

## A One Year Cost Analysis of Acute Paediatric Mental Health Presentations

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### Abstract

#### **Aim**

Examine costs associated with acute mental health presentations (AMHP) to a paediatric emergency department (ED) in 2016 and 2018.

#### **Methods**

Case identification and bed costs were calculated.

#### **Results**

In 2018, 163 youths attended the ED with AMHP, 122 (75%) were admitted (average 8 days), representing a yearly cost to the hospital of €1,028,020, average cost per patient €8,426. This marks an increase of €425,320 or €2,686 per patient compared to 2016. Arriving out of hours, presence of self-harm (SH) and discharge to an inpatient psychiatry bed were all associated with greater costs.

#### **Conclusion**

Despite increasing hospital costs associated with out of hours psychiatric emergencies, dedicated funding is not yet in place. All children should have access to urgent MH assessment. Work force planning and creation of pathways of care for young people with MH needs, including dedicated funding from HSE mental health division must be a priority.

### Introduction

Rising costs have been seen across the healthcare spectrum and child and adolescent mental health services (CAMHS) is no exception. Demand for CAMHS is on the rise, with a 26% increase in referrals between 2012 and 2017<sup>1</sup>, yet according to the National Mental Health policy document recommendations, A Vision for Change<sup>2</sup>, the service is fragmented and under-resourced with significant disparity between recommended and current staffing levels<sup>3</sup>.

Poorly established out of hours CAMHS have contributed to increasing numbers of young people presenting directly to emergency departments, assessment occurring by ED staff who may not be trained in Psychiatry. In order to mitigate

risk, many children are admitted for assessment by the psychiatry consultation liaison service (PCLS) contributing to a diversion of PCLS services from medical and surgical in-patients with psychiatric co-morbidities.

The aim of this study was to provide a cost estimate of acute mental health (MH) presentations to Ireland’s largest paediatric emergency department. Data was collected over a 12-month period (2018) and compared with a similar data set from 2016<sup>4</sup>.

## Methods

Case notes of all 233 patients presenting to the PCLS in 2018 were reviewed. Using a study specific proforma, data relating to all patients was extracted. Four main cohorts were identified: (1) Acute Mental Health (AMHP) (N=163) (2) Paediatric Liaison Psychiatry Cases (N=37) (3) Patients admitted with Eating Disorders (N=13) & (4) Tertiary OPD neuropsychiatry assessments (N = 20). This study focuses on the AMHP. Comparison data was available from a previous audit of AMHP bed days conducted in 2016.

The average cost of a bed day (980 euro) was obtained from the hospital accounts department and is the most up to date figure available at the time of writing, and used in the study. The cost is therefore likely under-represented, as mental health admissions tend to be more costly, due to the need for one-to-one nursing care in many cases. Ethical exemption was received from the hospital ethics committee.

## Results

One hundred and sixty-three patients (70%) of all PCLS cases attended via the ED with an Acute Mental Health Presentation. The mean age was 13.6 (range 6-17) with 104 patients (64%) being female. Fifty-seven (35%) had ongoing suicidal Ideation (SI) and 56 (34.5%) had engaged in self-harm (SH) (Table 1).

**Table 1. Details of AMH Attendances and Admissions (N=163)**

|  | <b>Acute Mental Health Patients (N=163)</b>   |   |
|--|---|---|
| <b>Age (n = 163)</b>                           | <b>Mean = 13.6</b><br><b>Median =14</b>   | <b>Range = 6-17</b><br><b>SD = 2.39</b> |
| <b>Gender (n = 163)</b>                        | 104 (64%) Female  | 59 (36%) Male                           |
| <b>Time of Presentation (n=162)</b>            | 89 (55%) ONWH<br>79 (89%) admitted  | 73 (45%) INWH<br>43 (59%) admitted      |
| <b>Presence of Self-Harm (n = 162)</b>         | Yes 56 (34.5%)  | No 106 (65.5%)                          |
| <b>Presence of Suicidal Ideation (n = 162)</b> | Yes 57 (35%)  | No 105 (65%)                            |
| <b>Social Work Involvement (n = 160)</b>       | Yes 54 (34%)  | No 106 (67%)                            |
| <b>Discharge Plans (n= 162)</b>                | 23 (14.2%) to Primary Care<br>128 (79%) to CAMHS OPD<br>10 (6.2%) Inpatient CAMHS<br>1 (0.6%) to Adult MH OPD |   |

Of these 163 patients, 122 (75%) were admitted. Eighty-nine patients (54%) presented outside of normal working hours (ONWH) and were significantly more likely to be admitted (Table 2). There was also a significant association shown between SH and admission, with 49 (86%) out of the 56 patients with SH being admitted (Table 2). There was no significant association between gender or presence of SI and admission.

**Table 2. Comparison between those admitted and not admitted**

|                                      | Total Patients          | Admitted                       | Not Admitted       | Significance  |
|--------------------------------------|-------------------------|--------------------------------|--------------------|---|
| Gender<br>(n = 163)                  | 59M (36%)<br>104F (64%) | 43M (73%)<br>79 F (76%)        | 16M<br>25 F        | $\chi^2$ (1, n=166) = .155,<br>p =.694, phi = .045                  |
| Time of<br>Presentation<br>(n = 162) | ONWH 89<br>INWH 73      | ONWH 79 (89%)<br>INWH 43 (59%) | ONWH 10<br>INWH 30 | $\chi^2$ (1, n=162) =<br>17.658,<br><b>p &lt;.005*</b> , phi = .345 |
| SH (n = 162)                         | 56                      | 49 (86%)                       | 7                  | $\chi^2$ (1, n=166) = 4.920,<br><b>p =.027*</b> , phi = 187         |
| SI (n = 162)                         | 57                      | 42 (74%)                       | 15                 | $\chi^2$ (1, n=166) = .039,<br>p =.843, phi =.030                   |

The average length of stay for those admitted was 8.6 days (range 1-74 days).

Of those who presented acutely but were not admitted, most were discharged back to CAMHS (31, 76%), the remainder to their GP (10, 24%). As might be expected those referred to CAMHS as opposed to GP, were more likely to have an Axis 1 psychiatric diagnosis ( $\chi^2$  (1, n=41) = 4.23, p=.04, phi = .384). If admitted (N=122), 14% were discharged to primary care, 80% to CAMHS follow up and 6% to inpatient CAMHS units (Table 3), the latter having a longer LOS (median = 21) than either of the other two groups (Primary care median = 2, CAMHS OPD median =4) ( $\chi^2$  (2, 122) = 11.432, p=.003) (Table 3).

The mean duration of stay for youth discharged back to their GP was 8.8 days (SD 12.34), similar to those referred to CAMHS OPD (mean duration of stay was 7.54; SD 12.88). For youth who were transferred to an in-patient MH unit, mean duration of stay was 19.78 (SD 13.31) (Table 3). There was no significant association between time of arrival, presence of SH or SI and LOS. A closer look at the clinical profile of those transferred to an in-patient unit revealed many (4) had multiple prior presentations to the paediatric hospital.

**Table 3. Length and Cost of Stay by Discharge Case Type of those admitted (N=122)**

|                              | Total Admitted | Discharge to<br>Primary Care | Discharge to<br>CAMHS OPD | Discharge to<br>Inpatient CAMHS |
|------------------------------|----------------|------------------------------|---------------------------|---------------------------------|
| Number                       | 122            | 15 (12.2%)                   | 98 (80%)                  | 9 (7.4%)                        |
| Mean LOS                     | 8.6            | 8.8                          | 7.54                      | 19.78                           |
| Range                        | 1-74           | 1-36                         | 1-74                      | 2-45                            |
| Total number of<br>bed days  | 1049           | 132                          | 739                       | 178                             |
| Total Cost<br>(980e/bed day) | 1,028,020      | 129,360                      | 724,220                   | 174,440                         |
| Average Cost per<br>Patient  | 8426           | 8624                         | 7390                      | 19,382                          |

The 122 admissions resulted in a total of 1,049 bed days over the course of the year, resulting in an approximate total bed cost of €1,028,020 with an average admission cost per patient of €8426. In 2016, 105 youth were admitted following AMH presentation for a total of 615 bed days, giving a total cost of €602,700 with a cost per patient €5740. (Table 4)<sup>4</sup>. The 2018 figures mark an increase in total costs of €425,320 or €2,686 per patient. Although the average LOS was slightly longer in 2018, a Mann Whitney U test revealed no significant difference between LOS for 2016 (md = 4, n =107) and 2018 (md=4, n =126), U= 6508.0, z= -.457, p= .647, r=.03 (Table 4).

**Table 4. Comparison between costs in 2016 and 2018**

|                                  | 2016                             | 2018                               |
|----------------------------------|----------------------------------|------------------------------------|
| AMH Patients Presented           | 134                              | 163                                |
| Patients Admitted                | 105 (78%)                        | 122 (75%)                          |
| Gender                           | 42 (40%) Male<br>63 (60%) Female | 59 (36%) Male<br>104 (64%) Female  |
| ONWH                             | 68 (65%)                         | 89 (54%)                           |
| Presence of SH                   | 56 (53%)                         | 56 (34%)                           |
| Presence of SI                   | 70 (67%)                         | 57 (35%)                           |
| LOS if admitted                  | Mean 6 (SD 8.132)<br>Median = 4  | Mean 8.82 (SD 13.15)<br>Median = 4 |
| LOS range                        | 1-57                             | 1-74                               |
| Total bed days                   | 615                              | 1049                               |
| Total Estimated Cost (€980/day)  | €602,700                         | €1,028,020                         |
| Total Estimated Cost per patient | €5740                            | €8426                              |

## Discussion

Nationally there is a lack of adequate out of hours CAMHS for youth experiencing an acute mental health crisis. This has resulted in many children presenting to EDs after hours when CAMHS are unavailable<sup>5</sup>. Whilst this is often necessary and appropriate, many of these presentations could potentially be better managed within their own community setting, by their own CAMHS clinicians who are cognizant of their difficulties, if out of hours CAMHS access was available.

Furthermore, the evidence supporting crisis management of youth with suicidal crisis, often a reason for presentation to the ED, suggests that community based Dialectic Behavioral Therapy (DBT), cognitive-behavioral therapy (CBT), and mentalization-based therapy, is the most efficacious approach<sup>6</sup>.

Although overnight admission is recommended by the NICE guidelines following youth SH to allow for a comprehensive MH assessment<sup>7</sup>, should this be available at the time of crisis, admission might be avoided. Given the risk associated with admissions of undermining both youth and parental competency, avoiding admissions when possible is encouraged, especially in SH<sup>8</sup>. There is also a risk of an invalidating response of the adolescent if assessed by staff without adequate understanding of the many complexities linked to SH, along with the fact that the paediatric setting is not always suitably staffed or resourced to provide the specialist input required<sup>3</sup>. Indeed adequate MH trained staff within ED 24/7 is set as a priority target in the National Clinical program for SH in Ireland, although specific paediatric services have yet to be realized<sup>9</sup>. The introduction of the emergency out of hours social work service established in 2015 is a welcome addition<sup>10</sup>. Better developed primary care psychology services might also reduce crisis presentations, in that earlier and appropriate interventions could potentially manage and treat MH issues before escalating to emergency presentations.

Access to specialist in-patient child psychiatry beds is also essential, but to date not readily available. In this study, the children awaiting inpatient CAMHS stayed significantly longer in hospital. Given that 46% of youth presented within normal working hours, this suggests that CAMHS are not adequately resourced to cope with even day-time emergencies. Given many teams are operating at just above 50% of resource recommendations, this is not surprising<sup>2</sup>. It is also recognized that many consultant psychiatry posts remain unfilled with consultants reporting high burnout rates<sup>11</sup>. Similar concerns have been raised with regard to adequacy of service provision in the UK, where 60% of MH trusts have felt unable to meet current need<sup>12</sup> and investment in CAMHS prioritized in the UK Long-term plan<sup>13</sup>. Growth in Liaison (Child & Adult) Psychiatry Services in the UK has been driven by the realization of the high unmet MH needs in acute medical settings, the estimated additional costs (£14 billion a year) of physical healthcare in the presence of MH co-

morbidities which is borne by acute hospitals<sup>14</sup>. Increased investment is bringing tangible rewards, in terms of both improved medical and MH outcomes, reduced and shortened admissions, and better adherence to treatment overall, with a benefit: cost ratio of more than 4:1<sup>14</sup>.

Proportionally fewer cases were admitted in 2018 (75%) versus 2016 (78%), however costs appear to be rising sharply due to higher numbers presenting (163 versus 134), increased admissions (122 versus 105) and longer duration of stay (8.8 versus 6.0). In order to monitor this trend, the collection and analysis of relevant data is essential.

Interestingly, fewer cases presented to the ED with SH and SI in 2018 than 2016. This is not in keeping with general national trends, where rates of SH in Irish 10-24 year olds have risen by 21% between 2007 and 2017<sup>15</sup>. Similar increases have been noted in UK hospital presentations<sup>16</sup>. Whether this reflects an increased availability of local CAMHS providing emergency assessment is unlikely as presentations within hours actually increased between 2016 (35%) and 2018 (46%). In the 2017 National Self-Harm Registry Ireland annual report, rates of paediatric SH increased by 20% between 2016 and 2017 in 2 of the 3 Dublin paediatric hospitals (OLCHC and Temple St) but decreased by a similar amount in Tallaght University Hospital, suggesting other complex reasons explaining prevalence of SH<sup>17</sup>.

Hospital admission and emergency care are costly interventions with treatment costs borne by the acute hospital trust. The funding for MH treatment of this cohort is outside the CAMHS MH Division budget and as such is unrecognized and unrecorded. Youth with mental illness have twice the rate of health care costs compared to their peers, and so reducing costs, by reducing hospital admission rates and duration of stay, represent one potential area for cost saving<sup>18</sup>. Alternative service delivery models in other jurisdictions have shown promise. A large RCT in the US found a reduction in AMHP, ED visits; duration and frequency of hospital admissions, with significant cost savings for adults with mental illness following the provision of comprehensive and intensive community MH based outreach<sup>19</sup>. A recent study examining early and supported hospital discharge with intensive home treatment in German youth found comparable treatment effects, to standard in-patient care, in addition to significant cost savings<sup>20</sup>. However, whilst targeting expensive costs associated with hospital admission are valid, indirect costs are known to far exceed medical costs in mental illness by a factor of almost 10:1<sup>21</sup>. These include costs associated with parental absence from work, cost incurred by social services, education, or juvenile service. In fact, in the German study, cost savings from hospital admission were offset by the increased non-healthcare cost. The real possibility to target both direct and indirect (non-healthcare) cost savings, argue for close collaboration and integration between relevant services.

Initiatives such as the upskilling of staff in DBT (establishment of the HSE National DBT program in 2013<sup>22</sup>) and Family Based Treatment for Eating disorders (HSE National Clinical Program for Eating Disorder FBT training in 2017<sup>23</sup>) are welcome, and will hopefully have both therapeutic gains and reduced reliance on paediatric admissions. A recent systematic suggests that although intensive community services, such as supported discharge, specialist outpatient services, multi-systemic therapy, day provision, and intensive home treatment, may all be potential alternatives to inpatient care, the evidence is weak<sup>24</sup>. Whilst studies have shown equal therapeutic efficacy, service use acceptability and cost efficiency, few have included this high risk SH cohort.

The recognition that an additional €450 million will have to be found to cover the costs of the new national children's hospital has rightly drawn public focus on costs, both structural and operational. Currently, children in Ireland with physical conditions stay in hospital longer than international averages. To ensure reduced admissions rates and shorter stays requires investment in community services as laid out in the HSE and the Faculty of Paediatrics' National Model of Care in Paediatrics<sup>25</sup>. With regard to mental health services, these are in their infancy.<sup>3</sup>

All children and families should have access to urgent MH assessment in a time of crisis and expect this care to be provided in a safe and suitable environment, delivered by appropriately trained staff. Despite public, professional and HSE awareness of significant under resourcing of CAMHS, funding for this 'neglected' cohort<sup>3</sup> remains to be addressed. This paper shows significant and rising costs associated with acute MH emergencies, and an absence of a coordinated plan to address previously reported shortfalls<sup>2,3</sup>. Work force planning and the creation of pathways of care for young people with MH needs presenting to the new National Children's Hospital must be a priority. This will contribute to ensuring parity of care between children with physical and mental health needs.

**Declaration of Conflicts of Interest:**

The authors have no conflicts of interest to declare.

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