Implementing chemotherapy dose-banding using retrospective data analysis and exponential calculus

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Background
Chemotherapies are generally prescribed and produced as a function of Body Surface Area (BSA). The most recent literature recommends that marketed drugs continue to use BSA-based dosing when supported by clinical evidence. If not, it recommends dose-banding (DB) with adjustments made for other important parameters.

Experiences of other hospitals

Purpose
Determine which of the drugs compounded in our centralised chemotherapy production unit were potential candidates for DB for adults, whilst guaranteeing patient safety and meeting the needs of physicians, pharmacists and nurses.

Material and methods
Discussions with interdisciplinary teams and senior physicians took place in order to promote acceptance of the project and its deployment.

Database analysed
A database of chemotherapy doses produced between 2010 and 2013 was analysed to define a Top 10 chart of the most common protocols and compounds. Dosage patterns were analysed, and new bands were modelled using exponential calculus in order to aid DB decision-making.

Best practice
Pharmacy Centralised chemo production unit

Product stability

Automation

Conclusion
Chemotherapeutic doses can now be prepared in bands, and pharmacy activity can be rationalised by producing doses in batches or campaigns. The imminent introduction of automation should ensure accuracy of the doses delivered. Future studies should examine product stability so that planning for chemotherapy production becomes highly efficient.

Impact of dose preparation on nurses

5 band doses = 90% of annual production needs
1227mg, 1470mg, 1629mg, 1805mg and 2000mg
Following the new specifications, just two bands (2000 mg and 1805 mg) already fulfil 50% of annual production needs; producing five band doses streamlines 90% of annual production needs.

Exponential calculus starting from the higher doses

Identification of trends in prescription

Retrospective analysis of gemcitabine manufacture in 2013
613 infusion bags in 111 different doses, ranging from 266 mg to 2900 mg

Goal: manufacture of complete doses

Dose prescription ...
70 mg?

“Ready to administer” infusion bag

Goal: manufacture of fractionated additional doses

Dose prescription ...
70 mg?

Elbe

In the ward: total dose preparation before administration
10 mg + 30 mg + 30 mg

10 mg  20 mg  30 mg

“Let’s please keep using ‘Ready to administer’ doses!”

Result
Application to gemcitabine

Download the map