Coping with IT Downtime in Hospitals

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Abstract. Downtime of information systems is a universal challenge faced by health care institutions. In this poster, we present the findings of a scoping review of how hospital organizations and their staff deal with downtime, and how coping can be grouped into three strategies; 1) Increasing communication, 2) Analog fallback, and 3) Restricted redundant systems. Our findings point to the importance of customizing coping mechanisms for individual healthcare institutions, and designing systems that empower users to deal with downtime.

Keywords. Health Information Systems, Downtime, Coping, Failure

1. Introduction

Anecdotal stories about system breakdowns and information technology (IT) downtime are frequent in health care. More rigorous investigations into the incidence of downtime has found that almost all healthcare institutions have experienced at least one unplanned downtime event, and that for the majority of these events the duration exceeded eight hours. Despite contingency planning and strategies for downtime handling, organizations still struggle to ensure that end-users of IT react sensibly during prolonged incidents. The aim of this work is to present an overview of coping mechanisms for handling unexpected downtime in hospitals. We focus on systems that can be fully, or partially, substituted with improvised solutions during the episodes.

2. Method

The study was conducted as a scoping review based on the search phrase ‘("technology failure" OR downtime) AND ("electronic health record" OR EHR OR "Information system" OR "electronic medical record" OR "Patient administration system" OR Paperless OR "Emergency care information systems" OR "Hospital Information Systems")’. We searched Pubmed, Engineering Village, and Cinahl. Included papers was thematically analyzed to identify general coping categories.

3. Results

A total of 51 studies were assessed in full text, resulting in the inclusion of 13 studies for the final analysis. From the thematic analysis we structured the coping mechanisms

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into three categories: 1) *Increased communication* which sought to facilitate the lack of coordination offered by the IT system, 2) *Analog fallback* to capture the clinical information and knowledge needed for processing and treatment of patients in alternate ways, and 3) *Restricted redundant fallback* systems which still utilized IT but without access to the entire suite of functionality. The findings of our analysis are distilled into Table 1.

### Table 1. Overview of results

<table>
<thead>
<tr>
<th>Category</th>
<th>Coping mechanism</th>
<th>Affected system</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased communication</td>
<td>Phone, Alternative working procedures, Email, Command center, Mass communication, Designated mediators</td>
<td>EHR, CPOE, LIS, HIS</td>
<td>System upgrade System launch, Hardware failure, Cyber-attack</td>
</tr>
<tr>
<td>Analog fallback</td>
<td>Printed labels, White board, Supplementary Paper Forms, Notebooks, Emergency Toolkit, Printed Ad-hoc logs</td>
<td>EHR, CPOE, CDSS, LIS, HIS</td>
<td>System upgrade, System launch, Hardware failure, Cyber-attack Natural disaster</td>
</tr>
<tr>
<td>Restricted redundant systems</td>
<td>Use of offline computers, Read-only systems</td>
<td>EHR, Medication administration</td>
<td>Hardware failure</td>
</tr>
</tbody>
</table>

The majority of downtime cases involve Electronic Health Records (EHR) or Hospital Information Systems (HIS), but also order entry systems (CPOE), clinical decision support (CDSS), and laboratory systems (LIS) were implicated. The coping mechanisms were coupled to the type of system affected.

### 4. Discussion

Given the steady improvement of hard- and software technology, one might expect that the risk of downtime would diminish over time, or even be an outdated issue. Yet, as illustrated by anecdotes as well as literature, this is not the case. During breakdowns, organizations either resolve to utilize broadcasting of information, or appointing designated carriers of information. Fallback systems are either improvised or designed in advance. In some cases, institutions were aware of the growing disparity between electronic or paper-based documentation and consequently prepared an entire emergency toolkit. From our initial navigation of the field, it is evident that grey literature of all kinds actually include a richer source of cases and experience. Given enough time and resources, there is most likely a lot of learning to be distilled from a systematic approach to collection and analysis of these stories.

### 5. Conclusion

The three coping strategies identified in this review, and the frequency by which they have been utilized, are indicative of the continued need for having fallback systems in place to handle lack of access to the IT systems. Although there are a number of research instruments available for gauging the impact of downtime, there is a need to harvest the experiences described in grey literature.