Background and Objectives

- Most expensive intravenous oncology drugs have dosing schedules that are based on patients’ weight or surface area.
- After drug reconstitution, leftovers can remain and due to short stability, products can be discarded if no other patient is treated within the next 24 hours.
- A recent study performed in the USA by Bach et al. has reported that the proportion of the 20 most used cancer drugs left overs could vary between 1 to 33 %. [1] The aim of the study is to provide an estimation of the vial-sharing benefits in terms of savings from the hospital perspective.

Methods

- To estimate the vial-sharing benefits, we developed a budget impact model to compare three scenarios:
  1) no vial sharing is carried out and the leftover of each vial used is lost;
  2) the leftover is administered to the next patient (if one comes within the 24h after vial opening);
  3) the leftover is always administered to the next patient, there is no product loss.
- The analysis was performed on three drugs: nivolumab, pembrolizumab and trastuzumab-emtansine (T-DM1) in two French centres for cancer research (Gustave Roussy in Villejuif and Eugene Marquis in Rennes), covering a three months period.
- Data on individual prescriptions, administration date and dispensation (number of vials used for each patient) were collected over a three month period from April to June 2016.
- The public French price was considered for trastuzumab-emtansine while mean hospital prices were considered for nivolumab and pembrolizumab.

Results

Table 1: Centres activity over the analysed period

<table>
<thead>
<tr>
<th></th>
<th>Nivolumab</th>
<th>Pembrolizumab</th>
<th>T-DM1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gustave Roussy</td>
<td>68(250)</td>
<td>97(336)</td>
<td>33(139)</td>
</tr>
<tr>
<td>Eugene Marquis</td>
<td>NA</td>
<td>NA</td>
<td>13(42)</td>
</tr>
</tbody>
</table>

- The number of preparations analysed is reported in table 1.
- The analysis for nivolumab and pembrolizumab was not performed in Eugene Marquis due to inconsistencies in the dataset.
- A total of 53,647 mg was prescribed and 54,220 mg was delivered during the 3 months period resulting in a wastage of 573 mg for nivolumab, at the GR.
- A total of 43,960 mg was prescribed and 44,300 mg was discarded resulting in a wastage of 340 mg, during the study period for pembrolizumab at the GR.
- At the EM, a total of 8,628 mg was prescribed and 9,200 mg was dispensed resulting in 572 mg of trastuzumab-emtansine discarded.
- At the GR, 26,330 mg was prescribed and 27,460 mg was dispensed resulting in 1,130 mg of trastuzumab emtansine discarded.

<table>
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<tbody>
<tr>
<td>Scenario 1</td>
<td>69,781 €</td>
<td>813,743 €</td>
<td>188,420 €</td>
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<tr>
<td>Scenario 2</td>
<td>NA</td>
<td>NA</td>
<td>85,207 €</td>
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Table 2: Annual wastage with the worst-case analysis (1st scenario, assumption)

Table 3: Annual wastage with the base case analysis (2nd scenario, observation)

<table>
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</tr>
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<tbody>
<tr>
<td>Scenario 3</td>
<td>34,679 €</td>
<td>57,760 €</td>
<td>88,346 €</td>
</tr>
<tr>
<td>Scenario 4</td>
<td>NA</td>
<td>NA</td>
<td>48,160 €</td>
</tr>
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</table>

Table 4: Annual wastage with the best-case analysis (3rd scenario, assumption)

- The cost of annual wastage was estimated from the data, and is detailed for each scenario (table 2, table 3 and table 4).

For each molecule the proportion of discarded product has been calculated and is shown in figure 1, figure 2 and figure 3.

Conclusions

- The proportion of drug wastage is largely influenced by the size of the health establishment and the number of patients treated by a drug.
- The total annual estimated cost for nivolumab, pembrolizumab and trastuzumab emtansine wastage is 180 000€ at the GR.
- Similar studies have confirmed these results such as Herpin et al. which has shown that the wastage of trastuzumab emtansine represents 3.4% of the total cost for this product [2].

REFERENCES