Effect of house officer clerking on short-term outcomes in paediatric orthopaedic patients

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ABSTRACT

**AIM:** Children who are admitted with acute orthopaedic problems are often fit and healthy. The house officer (ie, intern) is required to carry out the formal clerking/admission of inpatients. However, they are often also busy with sick ward patients, which leads to delays in formal clerking of these children until after they have been to the operating theatre (OT). The aim of this study was to assess what information, if any, is missed in children who were seen by a house officer prior to going to OT, compared to those who were not.

**METHODS:** All patients admitted to the paediatric surgical ward, under the orthopaedics service care, between 1 September 2015 and 30 November 2015 were included in this study. Information on age, sex, medical background, details of the admission and post-operative complications were collected.

**RESULTS:** A total of 139 children were admitted during the study period. The median age was 7.4 years (range, 0.2–17.5) and a male:female ratio of 1.3:1. In this study, there was no statistically significant difference in patient characteristics, post-operative complications or length of hospital stay. However, patients clerked by house officers had better documentation of their regular medications and non-orthopaedic examination findings.

**CONCLUSION:** To the author’s knowledge, this is the first study to examine the effect of house officer admission on paediatric orthopaedic patient outcomes. A suggested solution would be to encourage documentation of medication history and examination findings by the anaesthetic registrar, since all patients must be reviewed pre-operatively.

Children who present with acute orthopaedic problems are often fit and healthy. The events leading up to presentation are likely those of high-energy activities, rather than being subdued with a prodromal illness.1 As a result, most patients are now being managed in outpatient fracture clinics in liaison with the emergency department (ED).2 A few patients, often those for operative management, require ward admission.

The house officer is required to carry out the formal clerking/admission of patients. By the time the child presents to the ward, however, they would have been seen by multiple doctors. The presenting complaint and most of the history, as well as the orthopaedic examination, would have already been done by the admitting registrar. Prescription issues (ie, documentation of allergies and prescribing analgesia) are likely to have been addressed in ED. Additionally, children going to the operating theatre (OT) are also assessed by the anaesthetic registrar. This makes admission by the house officer, often busy with other ward tasks, redundant as the information has already been collected by others.

The aim of this study was to assess what information, if any, is missed in children who were seen by a house officer prior to going to OT, compared to those who were not. Post-operative complications prior to discharge and length of hospital stay were also evaluated. We hypothesised no difference would be found between the two groups.
Methods

Study setting
This prospective study was conducted at Christchurch Public Hospital (CPH), Canterbury, New Zealand. CPH is the largest tertiary hospital of New Zealand's South Island. It serves a population close to 540,000 and has a 600–650 bed capacity. In 2013, 18.7% of Canterbury's population were under the age of 15. Ethical approval was not required as this was a simple clinical audit with no intervention, clinical or otherwise.

Case selection
All patients admitted to the paediatric surgical ward, under the orthopaedics service care, between 1 September 2015 and 30 November 2015 were included in this study. This included acute admissions, as well as elective admissions who would have been seen, but not clerked, in the outpatient clinic. The clerking of patients was opportunistic—every effort was made to clerk the patient pre-operatively.

Data collection
Patients' notes were manually reviewed by the lead author. Information on age, sex, medical background, details of the admission and post-operative complications were collected. A case was considered 'clerked' if the patient had been seen by the house officer prior to their operation (or prior to consultant ward-round for non-operative management).

Statistical analysis
Descriptive statistics were used to analyse most of the data. Comparisons were conducted using an independent-samples student t-test. Regression analysis was used to test for correlations. Statistical significance was determined if type I error rate was <5% (p-value <0.05). All analyses were performed using SPSS Statistics® software package (version 22.0.0.0).

Results
Sample characteristics
A total of 139 children were admitted during the study period. The median age was 7.4 years (range, 0.2–17.5) and a male:female ratio of 1.3:1. The median length of hospital stay was one day (range, 12 hours–7 days). Of all the patients seen, 69 had some (mostly minor) past medical history (PMHx; 50%), 20 took regular medications (14%), 15 had allergies (11%) and 19 had non-orthopaedic findings on examination (13.6%). The most common examination findings were innocent murmur (8; 42%) and congenital umbilical hernia (3; 16%).

Acute vs elective admissions
Acute trauma cases constituted the majority of admissions (99 cases; 71%). The most common mechanisms of trauma were falls (53.5%), blunt trauma (11%) and rugby-related injuries (7%). These injuries most often resulted in fractures of the radius and/or ulna (29%), supracondylar fractures of the humerus (19%) and distal lower-limb injuries (14%).

Elective admissions were predominantly related to corrective surgeries for congenital talipes equinovarus or removal of K-wires. Acute and elective patients did not differ in their sex, medical background or post-operative complications. Elective patients, however, were significantly younger (6.7 ± 4.4 years) than acutely admitted patients (8.4 ± 4.2 years; p=0.04).

Clerked vs non-clerked patients
All patients were seen by a house officer prior to their discharge. However, only 100 patients (71.9%) met the definition of being clerked by a house officer. Table 1 shows the main differences between the two groups.

Discussion
To the author’s knowledge, this is the first study to examine the effect of house officer admission on paediatric patient outcomes admitted under the orthopaedic service. Clerking patients, as well as having a role as service provision, is an educational activity for the house officer to sharpen their clinical acumen. In this study, there was no statistically significant difference in patient characteristics, post-operative complications or length of hospital stay. However, patients clerked by house officers had better documentation of their regular medications and non-orthopaedic examination findings.

Children who require surgical management for their orthopaedic injuries are often placed first on the OT list. This makes it particularly challenging for house officers, who are often still on ward rounds by the time the child is called for theatre, to clerk these patients.
Children often sustain their orthopaedic injuries during high-energy activities and are most often fit and well otherwise.¹ This is in contrast to most adult patients who present to the orthopaedic wards; commonly elderly with multiple comorbidities (eg, osteoporotic neck of femur fracture) or patients who are quite sick (eg, septic arthritis). Therefore, house officers, especially when busy afterhours, may understandably elect to triage paediatric patients lower on their list of jobs.

In order to rectify identified problems, we suggest several solutions. In accordance with international trends to dedicate specialty-specific house staff,⁴ our institution has recently introduced a paediatric orthopaedic post. This is a full-time PGY-1 house officer post to jointly look after paediatric orthopaedic and spinal orthopaedic patients; this is because the workload of either component is insufficient for a full-time post. However, this did not fully address the identified problems, since spinal ward rounds still interfered with morning admissions.

A suggested solution would be to encourage documentation of medication history and examination findings using alternative means. These include other health staff input, electronic prescribing and pre-operative time-out checks. Our institution has recently introduced electronic prescribing, which allows the clinician easy access to the patient's regular medication and known allergies based on previous interactions.

Since all patients must be reviewed pre-operatively by the anaesthetic team, this could be an avenue to check medications and document physical examination findings. Though, anaesthetic documentation has also been shown to suffer from several deficiencies.⁵ This may be in part because the patient's team has already written a pre-operative admission note (or a clinic letter in some cases). However, due to the high turnover on the orthopaedic paediatric service and the relative inexperience of newly qualified house officers, pre-operative anaesthetic assessment is suggested to

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### Table 1: Differences in clerked vs non-clerked patient characteristics and note documentation.

<table>
<thead>
<tr>
<th></th>
<th>Clerked</th>
<th>Non-clerked</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>Mean</td>
<td>7.9</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.5</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>Sex (% female)</strong></td>
<td>41.5%</td>
<td>46%</td>
<td>0.62</td>
</tr>
<tr>
<td><strong>Admission type (% acute)</strong></td>
<td>72%</td>
<td>72%</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>PMHx</strong></td>
<td>Present (%)</td>
<td>51%</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>Recorded (%)</td>
<td>93.3%</td>
<td>82%</td>
</tr>
<tr>
<td><strong>DHx</strong></td>
<td>Present (%)</td>
<td>13.5%</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Recorded (%)</td>
<td>95.5%</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Allergies</strong></td>
<td>Present (%)</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Recorded (%)</td>
<td>98%</td>
<td>96%</td>
</tr>
<tr>
<td><strong>Examination findings</strong></td>
<td>Positive (%)</td>
<td>13.5%</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Recorded (%)</td>
<td>100%</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Analgesia prescribed</strong></td>
<td>99%</td>
<td>98%</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Complication rate (%)</strong></td>
<td>2%</td>
<td>2%</td>
<td>0.93</td>
</tr>
<tr>
<td><strong>Length of stay (days)</strong></td>
<td>Mean</td>
<td>1.8</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>1.3</td>
<td>1.2</td>
</tr>
</tbody>
</table>

DHx = history of regular medication use; PMHx = any past medical history; SD = standard deviation; *= statistically significant.
be more thorough (our institution utilises an anaesthetic proforma—this includes a pre-operative section for significant past medical history, medications and allergies, cardiovascular examination findings and other anaesthetic-specific details such as the Mallampati score\(^6\)). This way, not only can the anaesthetic proforma effectively replace the house officer admission note, but also provide a place all where physical examination findings and complete drug list may be easily accessible by all members of the patient's care team. Nursing notes, which often include medication history, can be incorporated into the proforma to complement the anaesthetic notes.

A few limitations inherent to the design of our study ought to be mentioned. Due to the observational nature of the study, random allocation of patients was not feasible. However, demographic and clinical parameters chosen \textit{a priori} were not significantly different between the two groups. The results presented remain a single-centre's experience evaluated in a relatively small population. However, data from multiple sources were sought in order to corroborate the findings reported. This study remains the first study to objectively report on the ramifications of house officer clerking. Larger better-designed studies are needed to definitively investigate the effects of clerking on patient outcomes.

In conclusion, this study has demonstrated similar short-term outcomes in paediatric patients who present for inpatient orthopaedic intervention, whether clerked by a house officer or not. From a medico-legal point of view, however, documentation especially of medical history and examination findings was inadequate in children not clerked by a house officer. This can be easily corrected by incorporating electronic prescribing and adequately completed anaesthetic assessment with the patient's notes.

### REFERENCES:


