Examination of financial charges associated with intentional foreign body ingestions by prisoners: A pattern of escalation

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ABSTRACT

INTRODUCTION: Intentional ingestions of foreign objects (IIFO) continue to be prevalent among prisoners. Our previous research examined determinants of hospital admission, endoscopy, and surgery among prisoners who ingest foreign objects. However, little is known about the financial impact of these events on healthcare facilities that service the prisoner population. This study aims to fill this gap by examining hospital charges attributable to 435 prisoner episodes of IIFO.

METHODS: A retrospective review of all prisoners who presented to our medical center with the complaint of IIFO was conducted. Both IRB and Bureau of Prisons approvals were obtained prior to data collection. All prisoners ages 18-75 were included between the dates of Jan 2004 and Dec 2011. Episodes were divided into three categories: (a) unverified IIFO wherein ingested object was claimed by the patient but never identified; (b) verified IIFO wherein ingested object was clearly identified; (c) secondary events due to direct complications of previous IIFO episode(s). The temporal occurrence of IIFO was organized by increasing number of episodes and grouped accordingly. Detailed list of hospital charges was obtained for every IIFO episode, including: (a) emergency services; (b) procedures; (c) laboratory; (d) surgical supplies; (e) allied health services; (f) radiology studies; (g) anesthesiology charges; (h) pharmacy; and (h) intensive care costs. Descriptive statistics were used to analyze basic data. Kruskal-Wallis test was used to examine differences among non-normally distributed variables and sub-groups. Statistical significance set at alpha = 0.05.

RESULTS: A total of 435 IIFO episodes occurred during the study period in a population of 125 patients (mean age 33.8±11.7 years, median age 34 [range 19-75] years, 92.8% male). Hospital charges associated with these episodes totaled $6,209,557. There were 94 unverified IIFOs, 332 verified IIFOs, and 9 secondary events. Verified IIFOs were associated with significantly greater median charges ($5,860) than unverified IIFOs ($3,997) and secondary events carried lower cost ($3,501) than the former two (p <0.01). We also observed a pattern of escalating costs associated with increasing number of sequential IIFO episodes, with the 1st episode carrying median charges of $4,683 and episodes numbered 11+ carrying median charges of $7,698 (p <0.01).

CONCLUSIONS: Hospital charges associated with care of prisoners who ingest foreign objects tend to escalate over time. Although charges in most of the categories demonstrated increases with greater numbers of ingestions, the largest contributors to this pattern of escalating charges included radiology, pharmacy, hospital room charges, and surgical services. These findings suggest that early intervention in the destructive cycle of IIFO may not only improve patient outcomes, but also result in savings to the healthcare system.

METHODS

After medical record screening for suspected IIFO cases, a retrospective review of all prisoners who presented to a tertiary university medical center with the complaint of IIFO was conducted. Both Institutional Review Board and Bureau of Prisons permissions were obtained prior to data collection. All inmates ages 18-75 were included between the dates of January 1, 2004 and December 30, 2011.
Detailed list of hospital charges was obtained for every IIFO episode, including: (a) emergency services; (b) procedures; (c) laboratory; (d) surgical supplies; (e) allied health services; (f) radiology studies; (g) anesthesiology charges; (h) pharmacy; and (h) intensive care costs. These charges were then grouped according to the occurrence number (as outlined in Table 1) and tabulated prior to performing statistical comparisons.

Descriptive statistics were used to present basic demographic data. The Kruskal-Wallis test was used to examine differences among non-normally distributed variables and sub-groups. Analysis-of-variance (ANOVA) was utilized for comparisons of groups characterized by normally distributed variables. Statistical significance set at alpha = 0.05. We utilized Minitab® 16 Statistical Software (Minitab Inc., State College, Pennsylvania, USA) to perform statistical analyses.

Table 1. Hospital charges associated with escalating number of intentional ingestions of foreign objects. A pattern of escalation is seen in most of the categories listed.

<table>
<thead>
<tr>
<th>Charge Category</th>
<th>Episode 1</th>
<th>Episodes 2-5</th>
<th>Episodes 6+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=125</td>
<td>N=165</td>
<td>N=145</td>
</tr>
<tr>
<td>Ancillary services/Supplies b,c</td>
<td>$200 ± 71</td>
<td>$249 ± 58</td>
<td>$314 ± 56</td>
</tr>
<tr>
<td>Laboratory charges a,c</td>
<td>$441 [1,219]</td>
<td>$486 [1,078]</td>
<td>$626 [1,447]</td>
</tr>
<tr>
<td>Endoscopy b</td>
<td>$1,611 [338]</td>
<td>$1,740 [320]</td>
<td>$1,740 [320]</td>
</tr>
<tr>
<td>Hospital room charges a</td>
<td>$920 [1,770]</td>
<td>$1,344 [2,455]</td>
<td>$1,324 [2,089]</td>
</tr>
<tr>
<td>Emergency care a,b</td>
<td>$1,062 ± 84</td>
<td>$1,183 ± 65</td>
<td>$1,429 ± 86</td>
</tr>
<tr>
<td>Radiology services a,b</td>
<td>$1,062 ± 163</td>
<td>$1,416 ± 160</td>
<td>$1,618 ± 171</td>
</tr>
<tr>
<td>Pharmacy services a,b,c</td>
<td>$231 [897]</td>
<td>$492 [1,195]</td>
<td>$647 [1,319]</td>
</tr>
<tr>
<td>Surgery/Anesthesia a,b,c</td>
<td>$1,448 [15,909]</td>
<td>$1,454 [4,257]</td>
<td>$3,754 [13,549]</td>
</tr>
<tr>
<td>Total charges a,b,c</td>
<td>$4,683 [4,620]</td>
<td>$5,484 [5,560]</td>
<td>$6,596 [8,287]</td>
</tr>
</tbody>
</table>

\( ^a \)Kruskal-Wallis testing for non-normally distributed variables; \(^b\) ANOVA testing for normally distributed variables; \(^c\) Denotes statistically significant result (p<0.05); \(^d\) Data reported as Median [Interquartile Range]; \(^e\) Data reported as Mean±StdErr.

RESULTS

A total of 435 IIFO episodes occurred during the study period in a population of 125 patients. Mean patient age was 33.8±11.7 years (median age 34 years, age range 19-75 years). Majority of patients (116/125, or 92.8%) were male. There were 94 unverified IIFOs, 332 verified IIFOs, and 9 secondary events.

The overall hospital charges associated with all recorded episodes totaled $6,209,557. This translates to approximately $49,676.50 per patient, or $14,274.80 per episode. Verified IIFOs were associated with significantly greater median charges ($5,860) than unverified IIFOs ($3,997) and secondary events involved lower charges ($3,501) than the former two event sub-types (p <0.01).

Furthermore, we also observed a pattern of escalation associated with increasing number of sequential IIFO episodes. More specifically the “average” 1st episode was associated with median charges of $4,683 per episode while the “average” late episode (11th episode and beyond) was associated with median total charges of $7,698 per episode (p <0.01). Mean (or median) hospital charges, grouped by charge category and episode range (episode 1, episodes 2-5, and 6+ episodes) are listed in Table 1.

Some degree of escalation was seen in all of the charge categories; however, the largest contributors to this pattern included radiology, pharmacy, hospital room, and combined surgery-anesthesiology service charges.

DISCUSSION

Intentional ingestions of foreign objects (IIFO) continue to be major problem among the prison population. In addition to the serious medical consequences associated with IIFO (1,3), the financial impact of this phenomenon is also substantial. Previous research performed by our group as well as other investigators examined determinants of hospital admission, endoscopy, and surgery among prisoners who ingest foreign objects. However, other than a perceived high level of expenditures associated with IIFO, little is known about the actual financial impact of these events on healthcare systems that service the prisoner population. The current study aims to fill this important knowledge gap by examining and quantifying hospital charges attributable to a large number of patients, many of whom experienced multiple episodes of IIFO.

One of the major difficulties faced by healthcare professionals who care for high-frequency IIFO groups, including psychiatric and prison populations, is the constant readiness and vigilance required in order to rapidly deploy necessary resources required to effectively treat foreign object ingestions before they turn into surgical emergencies. Such resources include, but are not limited to, 24-hour Emergency Medicine coverage, around-the-clock availability of endoscopy, and the stand-by capacity in the operating rooms. Due to the complexity of endoscopic foreign object removal, patient non-compliance, and high rates of psychiatric medication use, a larger than expected number of these endoscopic cases necessitate general anesthesia. Consequently, the real costs associated with care of high-frequency IIFO groups are likely much higher than the charges provided in this report.

Our previous research demonstrated a pattern of escalating psychiatric history among prisoners, with noticeable increase in documented psychiatric disorders with increasing number of consecutive IIFO episodes. In a way, these findings constitute a “call to arms” for early psychiatric preventive intervention in order to reduce the chances for recurrent IIFO events. The current study adds further urgency to our previous findings, especially given the fact that the total ($6,209,557), per-patient ($49,676.50), and per-episode ($14,274.80) charges associated with IIFO in this study could be easily translated into a substantial preventive effort and would likely result in overall savings to the system. The need for cost containment as well as preventive, rather than reactive care, has been noted by other authors as well. Furthermore, in many cases IIFO constitutes a chronic, recurring condition, and should be approached as such.

There are important limitations to this study. First, this study is retrospective and thus does not enable the authors to draw any causative inferences. Second, financial data presented are limited to hospital charges, which correlate but do not directly translate to, direct and indirect costs of patient care associated with IIFO ingestions. Physician professional service charges, transportation costs, and the security costs of transporting patients for health services are not captured in this study but are presumably significant. Thirdly, the size of patient sub-groups decreased with increasing number of IIFOs, thus further limiting the
generalizability of our observations and likely introducing additional bias as fewer patients accounted for many of the late episodes. Lastly, due to the complexity of the current financial dataset, a reliable/meaningful adjustment for effects of inflation was not possible. This study has a number of distinct advantages as well. First, it describes one of the largest patient samples and IIFO episodes to date. Second, it focuses on the financial aspect of this negative phenomenon. Lastly, it provides a strong impetus for early intervention within the prison healthcare system as both a health measure and cost reduction strategy. Such effort is certainly warranted given the high per-episode and per-patient costs, especially in the context of escalating charges observed in this series.

CONCLUSION
Hospital charges associated with care of prisoners who ingest foreign objects tend to escalate over time. Although most of the charge categories demonstrated an increase with greater number of ingestions, the largest contributors to this pattern of escalation included radiology, pharmacy, hospital room charges, and surgical services. These findings suggest that preventive interventions early in the destructive cycle of IIFO may result not only in improved patient outcomes but also substantial savings to the healthcare system.

REFERENCES