Context and Objectives

Context

The focus of the major part of research in health care has been on clinical and other interventions designed to improve health while health care managers and policy makers, seeking to improve health care delivery, have primarily focused on improvements in the drugs administered, the procedures undertaken and organisational structures. However these elements account for a minority of health care spending: two thirds of expenditures on health are accounted for by staff costs. Despite this very little attention has been given to researching this item of spend.

This position is no longer tenable as health care systems come under pressure from both rising demand for health care and increasing constraints on health care spend. Research into the cost effectiveness of the largest item of spend is essential. Policy makers are now turning their attention to the health workforce and there is increasing recognition that expanding the roles of some health professions, primarily nurses, may offer a way of mitigating these pressures. In recent years some countries have formalised extended roles for existing health care professionals, while they and others have created new professions that sit between doctors and nurses, such as Advanced Nurse Practitioners and Physician Associates. The MUNROS project was conceived with this understanding in mind.

The overall aim of the MUNROS project was to identify and measure changes in the roles and responsibilities of health professionals across nine different health systems in Europe and to assess their impact on health outcomes and health costs. It further sought to explore the consequences of these changes for the way we plan for the health workforce of the future, for workforce planning. The project ran over 54 months from 1st October 2012 to 31st March 2017. It involved seven European Community countries, Czech Republic, England, Germany, Italy, the Netherlands, Poland and Scotland, one associate country, Norway, and one applicant country, Turkey.

Objectives

The MUNROS project sought to explore changes in roles and responsibilities by first, identifying 'who does what' in a sample of different health care settings and health care systems. In so doing it would be able to identify those tasks which in similar settings were undertaken by different professions and where there appeared to be scope for one profession to shift tasks to another, or for one profession to substitute in the performance of some tasks for another profession. Where task shifting between professions was identified it would have implications for costs, because the different health professions typically have different salaries. The MUNROS project therefore set out to explore the cost consequences of such task shifting.

Health systems exist to attend to the health needs of the populations they serve. Any investigation into changes in the way health care services are delivered must therefore evaluate the impact of such changes on health outcomes as well as on costs. The MUNROS project therefore set out to explore the impact of such task shifting on health outcomes and to identify the different workforce configurations that could deliver similar or indeed identical health care.

Any sustained change in the composition of the health workforce will have consequences for workforce training: the numbers required to train in each of the health professions will change. Forecasts of the numbers required to train are informed by workforce planning models. The MUNROS project therefore sought to explore the implications of new and extended roles for workforce planning.

Specifically it set out to achieve its aim through the following objectives. First it recognised that while the relationship between changes in staff inputs and changes in health outcomes is sometimes investigated at a system wide-level, and could therefore form a central element of this project, the data to allow this do not exist. A central part of the MUNROS project would therefore be

the generation and analysis of primary data. It noted that it has proven exceptionally challenging to make comparisons between health systems and to estimate the relative efficiency of different health systems because of the many sources of (often unmeasured) heterogeneity between systems.

Many factors confound the relationship between changes in health service inputs and changes in health outcomes at a system-wide level. The composition of services differs between countries for a range of reasons. First the relative incidence of different diseases and conditions requiring treatment differs between countries, and therefore the need for different procedures differs. Second the mix of approved procedures differs due to the decisions of the regulatory authorities in different countries. For both these reasons the procedures undertaken and the mix of professions delivering those procedures within the health care systems differ between countries. Third, organisational and financial structures differ between countries and finally the health of patients presenting differ between health systems. Controlling in a rigorous way for all these differences, which effect on the relationship between health service inputs and health outputs, is impossible given the data currently available to researchers.

The MUNROS project therefore embraced a micro approach and it did so by focusing on three well defined clinical conditions and their associated care pathways. This micro approach was judged to have the following advantages. First the three clinical procedures each had established protocols prescribing what should be done. Clinical protocols and guidelines are condition specific and determine the management of the disease; prescribing the procedures, drugs and technologies to be employed. The focus on pathways would therefore mean that the MUNROS researchers had in effect controlled for some of the other factors that would otherwise confound the relationship between differences in the composition of the health workforce and health outcomes. Second, the focus on clinical conditions, and their associated care pathways, would mean researchers could refine the measures of health outcome and seek to obtain only those measures appropriate to patients treated along these pathways. Third, through a detailed patient completed questionnaire, they should be able to obtain details of a wide range of patient characteristics and of any co-morbidity associated with differential health outcomes. Finally by looking at pathways within hospitals, they should be able to obtain data on hospital characteristics and thereby control for differences between hospitals in throughput and technology, both of which may affect health outcomes.

The study design was cross-sectional - data was gathered from health professionals, managers and patients through questionnaires referencing a specific time period - and multi-level, located within care pathways within hospitals. A mixed methods approach was adopted which combined systematic reviewing, analysis of routinely collected and register data, qualitative methods (case studies) and extensive surveys.

Clinical Pathways

The first important step in implementing the project design was identifying the clinical conditions and their associated care pathways which were to be studied. Three clinical conditions were selected from a list generated in consultation with clinical managers, workforce managers and patient representatives in each partner country. The conditions were selected according to an agreed set of criteria. The selected conditions and their associated pathways were: breast cancer; type 2 diabetes; and heart disease.

Partner Countries

Countries were selected to reflect the diversity of systems in Europe and the different stages of reform of healthcare systems. They included those: in the later stages of transition from highly centralised (ex-communist) systems (Czech Republic and Poland), at the forefront of innovation of delivery systems (Netherlands, Scotland and England), with more established and stable systems (Germany, Italy and Norway), and a rapidly developing country (Turkey).

Hospitals and primary care centres

The study setting was twelve hospitals and sixty associated primary care centres (average 5 per hospital) in each of the nine countries.

Participants, eligibility and recruitment

Two categories of staff and those patients receiving care along each pathway were identified and recruited from a participating hospital or general practice. They were:

- *Healthcare professionals and managers*: All healthcare professionals providing care to patients within one of the three selected care pathways - from the point of diagnosis to long-term follow-up - were eligible to take part, together with all healthcare managers responsible for decision-making about the workforce providing care for these patients.
- *Patients*: A random sample of patients within each of the three selected care pathways was eligible to take part as long as they: were 21 years and over (note there is no upper age limit); were receiving care in one of the three care pathways and; had the capacity to understand the purpose of the study and complete the questionnaire.

The Questionnaires

Healthcare Professionals

The questionnaire content was based on case studies conducted in earlier stages of the project. Questionnaires were tailored to be condition specific, while covering the same generic items across conditions, and designed through extensive discussion with all health professionals involved in these pathways. The questionnaire presented to healthcare professionals asked:

- *About You; Where you work and who you work with;* the *tasks undertaken and time spent working with patients along the pathway;: your opportunity to undertake new roles; changes in the mix of staff working on the relevant care pathway;* and *the integration and specialisation of care.*

Healthcare Managers

The structure of the healthcare manager questionnaire was similar to that of the health care professional questionnaire and many questions were either identical or similar to those presented to health care professionals. The questionnaire sent to healthcare managers included the following sections:

- *About you; about the staff you manage; how you decide who does what; changing the mix of staff working on the relevant care pathway; the integration and specialisation of care*.

Patients

The patient questionnaire asked:

- *about your health; about the care you received for your Breast cancer/Heart disease/type 2 diabetes; your experience of care for your Breast cancer/Heart disease/type 2 diabetes; your use of health care services for your Breast cancer/Heart disease/type 2 diabetes; the value you place on your care: about you.*

Data management and analysis

Data from returned questionnaires was entered into an Excel spreadsheet following agreed data coding rules. Double data entry was undertaken for a 10% sample to check for accuracy. Where discrepancies were identified the original questionnaire was checked and the figure corrected as necessary. Data were cleaned following a standard protocol, identifying out of range entries, inconsistencies and data anomalies, and checking back to the original questionnaires as necessary. Final datasets were exported into a *Stata* database for analysis, using a standard syntax and according to an *a priori* data analysis plan agreed with all partners.

Governance and approvals

In the UK Ethical approval was given by NHS Research Ethics Committee Yorkshire and the Humber – Leeds East (Ref.: 14/YH/1052). NHS R and D approval was provided by the individual Research and Development departments of the Health Boards in which the study took place. The documentation used for the UK approval was circulated to other partners to translate and adapt as necessary to meet their own country's ethical guidance.

Following standard University guidance all the data and databases were stored on security protected *computers* and servers with automatic daily archiving at individual sites. A password protected MUNROS Microsoft SharePoint web based application was set up by Aberdeen University, and installed on the University IT infrastructure. All individual country data and collated, all-partner, datasets were stored there. At the end of the project (March 30th 2017) all data sets were locked and they will be retained on SharePoint for a further 10 years. Electronic transfer of data using USB drives or similar, zipped files or other portable media was password protected. At all times the Data Protection Act, laws of privacy and confidentiality, European Law of Human Rights and Good Clinical Practice were complied with together with other relevant national or EU legislation including Article 29 Workgroup paper WP131: The Processing of Personal Data relating to health in Economic Health research.

Cost Data

Data was extracted from the patient questionnaires, national health statistics, national wage surveys and gathered directly from hospitals. Three month healthcare costs were estimated using data from the questionnaires on patients' self-reported healthcare consumption which involved hospital admissions, visits to professionals at three different sites (hospital, general practitioners practice and other health care settings), treatment and diagnostic procedures, and medication. Societal costs were estimated using data on informal care received from the patient questionnaire, and productivity losses calculated using data from national wage statistics and information from the questionnaire on working time lost. Data on the unit costs of all items of care consumption were collected by partners using national secondary data and/or information obtained directly from participating hospitals. The resource use and unit costs data were combined to compute the health care and societal costs per patient.

Health Outcome Data

In all countries, data on health outcomes and processes were collected for the three care pathways (save the Netherlands and Germany which collected for two) in up to 12 hospitals. A principal source of data was the surveys of patients, health professionals and managers in each country. These surveys provided important information on patients' perceived health, on their satisfaction, and on professionals' involvement in their treatment. The measure of nurse involvement employed at this stage of the analysis was the MORNI. The analyses undertaken controlled for a number of hospital and patient characteristics that it was judged might affect patient and resource use.

Information on outcomes and process was obtained for a sample of patients for five countries - Germany, the Netherlands, Italy, the Czech Republic and Turkey - from routine data or patient records. These data are extremely difficult and costly to acquire, resulting in somewhat less extensive coverage of variables. For three countries, Scotland, England and Norway, the analysis uses very detailed register data, covering all patients in hospitals included in the survey, for one year (2013).