. **Professor Jim Bishop**, the former Chief Medical Officer of Australia, said "*The initial work done at the University of Leeds by Haward and Selby was an important basis for the recommendations within the report by Calman and Hine on cancer services improvement in the UK. This evidence and subsequent work from Leeds have provided an important part of the much needed evidence base to establish programs to improve the performance of cancer services in Australia. In*

particular, these data were influential in the development of cancer plans and in the support for multi-disciplinary care.
As the Chief Medical Officer for Australia, and Board Member of Cancer Australia (current Chair) the Australian Government Cancer Agency, I note that this evidence was also influential within the policy framework for Cancer Australia especially in promoting multi-disciplinary care in Australia. Cancer Australia has subsequently developed an extensive program of support, evaluation and best practice approaches for multi-disciplinary care in Australia as national standards."

5. Sources to corroborate the impact

[A] A policy framework for commissioning cancer services: A report by the Expert Advisory Group on Cancer to the Chief Medical Officers of England and Wales/Calman Hine Report 1995.
http://webarchive.nationalarchives.gov.uk/20080814090336/http://dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4071083?IdcService=GET_FILE&dID=17110&Rendition=Web
This report was the initial step in the impact of the Leeds research and the inclusion of the evidence in the report itself (authored by Selby) demonstrates the contribution to the report.
[B] Improving Outcomes in Breast Cancer. July 1996. Produced by Department of Health. Manual Cat.Nos. 96 CC0021 & Research Evidence 96 CC0022.
National Institute for Clinical Excellence: National Cancer Guidance Steering Group. Improving Outcomes in Urological Cancers. September 2002: NICE. www.nice.org.uk
National Cancer Guidance Group. Improving Outcomes in Upper Gastro-intestinal Cancers. Jan 2001: Produced by Department of Health. Manual & Research Evidence 23180 and 23943.
National Cancer Guidance Group. Improving Outcomes in Gynaecological Cancers. July 1999: Produced by Department of Health. Manual & Research Evidence 16150.
Improving Outcomes in Colorectal cancer. November 1997. Produced by Department of Health. Manual 97CV0119 & Research Evidence 97CC0120.
National Institute for Clinical Excellence: National Cancer Guidance Steering Group. Improving Outcomes in Haematological Cancers. October 2003: NICE. www.nice.org.uk
[C] The DH Cancer Plan 2000; The DH Cancer Reform Strategy 2007; DH Improving Outcomes a Strategy for Cancer 2012. The DH Manual of Cancer Standards 2000 which then became updated in 2004 and 2008 as the DH Manual for Cancer Services 2004, 2008, 2009 and 2011.
These were plans which drew on multidisciplinary and specialised care developed through Calman/Hine and sustained the specific Improving Outcomes Guidance.
[D] National Cancer Peer Review (NCPR) database (2010-2013). CQuINS The Cancer Quality Improvement Network System; a web based database used to support the Peer Review process. http://www.cquins.nhs.uk/
This is a national, Department of Health system and Mr Martin Waugh, Cancer Centre Information Manager has written a note explaining its use in practice.
[E] Walters S, Quaresma M, Coleman MP, Gordon E, Forman D, Rachet B. Geographical variation in cancer survival in England, 1991-2006: an analysis by Cancer Network. J Epidemiol Community Health. 2011 Nov;65(11):1044-52.
[F] Data supplied by Nicholas Ormiston-Smith, Head of Statistics, Cancer Research UK. Survival estimates were provided by the Cancer Research UK Cancer Survival Group, London School of Hygiene and Tropical Medicine on request, 2011. http://www.lshtm.ac.uk/eph/ncde/cancersurvival/
[G] Autier P, Boniol M, La Vecchia C, et al. Disparities in breast cancer mortality trends between 30 European countries: retrospective trend analysis of WHO mortality database. BMJ 2010 ; 341: c3620. Autier P, Boniol M, Gavin A, Vatten LJ. Breast cancer mortality in neighbouring European countries with different levels of screening but similar access to treatment: trend analysis of WHO mortality database. BMJ 2011; 343: d4411.
[H] Letter including quote from ex-Chief Medical Officer, Sir Kenneth Calman, 2 January 2013.
[I] Letter including quote from National Cancer Director, Professor Sir Mike Richards.
[J] International Corroboration, Professor Jim Bishop, Melbourne, Australia, 9 October 2013.
Letter and quotes from Professor Bishop who is an international authority on cancer service developments and former Chief Medical Officer of Australia. International Corroboration, Professor Bridget Robinson, Christchurch, New Zealand, 4 October 2013, *who is an international authority on cancer service developments.*