Managing Chemotherapy Drug Shortages in Ontario

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Background

- Chemotherapy drug shortages are common but the impact of specific drug shortages on the quality and cost of care has not been well studied. A recent shortage of liposomal doxorubicin (LDOX) provided an opportunity to describe the impact on patients as a shortage evolved.
- The initial treatment of ovarian cancer usually involves surgery and platinum-based chemotherapy. For women who relapse and become refractory to platinum treatment, LDOX and topotecan (TOPO) are comparably effective but the public funding depends on only one of these agents, as there is little evidence to support their sequential use.
- Between August 2011 and December 2012, LDOX was in short supply. Expert clinical guidance supported a funding policy amendment allowing a switch from LDOX to TOPO for patients who relapsed. Other less expensive chemotherapy agents, paclitaxel (PACL) and gemcitabine (GEMC), were also supported as evidence-based alternatives for this scenario.

Methods

- Administrative databases were mined to describe the pattern of drug use before, during, and after the LDOX shortage.
- Average monthly patients on treatment, switches, and new chemotherapy starts were tabulated by regimen.
- Direct patient cost was calculated by regimen and included:
  - drug procurement,
  - nursing and pharmacy time, and
  - other clinic and chemotherapy suite costs.

Results

- In the quarter pre-shortage, 86% of patients received LDOX and 14% of patients received other recommended agents (Figure 1).
- The impact of shortage evolved over 6 months. Initially, there was sufficient inventory of LDOX to support its ongoing use in 60% of patients, including 20 “new starts” in the first 3 months.
- After the first quarter, new starts on LDOX were rare, and the overall use of LDOX dropped to <10% of all patients by 6 months. However, even a year into the shortage some patients were still starting or receiving LDOX.
- Post-shortage, LDOX use rebounded quickly and the use of other drugs continued for patients who were responding or stable.

Table 1: Regimen switching during LDOX shortage

<table>
<thead>
<tr>
<th>Regimen switch from LDOX to</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gemcitabine (GEMC)</td>
<td>35</td>
<td>33%</td>
</tr>
<tr>
<td>Paclitaxel (PACL)</td>
<td>45</td>
<td>43%</td>
</tr>
<tr>
<td>Topotecan (TOPO)</td>
<td>25</td>
<td>24%</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>100%</td>
</tr>
</tbody>
</table>

- Although funding was available, only 24% of patients changed to TOPO (Table 1), with others switching to GEMC (33%) or PACL (43%).
- Preferences are also reflected in the overall utilization of the 3 alternatives during the 17-month shortage (Figure 1).
- Few patients received regimens outside the evidence-based recommendations (e.g. doxorubicin).

Conclusions

- During a recent shortage, ongoing access to LDOX was variable as the shortage progressed.
- The majority of patients received other effective chemotherapy options but the choice of agent varied.
- It appears that drug cost was not a factor in regimen choice.
- The direct cost for patient care did not increase, but indirect costs and patient experience during a drug shortage are important factors that need further study.

Figure 1: Treated patients by regimen pre, during and post LDOX shortage

Figure 2: Monthly Cost per Case during LDOX Shortage

• The total monthly direct cost varies significantly between regimens: LDOX ($3194) > TOPO ($2071) > GEMC ($562) > PACL ($519).
• The weighted average cost per case dropped during LDOX shortage (Figure 2).