

A Comparison of Arthroplasty Activity Nationally between Mixed and Elective-Only Units

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Abstract

Aims:

Ireland has one of the longest waiting times for elective arthroplasty. Previous research has shown that elective only units result in better outcomes, higher patient satisfaction rates and improved waiting times to surgery. As demand for arthroplasty increases nationally, the separation of planned and trauma surgical streams in Orthopaedics has been advocated. The aim of this study was to quantify the seasonal variation in activity and productivity between 'mixed' elective and trauma units and 'elective only' orthopaedic units.

Methods

Data was collected from HIPE from the years 2015-2019 for all Total Hip and Knee Replacements. The data was separated into 'mixed' and 'elective-only' arthroplasty units and analysed.

Results

The data from four elective-only and six mixed orthopaedic units was analysed. Elective only units performed 41 percent more operations per quarter. Seasonal fluctuations were observed in mixed units only, most specifically in the first quarter for each year (January/February/March), performing at a capacity of approximately 60 percent of the average.

Discussion

Elective-only units are able to consistently undertake arthroplasty without being affected by seasonal bed issues or high volumes of trauma. To achieve best practice in the future, we should aim to create more dedicated arthroplasty facilities in Ireland.

Introduction

The Organisation for Economic Co-Operation (OECD) reports¹⁻² and analysis completed by Brick et al³ has shown that Ireland has some of the longest waiting times for elective

arthroplasty of high-income countries. Irish people wait an average 182 days for Total Hip Replacement (THR) and 132 days for Total Knee Replacement (TKR) respectively. Approximately 18% of THR candidates and 23% of TKR candidates were waiting longer than one year for their surgery in Ireland²⁻³. When time from specialist assessment to treatment is used as the metric of measure, Ireland is the worst ranking country in the OECD²⁻³.

Furthermore, the demand for arthroplasty is increasing internationally. Data from the United States of America have projected the demand for primary THR and TKR to grow 71% and 85% respectively by 2030⁴. Similar projections in growing arthroplasty demand have been made by European research, albeit more conservatively⁵⁻⁶. Increasing levels of obesity, population ageing, and growth in sports-related injuries are all anticipated to manifest in a greater future burden of osteoarthritis⁷.

The recently published British Orthopaedic Association (BOA) report 'Get It Right First Time' (GIRFT) report, published in 2015, and its follow-up report in 2021 have identified 'cold' or 'ring-fenced' elective only units to be beneficial in reducing complications and improving waiting times⁸⁻⁹. The National Model of Care for Trauma and Orthopaedics advocated for the 'separation of acute (trauma) and planned (elective) surgical streams' and 'designated wards for trauma and planned orthopaedic patients' within its key recommendations¹⁰. This document further acknowledged that there are 'competing demands' between elective and trauma cases in 'mixed' units with planned surgery often being left at a disadvantage with cases being cancelled to 'cope with increased emergency care demands' and recognised that 'optimising productivity in a mixed trauma and planned surgery environment is challenging'¹⁰.

A mixed orthopaedic unit is defined as an orthopaedic department where both trauma and elective procedures take place within the same unit. An elective only orthopaedic unit is, as described, an orthopaedic department where only elective orthopaedic procedures take place. Anecdotally, during the winter months, mixed orthopaedic departments have a reduction in elective activity, usually as a result of increasing trauma demands and hospital bed pressures. The aim of this study was to quantify the seasonal variation in activity and assess the differences in productivity between 'mixed' elective and trauma units and 'elective only' orthopaedic units in the Republic of Ireland.

Materials and Methods

This research did not involve direct patient contact or specific patient information; thus, ethics was not required. We contacted the National Hospital In-Patient Enquiry (HIPE) office and requested the data regarding the number of THRs and TKRs carried out in the Republic of Ireland between 2015-2019. Upon receiving the data, we separated the information into

numbers of arthroplasty procedures in 'mixed units', i.e.: units that undertook both arthroplasty and trauma and those in 'elective-only' units. A list of the hospitals considered to be mixed units and those considered to be elective only units is shown in Table 1.

The data referred to number of arthroplasty procedures undertaken as a whole; we did not classify them into separate groups for THRs and TKRs. The data for each year was then analysed in a quarterly fashion so that seasonal trends in arthroplasty activity could be observed.

Data from Galway provided by HIPE could not be delineated into cases from Galway University Hospital and cases from Merlin Park Hospital and was therefore, excluded from analysis. Meaningful analysis of the majority of arthroplasty activity in Dublin was judged by the senior authors to be too difficult. There are a large number of orthopaedic units operating in the area and many consultants work across several public and private units in different hospital groups. This leads to complex referral patterns and tracking patients' movements is difficult. To avoid this skewing of the data the decision was made to exclude Cappagh and the majority of the Dublin hospitals. Data from 2020 was also excluded as the COVID-19 pandemic and associated lockdowns resulted in massive disruptions to elective arthroplasty nationally, resulting in skewed data and atypical activity patterns in both mixed and elective only units. Data was analysed and graphed using Microsoft Excel.

Table 1: List of 'mixed' and 'elective only' orthopaedic units

<u>Mixed Units</u>	<u>Elective Only Units</u>
Sligo University Hospital	Kilcreene Orthopaedic Hospital
Kerry University Hospital	South Infirmary-Victoria University Hospital
Mayo University Hospital	Croom Orthopaedic Hospital
Tallaght University Hospital	Our Lady's Hospital, Navan
Letterkenny Hospital	
Midlands Regional Hospital (Tullamore)	

Results

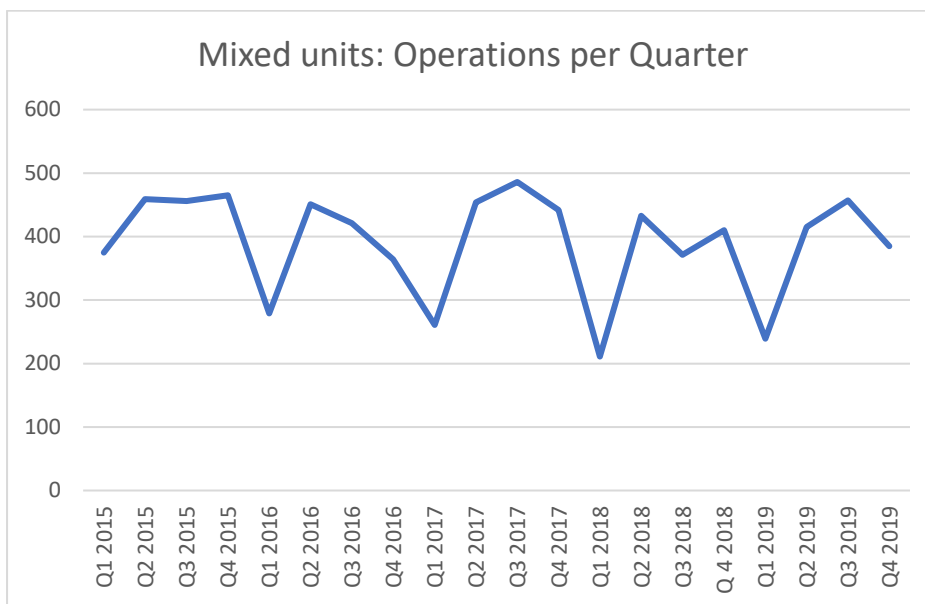
The data from four elective-only hospitals and six mixed orthopaedic hospitals listed in Table 1 above were included for analysis. Over the five years included in the data, the elective-only units performed 11,867 arthroplasty operations while the mixed units performed 7334 primary arthroplasty operations, a difference of 33.98%. The average number of operations carried out per quarter in the mixed units was 346.3 whereas the elective only units carried out an average of 593.35 operations per quarter, a difference in productivity of 41.6%. The average per quarter for each of the five years is shown in Table 2.

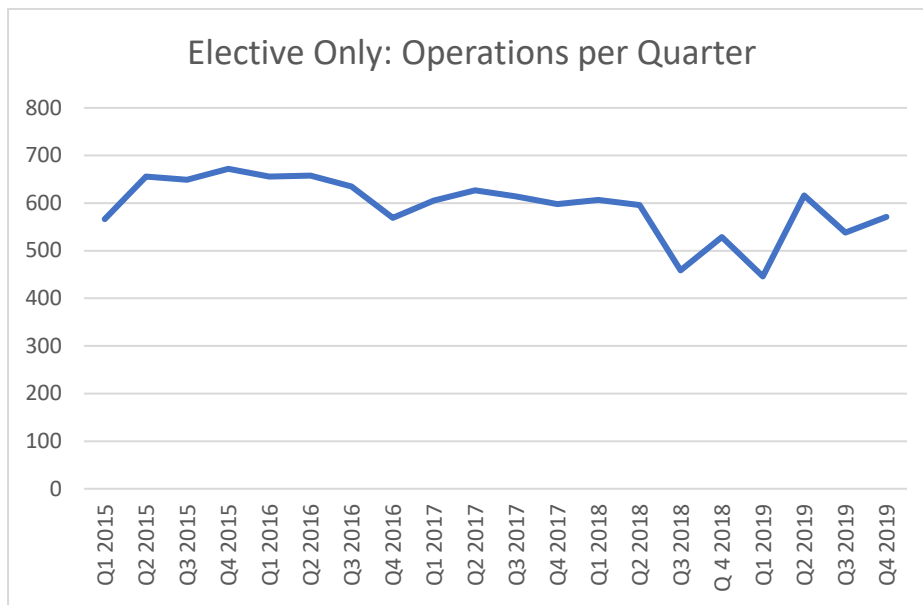
Table 2: average numbers per quarter for mixed and elective units between 2015-2019

Year	Average operations per quarter Mixed units	Average operations per quarter: Elective only units
2015	438.75	635.75
2016	378.75	629.5
2017	410.75	611
2018	356.25	547.75
2019	374	542.75

Seasonal or quarterly fluctuations in numbers was not seen in the elective only units but was present in mixed units. In particular, mixed units, those undertaking both trauma and arthroplasty, had a consistently poor arthroplasty numbers for quarter 1 each year (January/February/March), performing at a capacity of approximately 60% of the average. Even during the worst quarters, elective only units performed at a capacity between 85-90% of the average. The data for this is demonstrated in Figure 1.

Figure 1: Graphs showing seasonal trends in mixed and elective only units





Discussion

There is an increasing demand in modern society for Total Hip and Knee Arthroplasty³⁻⁷. To meet this demand, avoid cancellations and complications and improve patient overall satisfaction, previous research has advised that the current configuration of 'mixed' trauma and elective units is unsustainable and has recommended the creation of arthroplasty only orthopaedic units⁸⁻¹⁰. Our research has highlighted some of the inefficiencies of the mixed trauma/elective units and adds further support to previous calls for a definite separation of elective and trauma activity.

The 2016 and 2021 GIRFT reports by Professor Tim Briggs in the UK have identified that having 'cold' or 'ring-fenced' elective units or elective beds could reduce surgical site infection and other arthroplasty complications such as dislocation⁸⁻⁹. Previous research has shown that the introduction of a ring-fenced planned care orthopaedic ward and simple infection control measures allows 17% more patients to be treated and significantly reduces the incidence of all post-operative infections in orthopaedics¹¹⁻¹². Similarly, elective only units allow for increased elective volume to be undertaken, and previous research have shown a correlation between increased elective volume and a reduced rate of surgeon arthroplasty complications¹³⁻¹⁴. These measures in turn reduce the length of post-operative stay. Elective only units have shown to lead to reduced cancellations and receive higher patient satisfaction scores than 'mixed' or 'hot' units⁹⁻¹⁰.

Previous research has shown that Ireland has the worst specialist assessment to treatment waiting times, with approximately 18% of hip replacement candidates and 23% of knee

replacement candidates waiting longer than one year for surgery in Ireland¹⁻³. Our data shows that elective only units performed approximately 34% more operations over the five-year period compared to mixed units; this equates to 1566 more arthroplasty operations each year than mixed units are able to achieve. For these metrics to improve, arthroplasty surgeons need to be able to undertake elective lists without risk of cancellation. In mixed units, seasonal medical admission increases and increased trauma intake results in bed pressure and reduction in elective activity; these fluctuations are evident in Quarter One of our analyses and have been demonstrated to only effect mixed units(Figure 1).

These seasonal changes are not an issue in elective only units where beds are ring fenced and protected (Figure 2). Elective only units are able to continue to work at maximum level of capacity; even during slower periods, elective units perform at approximately 85-90% of their average compared to mixed units who perform at approximately 60% capacity. Apart from the increasing number of patients on waiting list as a result of this reduction in capacity, another potential consequence could be that the competency of the surgeon is affected during these periods of reduced capacity. Under Slaintecare contracts¹⁵, surgeons can only work in the public section and must achieve a certain number of each procedure each year to stay competent – if mixed units are performing at only 60% capacity during their worst quarters, it may be impossible for surgeons to maintain enough case numbers to be considered competent.

The Health Service Executive, through Slaintecare, have pledged to building three new elective hospitals in Dublin, Galway and Cork¹⁵. The aim of these new sites is to increase the number of elective procedures that can take place and reduce waiting lists. However, these elective units have been ring fenced to be 'day case only' type beds and may not be suitable units for arthroplasty as a result. Furthermore, these new units are being placed in areas of the country where there is already access to elective only units and continue to neglect areas of the country such as the North-West (Sligo, Letterkenny, Mayo) where patients have only access to mixed units and are thus, most vulnerable to the fluctuations in waiting times our research reveals.

The National Model of Care for Orthopaedic and Trauma acknowledges in their report that 'optimising productivity in a mixed trauma and planned surgery environment is challenging' and after the first quarter reductions in operative numbers that mixed units suffer (Figure 1), it may take some time for the arthroplasty team and the multidisciplinary team to work cohesively again¹⁰. Previous research has shown a considerable link between volume of arthroplasty and the reduction in length of stay and complications¹³⁻¹⁴. Thus, when elective joint replacements are able to begin again in these mixed units, these procedures may take longer to complete and require a longer length of stay to compensate for this. The rate of complications may also be increased and increase patient length of stay as well. These

factors accumulate in a reduction in the number of arthroplasty operations the mixed units are able to perform, further increasing their waiting lists and perpetuating the issues.

We acknowledge that this paper is not without limitations. Due to issues regarding the complexity of referral patterns in Dublin and HIPE not being able to determine which cases came from mixed and elective only units in Galway, large areas of the country which may have impacted the analysis have been excluded.

Elective-only units are able to consistently undertake arthroplasty without being affected by seasonal bed issues or high volumes of trauma. Our paper has shown patients who live in parts of the country whom can only access mixed orthopaedic units are vulnerable to seasonal variations in the care they receive. To achieve best practice in the future, we should aim to create more dedicated arthroplasty facilities in Ireland, and we would advocate for all parts of the country to be included in any such plans.

Declarations of Conflict of Interest:

None declared.

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