Estimates on waste of breast cancer related chemotherapy drugs in the NHS (England)

RWD158

Tom Edmonds[1], Elise Evers[1], Charlotte Ahmadu[1]
1. Initiate Consultancy, London, UK.

SUMMARY

OBJECTIVES

- **Dose banding as part of the NHS Long Term Plan aims to improve patient outcomes, reduce wastage of medicines and achieve greater value for money invested in medicines in the NHS.[1]**
- **This study intends to investigate, estimate and quantify chemotherapy treatment waste in relation to NHS England's annual drug acquisitions.**

METHODS

- **The study simulates a patient cohort based on observed average patient characteristics to assess needs for each treatment option.**
- **The optimal combination of treatment strengths are calculated to simulate treatment provided.**
- **These dosing profiles are applied to a probability distribution set to assess average utilization and waste.**

FINDINGS

- **Treatments with greater number of available strengths lead to less overall waste.**
- **Dose banding is integral to maintaining low waste; if dose bands closely correlate with available strengths waste can be entirely eliminated.**
- **Other sources of waste and waste savings are still present.**

BACKGROUND & AIMS

- NHS England's Specialised Commissioning spends approximately £1.4 billion annually on chemotherapy treatment, with 80% attributed to drug acquisition costs.[2]
- Breast cancer is the UK's most prevalent cancer, accounting for 15% of new cases, equating to roughly 56,000 cases each year.[3]
- Chemotherapy is a common treatment for many cancer patients, requiring tailored dosing regimens which can be administered in neoadjuvant, adjuvant, combined and metastatic settings.[4]
- As infusion is the administration method for many breast cancer chemotherapies, patients' doses are formed by combining multiple vials to achieve the precise amount needed, resulting in unused material that is wasted.
- **This study aims to estimate and quantify this waste in relation to NHS England's annual drug acquisitions.**

METHODS

- Treatments were selected from chemotherapies considered in NICE appraisals for breast cancer between 2015 and 2021.[5]
- Acquisition data from the secondary care medicines database 2022 (SCMD)[6] was extracted for these treatments to identify relative scale of use.
- List prices for each treatment were taken from the NICE BNF.[7] (**Table 1**)
- These treatments' doses in clinical practice are primarily determined by body weight or body surface area (BSA). Doses are then adjusted using NHS dose banding guidelines[8] to allow for more feasible dosing in clinical practice.
- The probability of patients requiring individual dose bands was calculated using a normal distribution of weight or BSA based on the averages collected from NHS patient statistics[9] and a retrospective study of cancer patients in clinics in the UK.[10]
- Each dose band was assessed to determine the appropriate number of vials or tablets to fulfil the required dose and subsequent wastage.
- This approach assumed no vial sharing took place as use of this waste-reducing strategy is notably heterogeneous amongst clinics.
- Where multiple strengths of the treatment were available, the approach assumed the lowest cost combination of strengths was taken.
- The average per person dose and waste for each treatment was then calculated by assessing the area-under-curve of the normally distributed doses.
- These findings were then scaled to match the respective drug acquisitions, assessing the overall cost of acquisition and waste in £/year. (**Figure 1**)
- Additionally, the percentage waste per person in terms of costs was calculated to assess waste independent of acquisition. (**Figure 2**)

Figure 1. Annual estimated acquisition costs of treatment.

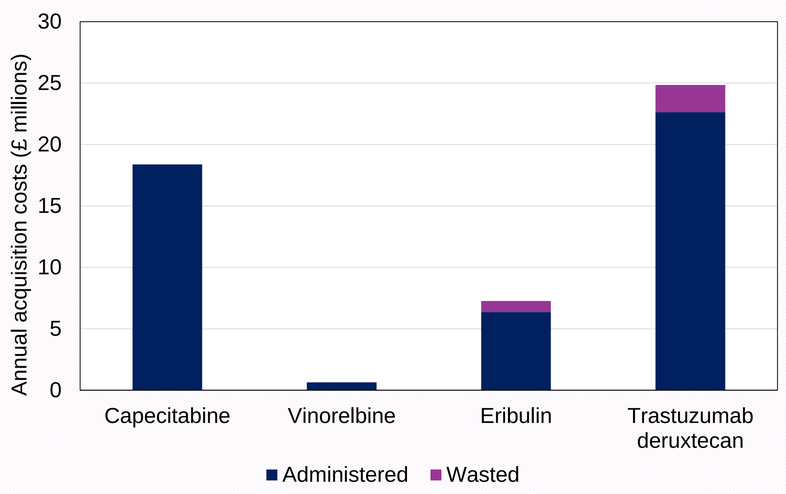
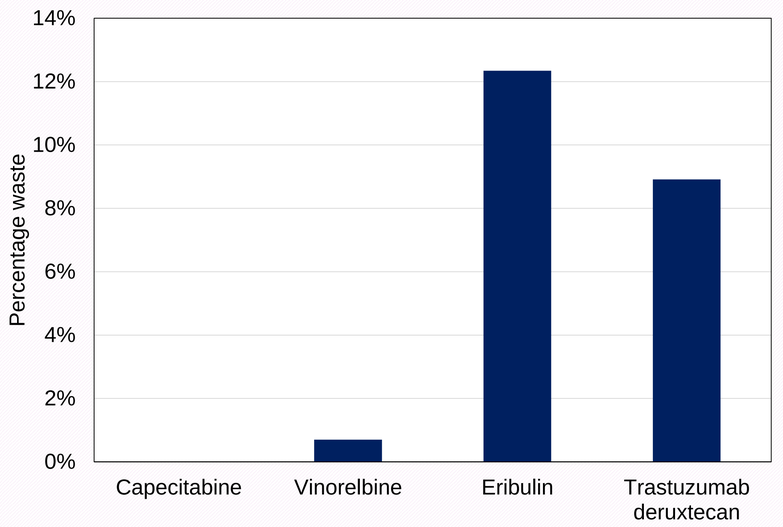


Figure 2. Percentage of treatment wasted.



RESULTS

- Waste percentages relative to acquisitions varied from 0% to 12%, with the highest waste cost amounting to £2.2 million for individual drug.
- Treatments with varying vial or tablet sizes exhibited lower overall waste compared to single-sized vials, and in certain instances (notably in oral medication), dose banding correlated exactly with combinations of strengths in all cases, completely removing this source of waste.
- In the instance of highest potential % wastage (eribulin), an estimated 22% of patients were wasting at least 50% of a vial.
- Notably, the second highest potential % waste (trastuzumab deruxtecan) was estimated to have more patients wasting at least 50% of a vial (35%), despite resulting in less overall waste than eribulin. This is likely due to the greater numbers of patients with no waste for this treatment vs eribulin.

Discussion

- Other sources of waste are likely to occur in clinical practice which may skew the results to greater levels of waste. These sources include sub-optimal combinations of strengths where multiple vials are used, adherence, expiry date, and infusion appointment cancellations. These sources are not able to be simulated without high uncertainty.
- Conversely areas of waste savings may be implemented such as vial sharing which can skew the results to less waste.
- Sources for the cost of eribulin 1320µg/3ml were not provided on the BNF. As acquisitions for this strength was comparatively low, calculations assumed all doses with eribulin 880µg/2ml.

CONCLUSIONS

- The study concludes that using variable vial sizes, combined with carefully calculated dose banding, can help reduce waste.
- Most notably accurate dose banding occurs in oral medications, which is to be expected due to the difficulty of splitting doses.
- However, the analysis did not account for other potential sources of waste, such as suspended treatments, adherence issues, and vial availability
- Additionally, while vial sharing may be a way to reduce waste, its practical implementation has not been well-established in clinical practice.

Table 1. Treatment information.

Treatment	Administration	Pack Price[7]	Pack Size[7]	Unit Price	Units Acquired[6]	Dosing Calculation	Dosing Rate
Capecitabine 150mg	Oral tablets	£30.00	60	£0.50	2,553,335	BSA	1250 mg/m²
Capecitabine 300mg		£76.04	60	£1.27	19,490	BSA	1250 mg/m²
Capecitabine 500mg		£225.72	120	£1.88	9,078,726	BSA	1250 mg/m²
Vinorelbine 10mg/1ml	Solution for infusion vials	£29.00	1	£29.00	5,050	BSA	60 mg/m²
Vinorelbine 50mg/5ml		£139.00	1	£139.00	3,545	BSA	60 mg/m²
Eribulin 880micrograms/2ml		£361.00	1	£361.00	20,133	BSA	1 mg/m²
Eribulin 1320micrograms/3ml		N/A	N/A	N/A	738	BSA	1 mg/m²
Trastuzumab deruxtecan 100mg		£1,455.00	1	£1,455.00	17,078	Weight	5 mg/kg

References

1. Royal Pharmaceutical Society. "Medicines Optimisation: Helping patients to make the most of medicines." (2013).
2. NHS England U.K. "Chemo drug optimisation to improve patient experience of cancer treatment." Accessed June 28, 2023. https://www.england.nhs.uk/2016/05/chemo-drug-optimisation/
3. Breast Cancer U.K. "Facts and figures about breast cancer." Accessed June 28, 2023. https://www.breastcanceruk.org.uk/about-breast-cancer/facts-figures-and-qas/facts-and-figures/
4. Amjad, Muhammad T., Anusha Chidharla, and Anup Kasi. "Cancer chemotherapy." (2020).
5. NICE HTA Submissions Statistics https://www.nice.org.uk/about/what-we-do/our-programmes/nice-guidance/nice-technology-appraisal-guidance/data/appraisal-recommendations
6. Secondary Care Medicines Database https://opendata.nhsbsa.net/dataset/secondary-care-medicines-data
7. NICE BNF https://bnf.nice.org.uk/drugs/[DRUG NAME]
8. NHS Dose banding tables: https://www.england.nhs.uk/commissioning/spec-services/npc-crg/group-b/b02/chemotherapy-dose-banding/
9. NHS Patient Statistics https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2019/health-survey-for-england-2019-data-tables
10. Saccp et al. 2010 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0008933

Presented at ISPOR Europe, 12th-15th November 2023
initiateconsultancy.com *hello@initiateconsultancy.com*