

# Why we overhauled our cytotoxic production WORKSHEETS AND LABELS

By STEPHEN LOFTHOUSE

*Pharmacy staff at a Yorkshire hospital decided to overhaul their production worksheets and labels for cytotoxics to increase efficiency*

**R**ecently, government initiatives have speeded up cancer diagnosis and treatment. This has placed increasing pressure on manufacturing units within small general hospitals to produce large quantities of hazardous drugs safely, quickly and efficiently, despite severe staff shortages.

The methods of manufacture at Rotherham General Hospital are not unique. Historically, the production worksheets have been a photocopy of an approved master with labels stored on two different computer systems. In addition, an increasing workload means that unqualified staff are playing a greater role in preparation and production of paperwork and labels.

In an attempt to unify and improve the system for worksheet and label production, a new computerised system has been developed using Microsoft Excel.

Microsoft Excel was chosen because:

- 1 it is relatively cheap
- 1 it is a readily available spreadsheet program
- 1 it was already installed on many of the computers within the department
- 1 maintenance costs would be negligible since the trust's IT department could provide any necessary technical support

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- 1 the software is widely used and its capabilities are well known

The aims of the new system were to:

- 1 improve safety
- 1 integrate the production of worksheets and labels
- 1 simplify and speed up the process of producing worksheets and labels

## METHOD

**I**n order to avoid having to make changes later on, a lot of thought went into the design and setting up of a template upon which the worksheets are based.

The design and programming process was made easier by printing off a gridline sheet using Microsoft Excel. This sheet was used as a base for the design of the worksheet and labels. This sheet is also useful when creating formulae to work out drug volumes and expiry dates.

When designing the worksheet I kept in mind that information would need to be displayed in a clear and logical fashion. I thought about dosage validation and error traps, and that the system would need to be validated by my colleagues to ensure that it functioned correctly and met the needs of the department. If they could not follow what had been done, errors could be missed.

A typical Rotherham computerised worksheet is shown in the Figure (p26).

## KEY TO THE FIGURE

**A**n explanation of the numbers in red in the Figure are shown below.

- 1 The date at the top of the worksheet is the date the worksheet is printed. Validating the date the product is made against the date that the worksheet is printed prevents the production of post-dated worksheets.
- 2 The strength of the product being made is entered here. It is prudent to set up some kind of check on the dosage range in this cell as it would be very easy, for example, to enter a 22mg vincristine dose instead of a 2mg dose.
- 3 After a meeting with the trust's risk management committee it was decided to include the new NHS number on the worksheets and labels. This is because the technical services unit manufactures products for patients from hospitals who use a different hospital number format to our own. The new NHS number acts as a universal identifier and goes some way to make the system "future proof".
- 4 The number of items made is linked to print functions described later on. The default is set to 1.
- 5 The volume calculation is done in this cell. After much discussion it was decided not to show the formula used to calculate the volume on the worksheet.

CYTOTOXIC SERVICES  
PHARMACY DEPT  
ROTHAM NHE TRUST

UNTIL WORKSHEET THROUGH 05-Oct-01<sup>1</sup>

PREPARED IN ISOLATOR No.

**CYCLOPHOSPHAMIDE** <sup>2</sup> **mg in 100ml** **SODIUM CHLORIDE 0.9%**

PATIENT'S NAME: \_\_\_\_\_ HOSPITAL NUMBER: \_\_\_\_\_ NHE Number: <sup>3</sup> \_\_\_\_\_

WARD: \_\_\_\_\_ CONSULTANT: \_\_\_\_\_ BATCH No.: \_\_\_\_\_

No. OF ITEMS <sup>4</sup> **1** FORM: \_\_\_\_\_ IMG: \_\_\_\_\_

DRUG	MANUFACTURER	BATCH No.	EXPIRY
CYCLOPHOSPHAMIDE			
500MG VIALS			
1 QIAM VIALS			
WATER FOR INJECTION			
SODIUM CHLORIDE 0.9% 100ML			

**METHOD**

REMOVE VENT UNF FROM BAG  
PLACE A SPIKE VENT INTO EACH VIAL  
FIL CONSISTENTLY CYCLOPHOSPHAMIDE WITH  
25ML WATER PER 500MG CYCLOPHOS  
SHAKE TO DISSOLVE

<sup>5</sup> DRAW UP **0.0 ML OF CYCLOPHOS. AND ADD TO BAG**  
SHAKE AGAIN 10MIN

**EQUIPMENT PER UNIT**

1 AIR EXTRACTOR  
1 SPIKE VENT PER VIAL  
1 X 50ML SYRINGE  
2 SYRINGES  
2 GREEN NEEDLES  
1 ADDITIVE PORT CAP

TIME AND DATE PREPARED: 12:30 HRS ON 05-Oct-01<sup>6</sup>

EXPIRY IS 8 DAYS WHEN STORED IN A FRIDGE

**EXPIRY TIME AND DATE: 12:30 HRS ON 11-Oct-01**

<sup>7</sup> WORKSHEET AND LABELS IDENTIFIED BY: \_\_\_\_\_

EQUIPMENT PREPARED BY: \_\_\_\_\_

PRODUCT MADE BY: \_\_\_\_\_

BOOKED OFF COMPUTER BY: \_\_\_\_\_

COMMENTS:

FINAL CHECK AND RELEASE BY: \_\_\_\_\_

<sup>8</sup> [Click here to print worksheet](#)

<sup>9</sup> [Click here to print labels](#)

Figure: the Rotherham computerised worksheet

This forces the checker to recalculate the volume.

- The time and date when the product is made are entered here, and an expiry date is calculated. The date when the product is prepared is validated against the date the worksheet is printed to prevent the production of postdated worksheets and labels.
- The person printing the worksheet and labels enters his/her initials here. This cell is set up in such a way that this information has to be entered or the user cannot proceed.
- Microsoft Excel contains a "cut-down" version of Microsoft Visual Basic. Visual

Basic is an event-driven programming language which makes it possible to set up a number of important and useful features. Each worksheet has two buttons on the bottom of the screen, (the buttons are set so they do not print out on the finished worksheet). Number 8 shows the worksheet button which, if clicked, will print one copy of the worksheet and transfer information from the worksheet to a log file to maintain a record of what has been printed.

- Similarly, clicking the label print button will print off the labels. The number of label sets printed is linked to the number of items made, so if two items were

made, two sets of labels would be printed. Clicking button 8 or 9 will run an error checking program which will ensure that the worksheet has been filled in correctly.

## VALIDATION

Because I undertook the design and programming of the system in my own time, it has taken three years and five versions to reach the present stage. At the moment the system is going through the second stage of a three-stage validation process. The first stage involved the installation of the worksheets on to the computer and to correct any errors which prevented them from running properly, for example, programming errors in the buttons. The second stage involves checking every worksheet for errors, such as the calculations and spellings.

The third stage will follow after any necessary amendments have been made. This final stage is a run-in period when the new system will be run alongside the old one for about six months. Each step of the validation process is documented, as is every mistake, change or alteration. After the six-month run-in period, all the paperwork and documentation will be reviewed by both the pharmacy department and the trust's risk management committee. If everything is satisfactory, the system will be approved for use and protected with a password to prevent alteration of the worksheets.

## CONCLUSION

Before buying a chemo computer system (that is, a computer system that will track blood results, generate prescriptions and print worksheets and labels) it is important to consider what the needs of the department are. If the computer is only required to produce worksheets and labels there is no point in spending thousands of pounds on a sophisticated system. With planning, forethought and hard work it is possible to set up a system that is safe, reliable, easy to use and future-proof and at a fraction of the cost of a bought-in system.

Acknowledgments: With thanks to the staff of the technical services units at Rotherham District General Hospital and the Princess Diana Memorial Children's Hospital, Birmingham.

## REFERENCES

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