Cost-Effectiveness Of Major System Change in Specialist Cancer Surgery in London

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Background: Studies have shown that centralising surgical treatment for some cancers, including urological and oesophago-gastric, can reduce mortality and shorten lengths of stay. If centralised services deliver improved care at similar or reduced cost, potentially through economies of scale, then the centralised model would be more cost-effective than the preceding model. Clear evidence for this via high-quality economic evaluations is however currently lacking.

Methods: The RESPECT-21 mixed-methods study investigated reconfiguration of specialist surgery services for urological and oesophago-gastric cancers in an area of London. As part of this study, we used routine patient-level data to calculate the net monetary benefit (NMB) of the reconfigured services in the London Cancer (LC) region before and after the reconfigurations, compared to services in the rest of England (RoE) using difference-in-differences, for patients receiving surgery. NMB is calculated as total quality-adjusted life-years (QALYs) multiplied by a range of cost-effectiveness thresholds, minus total costs, over a 10-year time horizon. The NMB was calculated per cancer, time period, and region, using models beginning on date of surgery and comprising a short-term decision tree followed by a 10-year Markov model with 6-monthly cycles. Costs (payer perspective) were calculated by multiplying patient-level hospital resource use by published NHS Reference Costs. QALYs were calculated as the area under the curve using estimated quality-of-life scores from aggregated published values. The overall adjusted, discounted overall 10-year costs and QALYs were calculated by summing the costs and QALYs from the decision tree and Markov sections for each cancer. Uncertainty was explored using bootstrapping of costs and QALYs, with results expressed on cost-effectiveness planes and cost-effectiveness acceptability curves.

Results: The reconfigurations of prostate cancer surgery services in LC around 2016 led to potential cost savings of approximately £190,000 per year compared to the RoE scenario, driven by comparatively shorter LOS and fewer readmissions after surgery, and comparatively lower mortality rates translating into potential QALY gains. There was no evidence that renal or bladder reconfigurations led to significantly different costs or QALYs compared to RoE. The OG reconfigurations seemed to lead to comparatively higher treatment pathway costs in patients receiving surgery, with no significant difference in QALYs. There was high probability (≥90%) of the LC changes leading to more cost-effective treatment provision in prostate cancer specialist surgery compared to services as provided in RoE. There was a low probability of the LC reconfigurations having been cost-effective for bladder, renal or OG (0-41%) at standard cost-effectiveness thresholds. If the reconfigurations are taken together, they would have resulted in a 10-year cost saving of £74,000 to LC compared to RoE per annual LC cohort, although with 79 fewer QALYs overall.

Implications: The reconfigurations in prostate cancer in the LC region appeared to have a high probability of being cost-effective compared to what happened elsewhere in RoE. It is not clear however whether these results can be taken in isolation, given that these reconfigurations occurred simultaneously with reconfiguration of other services, and health care service delivery in the NHS is highly networked and collaborative, as observed particularly during the Covid-19 pandemic and as discussed in work published by the RESPECT-21 study team regarding provider networks. A limitation of this work is that quality-of-life scores were estimated rather than routinely captured, meaning changes in side effects or other important outcomes were not reflected in the QALYs, and other benefits of reconfiguration both for surgery patients and elsewhere in the tumour pathways and more broadly, for example changes in treatment decisions including non-surgical options, and aspects such as expanding opportunities for research, were also not included.

Estimating The Cost of Inpatient Diabetes Care in An Irish Public Hospital

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Background: The World Health Organisation Global Report on Diabetes estimates that 422 million adults were living with diabetes in 2014 compared to 108 million in 1980. The global prevalence of diabetes has nearly doubled since 1980, rising from 4.7% to 8.5% in the adult population with precipitous growth in low and middle-income countries. Recent estimates suggest that the number of people with diabetes across the world will increase from 415 million in 2015 to 642 million by 2040 and suggests that even if countries meet internationally set targets, the global economic burden from the disease will nonetheless increase by 88%.

Methods: A retrospective audit of inpatient admissions for the period 2013-2017 inclusively was undertaken to establish the primary causes and costs of diabetes-related hospital admissions at an Irish public hospital. The data sample comprised of 7,548 admissions with diabetes related hospitalisations. Up to 16 diagnosis fields and up to 5 procedure fields were provided in addition to admission and discharge dates, age, gender admission type (elective and unscheduled), discharge type (residence/home, nursing home, emergency and nonemergency transfer to other acute hospital, psychiatric hospital and decreased), length of hospital stay (days), insurance type and associated Diagnoses Related Group (DRG). A series of descriptive, univariate and multivariate analyses were undertaken to estimate and examine the costs associated with the care of type 1 diabetes and type 2 diabetes in the Irish public hospital system.

Results: The odds of being admitted to hospital with T2D were 1.28 times higher if the patient was male than if they were female and 1.90 times higher if the patient did not have diabetes-related complications. Admissions with T2D were 12.14 times higher if the patient did not have a diagnosis of diabetes recorded as their primary condition while those with T1D were younger (M=49.85) than those admitted with T2D (M=76.88). Mean inpatient costs were found to be higher for inpatients with T2D recorded as elective admissions than for unscheduled admissions and among those without diabetes as their primary diagnosis. However, mean inpatient costs, among those with T2D, were lower than for those with no reported diabetes complications. There was a significant effect for discharge destination on inpatient costs with each unit increase in discharge destination showing an increased inpatient cost of €794.86 and €1362.31 for T2D and T1D admissions respectively. Unscheduled admissions cost approximately €1889.05 less than elective T2D admissions while those with diabetes complications cost an average of €720.88 more than their diabetic counterparts with no diabetes complications. In T1D admissions, female inpatient admissions cost approximately €842.92 less than male inpatients. As length of stay increases, so too does the inpatient costs per case. For each additional day spent in hospital, costs increase by approximately €131.79 for T2D admissions and approximately €118.31 for those with T1D.

Implications: This paper estimates the costs of inpatient diabetes care in an Irish public hospital and provides a critical look at current costs of diabetes care nationally. It bears comparison to the CODEIRE study which demonstrated type 2 diabetes as a very costly disease and studies associating increased risk of hospitalisation with diabetes-related complications by emonstrating that patients with diabetes complications cost more. This work further highlights the valuable role that real world evidence can play in highlighting inpatient costs of diabetes care to the Irish health system and contributes information to the long-term diabetes strategy to improve diabetes care as recommended by Diabetes Ireland.

Evaluating the effectiveness of the NHS Diabetes Prevention Programme.

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Background: The burden type 2 diabetes places on health care systems is considerable. Estimates have suggested that £8.8bn is spent annually by the NHS in treating type 2 diabetes and its associated complications (price year 2011-2012). This is in addition to significant patient and carer costs, impact on health related quality of life and reductions in mortality. In the UK, prevalence rates have more than doubled between 2000 and 2013 (2.39% to 5.32%); exacerbated by an increase in obesity, sedentary lifestyles, and an aging population. Rising prevalence coupled with extreme financial pressures on the health care system, have emphasised the importance of targeted prevention strategies. In 2016, a nationwide prevention programme was launched, the NHS Diabetes Prevention Programme (DPP). The DPP targets individuals identified as at high-risk of developing type 2 diabetes, referred to as having Non-Diabetic Hyperglycaemia (NDH) or 'pre-diabetes'. The programme, delivered by private providers, consists of a minimum of 13 group-based behaviour change sessions, incorporating structured education on nutrition, physical activity and weight loss; typically lasting 9-12 months. As part of the DIPLOMA (Diabetes Prevention – Long Term Multimethod Assessment) study, we evaluate the cost-effectiveness of the NHS DPP as it is implemented in a real-world setting, from the perspective of the NHS and Personal Social Services.

Methods: The evaluation utilises two linked datasets. The first is an information rich dataset that programme providers are contractually obliged to collect for reimbursement. This data contains information on over 500,000 referrals made to the programme, including number of sessions attended, socio-demographic data and outcome measures, such as weight, HbA1c and quality of life. Secondly, we use the National Diabetes Audit; which contains data from patients' primary care records for over 3 million patients diagnosed with type 2 diabetes and over 2 million patients with a readcode of NDH. This is the first time that information from the NDH module of the National Diabetes Audit has been published. As these two datasets are linked, it is possible to observe an individual's participation in the DPP and their long-term outcomes, in terms of type 2 diabetes conversion. Due to the pragmatic nature of this evaluation, there is no direct comparator or control group (as would be usual in an economic evaluation alongside an RCT). As such, we will compare outcomes across groups who have had different levels of engagement with the programme. Whilst it is expected that the maximum effect (i.e. reduction in diabetes onset) will be observed amongst participants who have attended all programme sessions, it is possible that those who interacted with the DPP to a lesser extent, may also have incurred benefit. Therefore we will evaluate outcomes across the following groups: those who have had no involvement, those who were invited but did not participate, those who only partially engaged in the programme and finally those who attended all sessions. Outcome measures will include diabetes conversion, weight loss, reduction in Hba1c and quality adjusted life years. Costs will be those associated with implementing and running the programme, as well as potential change in healthcare resource use due to diabetes being prevented.

Implications: This evaluation will determine the cost-effectiveness of the DPP, thus determining whether it is an efficient use of NHS resources. It will identify which groups of participants benefited most from the programme, and identify whether the DPP is targeting those at highest risk, or in most need. Lastly, this study details the challenges that evaluating real-world prevention programmes pose, as well as demonstrating the use of big data for programme evaluation.

[Please note that this is a work in progress with completed analysis due March 2021]

Controlled Observational Study and Economic Evaluation of The Effect of City-Centre Night-Time Drunk Tanks on The Emergency Care System Compared with Usual Care

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Background: Front-line health-care services experience increased demand when acute alcohol intoxication is most common, which is in night-time environments. Cities have implemented alcohol intoxication management services (AIMS; or Drunk Tanks) to divert the intoxicated away from emergency care. Objectives: To evaluate the effectiveness, cost-effectiveness and acceptability to patients and staff of AIMS and undertake an ethnographic study capturing front-line staff's views on the impact of acute alcohol intoxication on their professional lives.

Methods: This was a controlled mixed-methods longitudinal observational study with an ethnographic evaluation in parallel. Six cities with AIMS were compared with six matched control cities to determine effects on key performance indicators (e.g., number of patients in the emergency department and ambulance response times). Surveys captured the impact of alcohol intoxication management services on the quality of care for patients in six alcohol intoxication management services, six emergency departments with local alcohol intoxication management services and six emergency departments without local alcohol intoxication management services. The ethnographic study considered front-line staff perceptions in two cities with AIMS and one city without alcohol intoxication management services.

Results: AIMS typically operated in cities in which the incidence of acute alcohol intoxication was greatest. The per-session average number of attendances across all AIMS was low (mean 7.3, average minimum 2.8, average maximum 11.8) compared with the average number of emergency department attendances per alcohol intoxication management services session (mean 78.8), and the number of patients diverted away from emergency departments, per session, required for services to be considered cost-neutral was 8.7, falling to 3.5 when ambulance costs were included. AIMS varied, from volunteer-led first aid to more clinically focused nurse practitioner services, with only the latter providing evidence for diversion from emergency departments. Qualitative and ethnographic data indicated that alcohol intoxication management services are acceptable to practitioners and patients and that they address unmet need. There was evidence that AIMS improve ambulance response times and reduce emergency department attendance. Effects are uncertain owing to the variation in service delivery.

Limitations: The evaluation focused on health service outcomes, yet evidence arose suggesting that AIMS provide broader societal benefits. There was no nationally agreed standard operating procedure for AIMS, undermining the evaluation. Routine health data outcomes exhibited considerable variance, undermining opportunities to provide an accurate appraisal of the heterogenous collection of alcohol intoxication management services.

Conclusions: AIMS are varied, multi-partner endeavours and would benefit from agreed national standards. AIMS are popular with and benefit front-line staff and serve as a hub facilitating partnership working. They are popular with AIMS patients and capture previously unmet need in night-time environments. However, acute alcohol intoxication in emergency departments remains an issue and opportunities for diversion have not been entirely realised. The nurse-led model was the most expensive service evaluated but was also the most likely to divert patients away from emergency departments, suggesting that greater clinical involvement and alignment with emergency departments is necessary. AIMS should be regarded as fledgling services that require further work to realise benefit.

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