Intensive Care Society

Patient Flows Group

Report March 2007

Use of the Patient Flows Model and data collection during the July 2006 KH03a bed census:
A report from the Patient Flows Working Group

Background

The Intensive Care Society's Patient Flows Group believes that measuring patient flows locally will improve delivery of critical care. By using a simple database developed to capture and graphically show how critical care capacity is being used, units are able to demonstrate unmet demand and identify contributing factors at times of peak demand. A unit picture is built up, which is easily understood by managers and clinicians; this should initiate discussion about whether the costly ICU resources are being utilised efficiently and effectively.

Summary

The information obtained from this study shows that the Patient Flows Model is a good useful tool to enable units to pictorially demonstrate activity and capacity within critical care. In the main, the units participating in the survey uphold this view with the caveat that there needs to be enhancements to make it more user friendly, easier to download and to provide more explicit information of how to get the best out of their data. The Patient Flows Group is currently investigating how flexible units can present their data in a way that does not make them appear as though their resources are under or inappropriately used. Furthermore, the Group are continuing to explore the present demands placed on critical care and are looking at possible options – including guidance or toolkits – that can help predict likely alterations in capacity using mathematical simulation analysis.

Some units were disappointed that the data did not reflect their typical activity level but this is to be expected in *ad hoc* audits and is not detrimental to the information gleaned from this survey. The model is not to be used continuously but as a spot audit as and when required.

Method

Units were asked to participate in a study using the patient flows model toolkit at the same time as the July 2006 KH03a bed census to ascertain whether the model was easy to use and might provide more in-depth local information to support the data collected centrally by the KH03a census. The Intensive Care Society, Medical Leads, Network Managers and a series of emails were used to disseminate details of the study. The National Critical Care Stakeholders Forum was contacted to facilitate uptake. It was hoped that units would ideally use the model for at least 14 days to coincide with the bed census date on 13 July 2006.

The database program was downloaded from the ICS website, the Smart Group Patient Flows website or installed from CD. A toolkit information pack about the database was also issued. Units were asked to complete a questionnaire that would give details of their unit profile (Appendix 2).
Units were asked to report their experience of using the tool and to export their data for analysis. It was hoped to compare the KH03a data with data extracted from the patient flows model on 13th July to assess the accuracy of the KH03a returns. This would give units an opportunity to validate or refute clinicians' criticisms of the census.

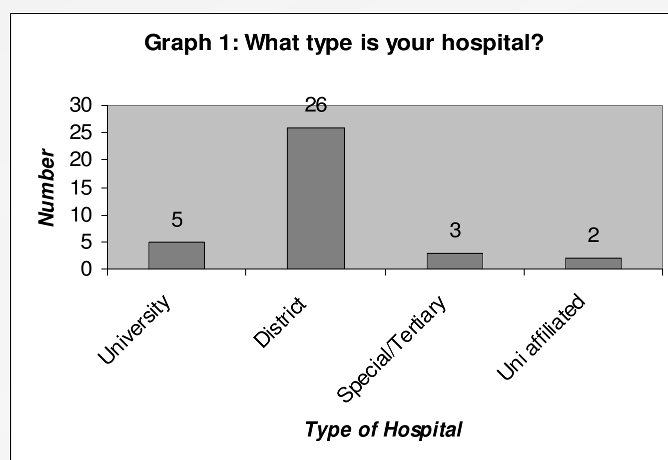
Results

Units were requested to send their data to a central collection point in Excel format to facilitate data analysis. All units reported that the period of data analysis was extremely quiet in comparison with the rest of the year and a few units were reluctant to participate simply on this basis. Many participating units submitted their data with the qualification that the data was totally unrepresentative of their usual activity - 86 hours of virtual patient data were logged during the data collection period equating to less than 1% of the total number of hours of data collected.

A resume of the units participating in the survey is given in Appendix 1 with a brief summary of analysis of data collected.

Seventy-nine units replied that data would be available for analysis together with their unit profiles and details of their user experience.
Forty-six percent of the units (36/79) were able to provide unit profiles.

Five units were situated in university hospitals, 26 in district general hospitals, three units were in specialist or tertiary hospitals and two units were in university-affiliated hospitals.



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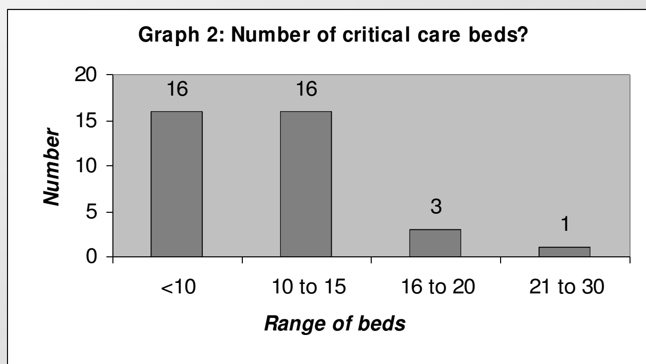
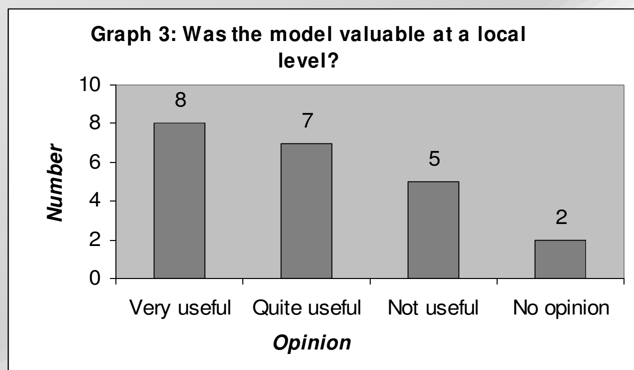
Of the 36 units providing data 32 were adult general units and the remaining four were specialist units.

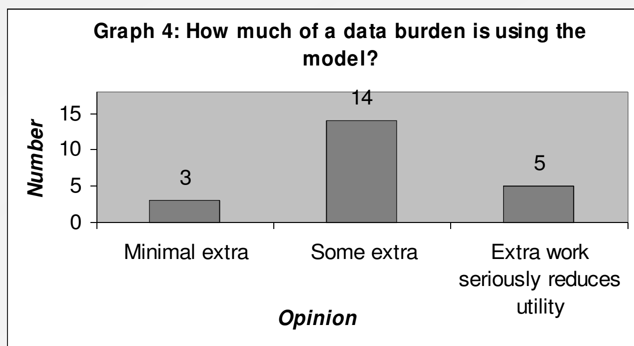
Sixteen units reported they had beds in the range of 10 – 15 while 16 units had less than 10 beds. Three units had 16 – 20 beds and one unit reported over 21 beds. (Graph 2)



Units were asked about the validity and effectiveness of the Patient Flows Model at a local level. Twenty-two of the 79 units replied. In the main, 68% (15/22) thought the model was either 'very/quite useful'. Five units felt it was 'not at all useful' and two units did not express an opinion. (Graph 3)

When asked if data collection was a burden, 22 of the 79 units responded. Fourteen units thought it needed some 'extra work', three thought 'a minimal extra amount of work' was needed and five units advised that the extra work reduced the utility of the model. (Graph 4)





Conclusion

Units familiar with Patient Flow Model reported that the toolkit was workable and that it was possible to customise the database to fit in with their information needs. However, new users indicated that they found the model complicated and awkward. Therefore, the Patient Flows Working Group has noted the comments listed in Table 1 and made slight modifications to the model, which should assist all users.

The link with the KH03a data presented the Working Group with an ideal opportunity to compare the number of critical care beds open reported by Trusts on 13th July 2006 with capacity reported from the returned Patient Flows data. It was anticipated that this comparison (Table 2) would prompt participating units to examine their own information to test the accuracy of the model and their Trust's KH03a returns. However, the survey's purpose was to capture activity recorded not investigate any discrepancies.

It is envisaged that the exercise will be repeated to test the enhancements to the Patient Flow Model and to compare the model's results to returns on the KH03a census day.

Recommendations

The Group recommend that any discrepancies should be followed up and to try to ascertain the reason for the mismatch of beds open with reported capacity hours. The Group recommend that the exercise be repeated in line with the July KH03a bed census to test the amended model.

Appendix 1: Summary of the units participating in the survey

Network or Unit	No. of participating units	Data Received	Unit Profiles
Cheshire & Merseyside CCN	23	Y	12
Hinchingbrooke	1	Y	Y
Kent & Medway Network	6	Y	Y
Lancs & South Cumbria	8	Y	None
Lister Hospital	2	Y	Y
Manchester Royal Infirmary	1	Y	Y
Mayday University Hospital	1	Y	Y
Mid Trent CCN	5	Y	Y
Northampton General	1	Y	Y
Surrey wide CCN	1	Y	None
Sussex CCN	5	Y	Y
Tees Valley & South Durham CCN	11	Y	1 received
West Yorkshire CCN	14	Y	1 received
Total Units	**79**		

Appendix 2: Unit profile questionnaire

Patient Flows Model

To:

ICS E-Newsletter recipients
ICS Linkmen
Medical Network Leads
Network Managers
Stakeholders Forum

Introduction:

To date, there has been no satisfactory way of following in detail the way critical care beds are used and accurately identifying pressures and bottlenecks. But this has now changed with refinement of the Patient Flows Model, which is now available for use. The Patient Flows Model has been distributed to networks with the CCMDS at the various recent training days. Further copies of the model and the supporting literature are available for downloading from the Patient Flows page of the ICS website (www.ics.ac.uk).

Suggestion:

Although units are free to use the model at any stage, it may be useful to monitor patient flows for a minimum of two weeks and possibly a maximum of four weeks around the 13th July 2006 KH03a bed census. This would allow useful supporting data for the census and may help locally to improve either the census returns or any criticisms of the results. Clearly the data collection period should span 13th July. Most clinicians have major reservations about the accuracy of this census, despite the fact that ministers and civil servants rate it highly for the information it provides on critical care provision. Using the model around this period would provide useful supporting data as well as an opportunity to validate or refute clinicians' criticisms of the census.

Method:

The Patient Flows Working Group would hope that measuring patient flows locally would improve delivery of critical care. To help assess the usefulness of the tool and reduce the work entailed for units, the Working Group proposes that data is exported from the local databases for collation at a national level. Results would be made widely available. Also a simple questionnaire about the usefulness of the model would also be circulated to assess the value of the tool to end-users.

Data Extraction:

The exported data will be used to calculate the following variables for national comparisons:

1) Duration of the survey (two, four weeks or other)
2) Delayed discharges ~ expressed as number of bed-days per week
3) Virtual patients ~ expressed as number of bed-days per week
4) Transfers in ~ expressed as number of patients per week
5) Non-clinical transfers out ~ expressed as number of patients per week

Please use the export to Excel button in the Patient Flows Model to extract the data and send the exported file to Saxon Ridley (saxon@ridley.waitrose.com) or Di Elson (di.elson@nottinghamcity-pct.nhs.uk).

Assessment of Patient Flows Model

1) Do you find the model valuable at a local level?
   a. Not at all
   b. No opinion
   c. Quite useful
   d. Very useful

2) How much of a data burden is using the model
   a. Minimal extra work
   b. Some extra work
   c. Extra work seriously reduces utility of model

3) What enhancements or changes would you suggest?

4) What difficulties are there with the program?

5) Has the Patient Flow Model been used in connection with joint planning with other hospital areas - for instance, operating theatre planning, emergency department etc? If so, has it been helpful, what has been the reaction of other clinical directorates or specialities?

6) If your unit is a flexible unit admitting Level 1 and 2 patients, does this flexibility make model more difficult to use?

7) What is the name of your hospital?

8) What is NHS code for your hospital?

9) What type is your hospital?
   a. University
   b. University affiliated
   c. District
   d. Specialist or Tertiary hospital.

10) Is your unit:
   a. An adult general critical care unit
   b. A specialist critical care unit

11) Number of critical care beds:
   a. < 10
   b. 10-15
   c. 16-20
   d. 21-30
   e. > 31

Results:

The questionnaire should be emailed back to:
Saxon Ridley (saxon@ridley.waitrose.com)
or
Di Elson (di.elson@nottinghamcity-pct.nhs.uk).

The Working Group strongly encourages members to participate; the project is designed to help you.

Table 1: Unit responses to the model

Units were asked to give their opinions on how the model could be enhanced or changed. They were also asked to provide their comments on the problems they may have encountered with the program. This information is summarised below together with the Patient Flows Working Group responses.

Technical/programming enhancements	Responses
Would be easier and less time consuming if linked to CCMDS program or other	This would be difficult as the CCMDS is patient centred where as the PFM is bed centred (the same bed may be occupied by different patients over the course of the day and the same patient may be cared for in more than one bed). In the long term, commercial clinical databases and eventually the NHS Integrated Clinical Record System could be adapted to provide graphical analysis similar to the PFM tool
Time consuming	It may be time consuming but it is a tool (not a database). It does require an investment of time to get it to work effectively. It does become less time consuming with frequent use
Installation difficult	A letter will be forwarded to IT departments advising the purpose of the PFM and to request their help in downloading the program should difficulties arise
Data simple to input but not managed to find graphs or use data	The graphical summary has been improved so that the graphs consistently deliver the same output (e.g. same colour codes and order of bed categories)
Make it more user friendly	Ease of use improves with greater familiarity. It is important than the macro function of Access/Excel is not turned off
Make it easier for flexible units - virtually impossible to make sense of data	The issue of flexible units has been recognised and new options for showing empty beds suggested (see new document on website). These options allow the recording of empty Level 2 and 3 beds separately as well as unfunded or un-staffed beds
In spite of employing an expert to analyse the data and produce the reports the system does not allow instant information provision. Due to time and cost taken to manipulate the tool to generate some form of intelligent information for the units, particularly for the combined units, won't be undertaking the exercise again until new tool developed	Hopefully some of these issues have been addressed above. The PFM is meant to produce graphical outputs of capacity usage over relatively short periods (e.g. weeks). Although the data needs to be entered in real time (or as near as possible), the output needs to be viewed over relatively longer periods
Make customised reporting available	The PFM can be customised locally but it was always designed to be a relatively simple tool
Virtual patients- adding in retrospectively causes problems	This is acknowledged. The PFM has been tested on various PCs and with various operating systems. This 'bug' sometimes appears and sometimes does not. We can only recommend that the virtual patients are added in real time
Too complex	Complexity is balanced against simplicity. Others have found the PFM not complex enough (e.g. customised reports)
You cannot edit the bed names/ admission details	Again, complexity versus simplicity
A better front end. Microsoft access is not the best tool to use for entering large amounts of data. Suggest Visual BASIC application or Delphi. Also add in some function keys to complete laborious tasks	This may be true but the Microsoft programs are more or less universally available and can be edited/amended by those with a lower level of programming skills.
Nowhere to record discharge data and this would be useful Form does not tie admission data to individual pts so unable to see progress of pts through their stay - just bed occupancy	These details are not part of the PFM purpose

Table 2: Comparison with KH03a Results

As the exercise was scheduled around the KH03a* bed census date, the Patient Flows Working Group wished to compare the data extracted from the model with the Department of Health information. However, the KH03a data is Trust rather than unit specific which complicates the correct marrying process. Nevertheless, the KH03a returns for the 61 hospitals that returned data are given below; the final column gives the data submitted by the unit with the patients' flows data.

Open and staffed adult critical care beds at 13 July 2006, England Department of Health form KH03a (Published 25 August 2006) Name	Total critical care beds 3,236	General critical care 2,425	Other critical care beds 811	Data submitted by units
Aintree Hospitals NHS Trust	17	17	-	408 hours capacity 404 hours beds open = 17 beds
Ashford and St Peter's Hospitals NHS Trust	18	18	-	144 hours capacity 144 hours beds open = 6 beds (Part Trust participation 1 unit)
Blackpool, Fylde and Wyre Hospitals NHS Trust	27	12	15	288 hours capacity 288 hours beds open = 12 beds (Part Trust participation 2 units)
Bradford Teaching Hospitals NHS Trust	12	12	-	144 hours capacity 144 hours beds open = 6 beds (Partial Trust participation 1 unit)
Brighton and Sussex University Hospitals NHS Trust	26	26	-	504 hours capacity 504 hours beds open = 21 beds (Partial Trust participation 2 units)
Burton Hospitals NHS Trust	8	8	-	192 hours capacity 192 hours beds open = 8 beds
Calderdale and Huddersfield NHS Trust	14	14	-	384 hours capacity 383 hours beds open = 15.95 beds (Full Trust participation 2 units)
Central Manchester and Manchester Children's University Hospitals NHS Trust	38	22	16	624 hours capacity 528 hours beds open = 22 beds
Countess Of Chester Hospital NHS Trust	13	13	-	312 hours capacity 312 hours beds open = 13 beds
County Durham and Darlington Acute Hospitals NHS Trust	20	20	-	192 hours capacity 192 hours beds open = 8 beds + 24 hours virtual patients (Partial Trust participation 2 units)
Dartford and Gravesham NHS Trust	7	7	-	240 hours capacity 161 hours beds open 79 hours closed beds = 6.7 beds
Southern Derbyshire Acute Hospitals NHS Trust	28	28	-	60 hours capacity 360 hours beds open = 15 beds (Partial Trust participation 2 units)
East and North Hertfordshire NHS Trust	20	20	-	312 hours capacity 312 hours beds open = 13 beds (Partial Trust participation 2 units)
East Cheshire NHS Trust	6	6	-	144 hours capacity 144 hours beds open = 6 beds
East Kent Hospitals NHS Trust	21	21	-	360 hours capacity 360 hours beds open = 15 beds + 24 hours virtual (Partial Trust participation 2 units)
East Lancashire Hospitals NHS Trust	26	26	26	216 hours capacity 216 hours beds open (Partial Trust participation no data 13 July)
East Sussex Hospitals NHS Trust	19	19	-	480 hours capacity 452 hours beds open 28 hours beds closed = 19 beds
Hinchingbrooke Health Care NHS Trust	4	4		120 hours capacity 96 hours beds open 24 hours beds closed = 4 beds
Lancashire Teaching Hospitals NHS Trust	22	22	-	648 hours capacity 510 hours beds open 138 hours beds closed = 21.25 beds
Leeds Teaching Hospitals NHS Trust	67	40	27	1752 hours capacity 1704 hours beds open = 71 beds
Liverpool Women's Hospital NHS Trust	3	2	1	96 hours capacity 96 hours beds open = 4 beds + 20 hours virtual pt
Maidstone and Tunbridge Wells NHS Trust	14	14	-	336 hours capacity 335 hours beds open = 14 beds

Comparison with KH03a Results cont'd

Open and staffed adult critical care beds at 13 July 2006, England Department of Health form KH03a (Published 25 August 2006)	Total critical care beds	General critical care	Other critical care beds	Data submitted by units
Mayday Healthcare NHS Trust	12	12	-	360 hours capacity 287 hours beds open = 12 beds
Medway NHS Trust	19	19	-	216 hours capacity 216 hours beds open = 9 beds + 24 hours virtual pt (Partial Trust participation 1 unit)
Mid Yorkshire Hospitals NHS Trust	26	25	1	432 hours capacity 355 hours beds open= 14.79 beds 77 hours beds closed (Partial Trust participation 3 units)
North Cheshire Hospitals NHS Trust	14	14	-	384 hours capacity 384 hours beds open = 16 beds + 24 hours virtual pt
North Tees and Hartlepool NHS Trust	18	18	-	504 hours capacity 432 hours beds = 18 beds
Northampton General Hospital NHS Trust	10	10	-	Incomplete data
The Queen Victoria Hospital NHS Trust	7	3	4	96 hours capacity 96 hours beds open = 4 beds + 24 hours virtual pt (Partial Trust participation - burns unit)
Royal Liverpool and Broadgreen University Hospitals NHS Trust	27	27	-	480 capacity 479 hours beds open = 20 beds + 6 hours virtual pt (Partial Trust participation 1 unit)
South Tees Hospitals NHS Trust	54	25	29	1128 hours capacity 1039 hours beds open = 43 beds + 48 hours virtual pt (Partial Trust participation 6 units)
Southport and Ormskirk Hospital NHS Trust	20	10	10	240 hours capacity 240 hours beds open = 10 beds +18 virtual pt
St Helens and Knowsley Hospitals NHS Trust	14	14	-	336 hours capacity 336 hours beds open = 14 beds
The Cardiothoracic Centre - Liverpool NHS Trust	13	-	13	912 hours capacity 864 bed hours open (36 beds) - 571 empty hours = 12 beds
The Mid Cheshire Hospitals NHS Trust	11	11	-	264 hours capacity 264 bed hours open = 11 beds
United Lincolnshire Hospitals NHS Trust	24	24	-	360 hours capacity 359 hours beds open = 15 beds + 2 hours virtual pt (Partial Trust participation 2 units)
Morecambe Bay Hospitals NHS Trust	14	14	-	360 hours capacity 336 hours beds open = 14 beds (24 hours closed bed)
Walton Centre For Neurology and Neurosurgery NHS Trust	13	-	13	312 hours capacity 312 hours beds open = 13 beds
Wirral Hospital NHS Trust	16	16	-	384 hours capacity 384 hours beds open = 16 beds
Worthing and Southlands Hospitals NHS Trust	12	12	-	288 hours capacity 288 hours beds open = 12 beds

* The KH03a includes reports from a total of 164 Trusts with some level of critical care provision on at least one site (many have more than one site) and is for England only.