Seasonal Trends in Orthopaedic Trauma: performance indicators

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Overview of Hip Fractures

• In 2014 we admitted **286** hip fractures (**12.2%** of **2,337** cases) to our *Trauma and Orthopaedics* service
  - Hip # present throughout our catchment area (population = 440,000) – geocoded in *Google Maps*
  - *Operative* – 273 patients, age 81 [19–98]; **Male**: 32%, age 79 [28–94]; **Female**: 68%, age 82 [19–98]
• **Clinical Impact**: Incidence of hip fracture in our region is **65 in 100,000** with Male:Female ratio 1:2.1
Key Performance Indicators

- **Time-to-Theatre** and **Length-of-Stay** are key performance indicators – see NICE CG124: *Hip fracture*
  - T-to-T (44h) – median in Apr (72h, 56%), May (62h, 53%) and Dec (87h, 63%) is over 48h target
  - L-of-S (14d) – Jun (21d, 23%), Nov (15d, 10%) and Dec (21d, 26%) are beyond 30d L-of-S target
- **Clinical Impact:** In Apr/May/Dec T-to-T > 48h in 1/2 of fractures; in Jun & Dec L-of-S > 30d in ≈1/4
Reason for Cancellation

- 104 (38%) of 273 scheduled hip procedures grouped by 'reason for cancellation' – Time, Review or Unfit
  - April – highest absolute (n = 9) and relative (% = 69%) operations cancelled due to Time constraints
  - December – highest total (n = 19); with absolute (n = 7) and relative (% = 37%) due to Unfit patients

- Clinical Impact: Apr = 7/10 cancelled operations due to Time; Dec = highest total cancellations (n = 19)
Driving Performance Improvement

- Consider our 'T-to-T < 48-hr' performance (63%) – what-if we can solve both Time and Review delays?
  - With Ø Time issues, T-to-T improves by 16% to 79% – with Ø Review, T-to-T only improves to 73%
  - While we cannot improve Unfit cases, solving Time + Review delays gives an 89% 'T-to-T < 48-hrs'

- Clinical Impact: Ø Time (79%) → 44 more hip fixations; Ø Time + Ø Review (89%) → 72 more fixations
Analysing Time-to-Theatre

- 'Time-to-Theatre < 48-hours' is a key performance indicator driving patient morbidity and mortality
  - It is also a metric which we should be able to control through clinical management of resources
  - % T-to-T < 48 hrs (vs. % Paediatric Cases) – Apr: 52% (42%), Aug: 56% (37%), and Dec: 32% (11%)
- Clinical Impact: ↑Paediatric Cases correspond to ↓'T-to-T < 48h'; unexplained decrease in December
Modelling Paediatric Admissions

- We analysed admissions against seasonal *Temperature, Rainfall, Solar Radiation* and *School Vacation*
  - *Temperature* + *Solar Radiation* are well-correlated with admissions (81% and 92%, $p < 0.005$)
  - Sadly *School Vacation* calendar (known in advance) is only weakly correlated (29%, $p = 0.360$)
- **Clinical Impact:** Large residuals for Apr, Jul & Sep; unable to use *School Vacation* to model admits

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**Graphs showing correlation:***

- **Paediatrics**
  - Temperature: 83%
  - Solar Radiation: 92%
  - School Vacation: 29%

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7/9
Conclusions

Driving Performance Improvement

- $\emptyset$ Time (79%) = 44 more hip operations $\rightarrow$ 44/14 = 3 months of hip fixations (at current OLOL run rate)
- $\emptyset$ Time + $\emptyset$ Review (89%) = 72 more operations $\rightarrow$ 72/14 = 5 months of hip fixations (at current run rate)

Analysing Time-to-Theatre

- Apr/Aug – ↑Paediatric Cases with ↓'T-to-T < 48h' $\rightarrow$ paediatric cases take precedence for theatre time
- Dec – Worst 'T-to-T < 48h' (32%) $\rightarrow$ combination of poly-trauma, co-morbidities and annual vacation

Modelling Paediatric Admissions

- *School Vacation* known in advance ([http://www.education.ie](http://www.education.ie)) $\rightarrow$ poor predictor of paediatric admissions
- *Temperature* and *Solar Radition* are significant variables $\rightarrow$ incorporate 2013 data into predictive model

Seasonal Paediatric Trauma Service

- OLOL Drogheda is the third busiest trauma unit in Ireland, supported by only 1.2 operating theatres
- In order to achieve operative targets we require a dedicated, seasonal service for Paediatric Trauma
Thank You

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