AMBULATORY CHEMOTHERAPY BUSINESS IMPROVEMENT STRATEGY

Pilot project across eight representative sites

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The NSW Government agency dedicated to lessening the impact of cancer through prevention, detection, innovation, research and information.

Cancer Institute NSW
Australian Technology Park
Level 9, 8 Central Avenue
Eveleigh NSW 2015
PO Box 41
Alexandria NSW 1435
Telephone (02) 8374 5600
Facsimile (02) 8374 5700
Email information@cancerinstitute.org.au
Website www.cancerinstitute.org.au/publications

Acknowledgements:

Cancer Institute NSW: Ms Penny Adams; Ms Ramadevi Machiraju; Dr Stephen Della Fiorentina; Ms Karen Eaton; Ms Aisling Kelly and Ms Shelley Rushton

Chemotherapy Unit staff: Bega Valley Oncology; Calvary Mater, Newcastle; Concord Repatriation General Hospital; Gosford Hospital; Manly Hospital; Nepean Hospital and Orange Base Hospital.

ACBIS Steering Group members: Ms Angela Booth, Ms Trisha Brisley; Dr Tony Bonaventura; Ms Susanne Brooks; Ms Lucy Burns; Ms Loraine Cobbing; Ms Jennifer Duggan; Ms Narelle Driver; Dr Alex Guminski; Ms Maureen Hogan; Ms Ruth Jones; Ms Morag McPherson; Ms Margaret Ross; Ms Mary Ryan; Ms Christine Stanford and Ms Debbie Wall-Smith

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EXECUTIVE SUMMARY

The Ambulatory Chemotherapy Business Improvement Strategy (ACBIS) was developed as part of the *NSW Cancer Plan 2007–10* to examine and redesign key clinical service provision models in cancer care.

To better understand ambulatory chemotherapy services across NSW, the Cancer Institute NSW undertook a *Review of Ambulatory / Outpatient Chemotherapy and Haematology Services in New South Wales in 2005*. A follow-up statewide survey, focusing on identifying issues that could improve the delivery of ambulatory chemotherapy, was then conducted in 2008.

Based on the findings of these surveys, we developed and trialled four high level solutions for NSW chemotherapy units across a set of eight representative sites between October 2009 and November 2010. Managers from each of the units were invited to be members of the steering group that provided oversight for the pilot.

For the ACBIS pilot, we had the following objectives:

- Development and trialling of a process analysis / improvement approach to validate identified process bottlenecks identified in the 2008 survey.
- Development of process improvement solutions with a view to wider rollout.
- Provision of advice to support future business improvement initiatives in ambulatory chemotherapy.

The outcomes of this review will be considered both in terms of short-term business process improvement for NSW ambulatory chemotherapy units and in the longer term as part of statewide planning to provide quality ambulatory chemotherapy services for future cancer patients.

SUMMARY OF KEY FINDINGS AND OUTCOMES ACHIEVED

KEY FINDINGS

Across the representative sites, the ACBIS pilot found that:

- A variety of booking systems were used to record and manage patient scheduling.
- Fifty per cent of the pilot units used manual/paper based systems.
- Systems to book appointments did not generally match resource and staff availability.
- Units differed in available data sets for extracting reports for operational decision making.
- There was limited scope for most units to form improvement teams due to staffing and resource issues.
- Patient education was delivered to varying standards, leading to delays in treatment commencement. A need to consolidate the varying sources of patient education to support best evidence based practice was recommended.
- The use of the PCV measurement metric could be developed to support operational planning.
- Recording toxicity of chemotherapy drugs is poorly documented and would benefit from electronic recording and reporting.

KEY OUTCOMES

- A system survey that provided a landscape of the current business and information systems in chemotherapy units across in NSW.
- A set of KPIs for potential application in managing throughput, utilisation, workload, waiting times and finance.
- A collection of patient education resources.
- Recommendations for roll out and other business improvement suggestions for NSW chemotherapy services.

INTRODUCTION AND BACKGROUND

Chemotherapy refers to a type of cancer treatment, which uses drugs to stop or slow the growth of cancer cells. It can be used to cure cancer, control cancer or for palliation. Chemotherapy may be used as the sole type of treatment, or it may be used in conjunction with surgery, radiotherapy or hormonal therapies.

Chemotherapy may be delivered to patients in hospital, or on an outpatient basis either at home or in a day procedure centre (also known as ambulatory care).There are clear guidelines for safe prescribing, handling, storage, and administration of cytotoxic drugs, requiring a skilled workforce.

Ambulatory or outpatient care of cancer patients is an efficient, cost effective and patient-centred method of delivering treatment for many cancer patients. It involves focusing resources on short stay patients, while efficiently managing high throughputs with varying treatment requirements.

The *Smarter Models of Care Program* under the *NSW Cancer Plan 2007–10* aimed to examine and redesign key clinical service provision models in cancer care. A major element of this program was the Business Improvement Strategy (BIS), which worked with cancer service staff at all levels to analyse operational processes, devise improvement solutions and then embed them for sustained improvement.

The Cancer Institute NSW conducted the first stage of the BIS, the Radiotherapy Business Improvement Strategy (RTBIS) between 2006 and 2009 and achieved measurable improvements in waiting times and treatment capacity across the state. To sustain the benefits of this project, we also developed a set of electronic business improvement tools and deployed them across all NSW public radiation oncology units to assist in ongoing business management and mandatory reporting for NSW Health. The *Ambulatory Chemotherapy Business Improvement Strategy (AC BIS)* represents the next stage of the BIS program and is based on similar project methodology.

To understand ambulatory chemotherapy services across NSW in preparation for the ACBIS, we undertook a *Review of Ambulatory / Outpatient Chemotherapy and Haematology Services in New South Wales in 2005*. In the review, we identified a number of service delivery models, with variations in the range of services delivered, staffing levels, number of beds / recliners and location. The findings established that ambulatory chemotherapy in NSW is delivered through a distributed network of around 80 units, of which roughly 50 per cent are in rural areas. We also found that around 70 per cent of chemotherapy is delivered in metropolitan units.

The review also suggested process bottlenecks in patient scheduling, staff mix, pathology and pharmacy. To validate these bottlenecks, a follow up statewide survey, focusing on identifying issues that could improve the delivery of ambulatory chemotherapy, was then conducted in 2008.

We began the ACBIS by using the results of these two surveys and undertaking a pilot business improvement project at a representative sample of units. This report describes the outcomes of the pilot and provides recommendations for potential rollout beyond the pilot sites as well as additional business improvement projects.

PROJECT DESCRIPTION AND CONTEXT

The ACBIS pilot was carried out between October 2009 and November 2010 and included eight representative units, nominated by the directors of area cancer services. The sites included:

- North Coast Cancer Institute, Coffs Harbour
- Concord Repatriation General Hospital
- Bega Valley Oncology
- Orange Base Hospital
- Gosford Hospital
- Calvary Mater, Newcastle
- Nepean Hospital
- Manly Hospital

The ***Review of Ambulatory / Outpatient Chemotherapy and Haematology Services in New South Wales (2005)*** showed that ambulatory chemotherapy units in NSW are typically small, comprising on average 2.5 beds and eight reclining chairs; and staffed by four or fewer full-time equivalents (FTEs). It also showed that:

- There are few spare resources to implement extensive or complex changes to business processes.
- There is no common recording or reporting system to support NSW chemotherapy services.
- The majority of chemotherapy units in NSW are not operating at full capacity.

In considering these issues, we included the following factors to the design of the pilot:

- The spread of the pilot over eight representative units enabled the individual units to participate without over stretch and develop solutions for a range of unit types.
- The focus was on identified bottlenecks, which prevent capacity utilisation.
- The project explored the use of standardised measurement tools for chemotherapy services, especially the chemotherapy visit (PCV) as a consistent key performance indicator (KPI).
- The approach was designed with a view to translating outcomes to additional sites with minimal impact on resources.

The adoption of an evidence-based approach to process redesign in healthcare is crucial. In particular, it is vital when piloting and testing changes to include a quantitative element to measure impact.

To do this, we established a baseline performance level using existing data on resourcing, patient appointments, cancellations, timing of receipt of pathology results and other relevant data. Where this was unavailable or unreliable, we supplemented with sample data collected by the project team. This approach was built on the RTBIS methodology.

As for all clinical redesign projects, an important aspect of the pilot was to engage unit staff to actively participate in both the development and trialling of solutions. In addition, nursing unit managers from each site had input into the pilot through membership of the project steering group.

In the 2005 review of ambulatory chemotherapy in NSW, we highlighted the diversity in chemotherapy service models and information systems across the state. To better understand how to translate the outcomes of the pilot, a better understanding of the distribution of chemotherapy data / information systems was seen as a necessary part of the pilot by the steering group. To gather this information to inform next steps in implementing the ACBIS, we conducted a systems survey as the final part of the pilot.

PROJECT METHODOLOGY

Our aim is to improve the delivery of ambulatory chemotherapy in public units across NSW through the ACBIS. We started the pilot stage of this program in late 2009 and critically examined service models in a representative sample of units across NSW.

The ACBIS is built on a process improvement approach to address process bottlenecks identified as improvement points from a survey of NSW ambulatory chemotherapy units in 2008.

For the ACBIS pilot, we followed a methodology covering six broad phases:

1. **Start-up**: eight representative sites were identified across NSW by the area directors of cancer services in consultation with the cancer service development managers. The consultants familiarised themselves with earlier Cancer Institute NSW projects and service reviews to understand the project methodology and context. They also met with key stakeholders to better understand the chemotherapy environment and staff from the nominated units to set up the project.

2. **Baseline determination**: In this phase, an initial (lead) unit was identified for confirmation of priority areas and establishment of baselines over a range of key performance indicators.

3. **Process mapping**: the project team worked with unit staff to map the current processes and workflows.

4. **Process improvement**: this phase included an all staff critique process, based on process and workflow maps to identify strengths, weaknesses and priorities for improvement.

5. **Continuous improvement**: the project team engaged with the lead site staff and other subject matter experts to develop solutions. We achieved this by carrying out a solutions workshop with unit staff and other experts.

6. **Sustainability/suitability for roll out**: we explored potential suitability of each of the solutions for wider application beyond the pilot sites. As part of this phase, a systems survey was developed and conducted to understand the current chemotherapy information systems landscape to inform a wider statewide rollout.

The outcomes from each phase are as follows:

- Establishment of a baseline of performance over a range of common key performance indicators.
- Mapping of current patient flow processes, and confirming the nature and impact of bottlenecks.
- Engagement of unit staff in critiquing the current processes.
- Establishment of small teams to address the key problem areas identified by the critiques;
- Trialling, piloting and implementing solutions.
- Development of a Management Operating System potentially supported by regular, targeted data to provide visibility on unit activity.

RESULTS AND DISCUSSION

The Cancer Institute NSW engaged Amica Consulting Pty Ltd to conduct the ACBIS pilot between November 2009 and November 2010. The pilot was conducted in three broad stages (Figure 1). This section reports on the results from each phase.

Figure 1: Components of each stage of ACBIS Pilot

Stage:	Pre Launch Stage	Launch Stage	Roll Out Stage
Duration	October 2009 to March 2010.	April 2010 to July 2010.	August 2010 to November 2010.
Objective	Confirmation of the process bottlenecks identified in the 2005 report.	Development of process solutions.	Development of a roll out plan.
Tools / techniques	• Process mapping. • Staff critiques. • Baseline analysis. • Solutions workshop.	• Process design. • Webinars. • Data modelling. • Prototyping. • Feasibility analysis.	• Survey design. • Survey analysis. • Work breakdown structure. • Project planning.
Process focus	The patient journey, from booking to billing.	• Stand alone booking. • Integrated booking. • KPIs. • Patient communication.	• Systems survey. • Implications for the roll out. • Potential business improvement projects.

Pre-Launch Stage:

Prior to the start of the project, we did considerable work to find out where the process bottlenecks affecting ambulatory chemotherapy service delivery were in NSW. This stage prepared for the launch of the pilot and included:

- Identification of eight representative chemotherapy units across NSW by the area directors of cancer services in consultation with the cancer service development managers.
- Confirmation of The Medical Oncology Delivery Unit (MODU) at Concord Repatriation General Hospital (CRGH) as the lead unit.
- Finalisation of project approach to support the pilot.
- Confirmation of an agreed plan to carry out process analysis at CRGH and identify issues.
- Establishment of governance, steering and reporting arrangements for the pilot.
- Preparation of a high-level communications plan for the pilot.
- Dissemination of initial communication to all key stakeholder groups.
- Formation of a steering group.

Project Launch Stage:

To launch the project, all key stakeholders at the lead site (CRGH) including the nurse unit manager (NUM) were briefed on the pilot and its role in the wider ACBIS. Following this consultation, the project team worked with the staff to map current workflows and processes using process mapping, a

visual tool to assist in understanding workflows end-to-end. We used a 'swim-lane' style of process mapping, with individual roles listed down the left hand side of the map in 'lanes' stretching horizontally across the map. The resulting maps for hematology and medical oncology areas recorded the process steps in booking clinic appointments, consulting with patients and treating patients. (Figures 2, 3 and 4).

Figure 2: Booking Clinic Appointments - Process Map

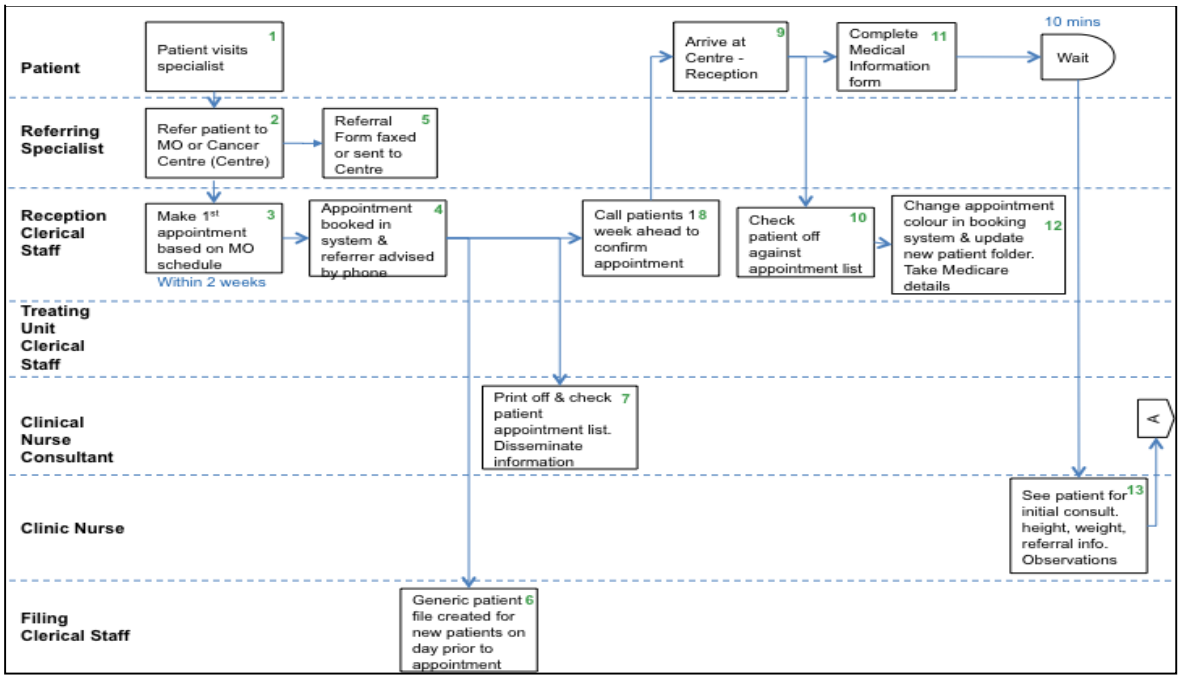


Figure 3: Consulting with Patients - Process Map

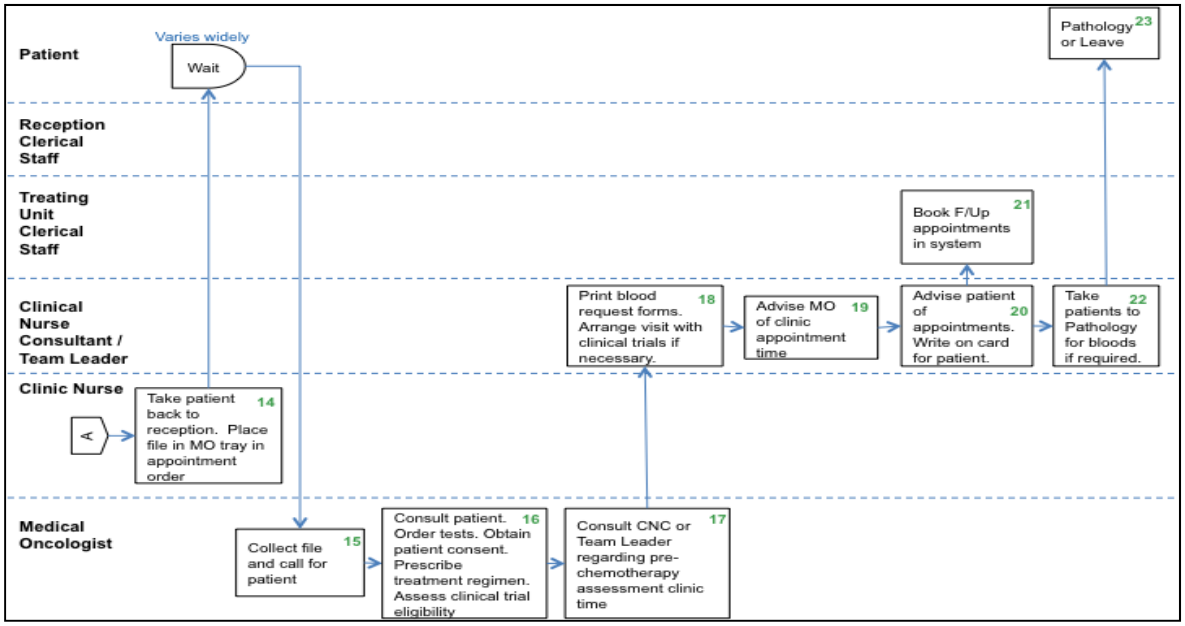
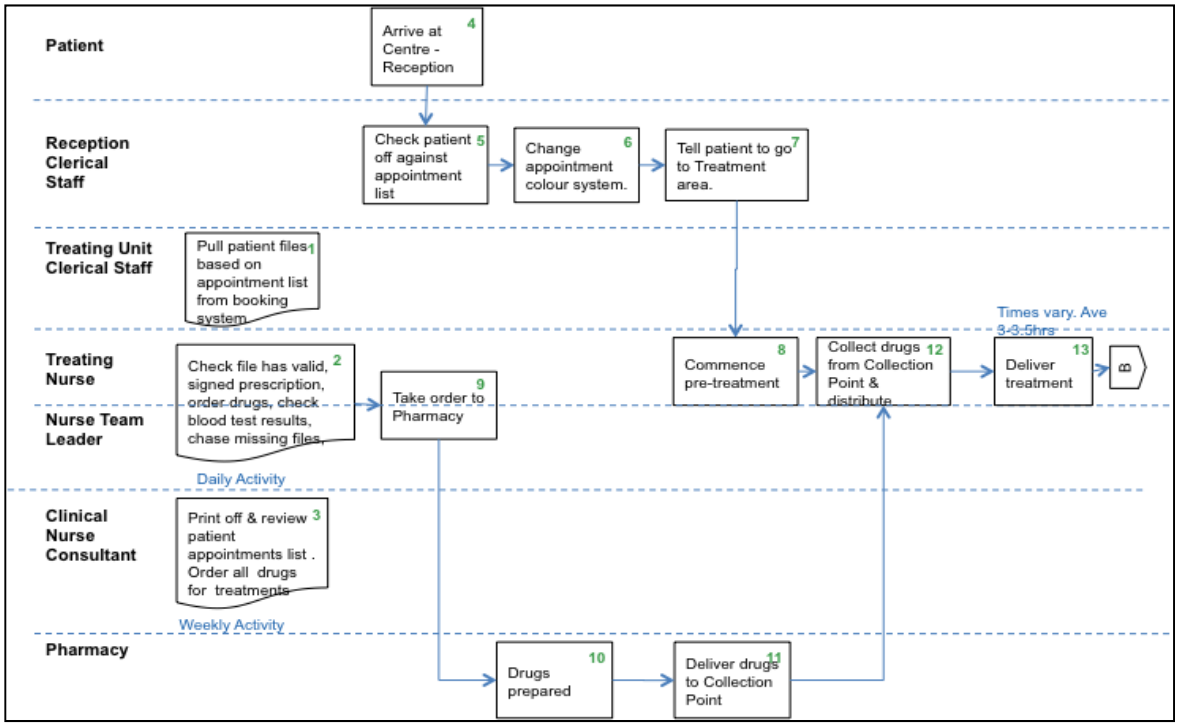


Figure 4: Treating Patients - Process Map



We then did an all staff critique process, based on process and workflow maps to identify strengths, weaknesses and priorities for improvement (Figures 5, 6 and 7).

Figure 5: Booking Clinic Appointments - Issues and Solutions

No.	Description	Issues	Solutions
2	Patient Referred	• Many ways patients can be referred to Centre	•
3	Book Appointment	• Sometimes problem booking for Prostate Clinic • Some patients are confused about who they need to book an appointment with • Reception staff not all familiar with the codes and/or specialists so book patients with wrong specialist • Some reception staff not aware of urgency so don't book within 2 weeks or don't refer to CNC	• • • Formal training required for all clerical staff on booking system & process • Formal training required for all clerical staff on booking system & process. Ensure single point of escalation and define rules
5	Referral Form	• Forms not rec'd before patient visit causing problems with billing	• Develop a triage system for referrals (see HACU)
6	Prepare File	• Secretary responsible but often not time to prepare file	• Make an Oncology Filing Clerk responsible for file preparation
8	Confirm Appointment	• Appointments are not confirmed due to lack of staff leading to no shows or patients arriving unprepared	• Implement a triage process (see HACU). Get referral, call patient day before to confirm appointment and instructions
10	No Shows / Cancellations / Walk-ins	• Patients don't always show up for appointment but the MO is not always advised • Occasionally specialist advises patient to attend clinic without advising Centre or sending referral • Inpatients turn up without an appointment in the system	•

Figure 6: Consulting with Patients - Issues and Solutions

No.	Description	Issues	Solutions
16	Initial Consult	• Patients sometimes forget to bring images or other important documentation	• Call patient day before to remind • PAX system will help as images available digitally
21	Book follow-up appointments	• Occasionally appointments are not booked in system or are missed off. • Sometimes appointments in system don't match the appointment written on the card • Patients often call & ask for the Treating Nurse as the number is on their appointment card but the Treating Nurse has no knowledge or information about the patient	• • • Remove Treating Nurse number from appointment card and just have one number for Reception.
22	Bloods	• Sometimes if patients need blood taken late in day, after Pathology closed, then the Treating Nurses are required to do this which can be difficult at the end of the day	•

Figure 7: Treating Patients - Issues and Solutions (1)

No.	Description	Issues	Possible Solutions
1	Patient Files	• Patient files are often missing and not retrieved files to treatment. Nurses not advised.	•
2	Check file / prepare for patient	• Regimen is not always written up. Consent forms sometimes missing. Prescriptions sometimes missing	•
3	Weekly preparation	• This works really well because there is an experienced CNC who makes the time to ensure everything is ready	• Key role / activity for other Centres?
4	Patient Arrives	• Some patients arrive very early for appointment, assuming they will be seen 1st but then have to wait, leading to dissatisfaction • Patients are sometimes late which has a knock-on effect all day	• Patients need to be told that there is no point arriving too early as they will have to wait until their appointed time anyway.
5	Check Patient In	• Patient may have spoken to the CNC in the morning but reception staff have not been advised or don't make a note so don't know to expect the patient	
7	Patient to Treatment Area	• New patients don't know where to go so sometimes wait in reception for a long time until noticed	• Patients should be taken through to Treatment Area immediately by staff member
8	Commence pre-treatment	• Some patients require more information or have a lot of questions so need extra time • Blood test results can delay or change planned treatment	• Schedule longer appointments for new patients to allow time to answer questions and educate • Take bloods day before treatment planned

Figure 8: Treating Patients - Issues and Solutions (2)

No.	Description	Issues	Solutions
9	Place order with Pharmacy	• Responsibility split between Treating Nurse and Team Leader so leads to confusion and sometimes missed • Can be delayed, especially on a busy day	
10	Prepare Drugs	• New process in Pharmacy requires all drugs to be prepared in isolation unit and only twice per day results in delays & scheduling problems	•
13	Treat Patient	• Patients are treated by the same Treating Nurse for ongoing appointments and sometimes patients are all scheduled at the same time • Staff rostering patterns affect workloads leading to F/T staff on early staff having to carry most of the load - stressful • Patients forget to get take home medication and instructions	• Ensure patients are spread out throughout the day so that the Treating Nurse doesn't have all patients at one time • Review staff rostering patterns and workload • Brief person accompanying patient on what is required and make sure they collect medication

The next stage involved establishing baseline volume and performance levels including patient volumes measured by PCV; treatment times and types; peak and trough volumes; rates of cancellation, walk-in and rescheduling of appointments; staff workloads; bed and chair utilisation; case complexity and need for specialist input.

We then held a solutions workshop involving unit staff and other subject matter experts at CRGH to discuss the outcomes of the mapping and develop solutions.

Roll out stage:

The final stage involved developing a plan to roll out solutions beyond the pilot sites. To prepare for this, we developed and deployed a systems survey (Appendix-1) to gather information about chemotherapy information and business administration systems across the state.

The draft survey was initially circulated to the pilot units in April 2010, with results presented to the steering group. Additional questions were incorporated from the steering group's suggestions before disseminating it statewide.

A total of 71 units were surveyed with a total response rate of 69 per cent. The detailed data analysis from the systems survey is in Appendix-2.

The key findings from the statewide systems survey include:

- A significant proportion of units operate without medical oncology systems or electronic medical records.
- Thirty-three per cent of units are entirely paper based, and 51 per cent mainly use paper.
- Rural units are 50 per cent more likely to be paper based than metropolitan units.
- Cerner and Aria comprise 66 per cent of medical oncology systems in use.
- Fifty-four per cent of units disagreed there were adequate resources to resolve systems issues quickly and easily.
- Nursing staff were responsible for reporting in 60 per cent of units.
- The practice of recording pathology results electronic medical record (EMR) systems is not widespread. Of units which use an EMR system, 63 per cent do not record pathology results in the electronic medical record.
- Fifty-three per cent of the respondents disagreed that their systems met the unit's needs.

- The survey suggested that the implementation of a medical oncology system has a positive impact on the performance of all key process steps; the difference is most marked for booking patient appointments.
- Eighty-four per cent of units with medical oncology systems agree to some extent with the proposition that the system meets the unit's needs for booking patient appointments. Only 25 per cent of units operating paper-booking systems agree to any extent that the system meets the unit's needs for this process.

DISCUSSION:

In this pilot, we identified and trialled four possible solutions to address common process bottlenecks affecting chemotherapy service delivery in NSW. In this section, we discuss the details of these solutions and explore potential suitability for roll out beyond the pilot sites. We also include suggestions from the consultants regarding additional potential business improvement projects.

Possible solutions resulting from the AC BIS pilot

Stand alone booking: The systems survey confirmed that 50 per cent of units use paper based systems. The systems survey confirmed the high level of need and want for this solution. It provides basic, stand alone booking functionality for units which currently record patient appointments manually. Manly, Orange, Bega and Gosford units participated to trial this solution.

The consultants evaluated two platforms for the delivery of the stand alone booking tool, Google Apps and Excel. While both appear to have adequate functionality to meet the need, decisions regarding future development of this tool and subsequent integration into paper based units is being considered in light of maintenance requirements and emerging electronic management / reporting systems for chemotherapy in NSW.

Integrated booking: This tool builds on existing medical oncology (MO) systems, and provides an enhanced approach to patient booking, taking into account resource and staff availability, and peak minimisation. Concord, Coffs Harbour, Nepean and Calvary Mater units trialled this solution.

The systems survey results failed to identify either a significant want or a substantial need for enhanced booking functionality. The survey confirmed that the overwhelming majority of units with MO systems are satisfied with the level of support for booking. Therefore, this project is considered unsuitable for roll out at this stage.

Management Operating System (key performance indicators): This tool includes a range of measures to improve management of operational bottlenecks. Calvary Mater unit trialled this solution.

The pilot confirmed the potential of Cerner and Aria systems to extract data sets to support improvements in operational management. The systems survey identified that Cerner and Aria account for 66 per cent of MO systems in use, so a roll out plan targeting the users of these would make the maximum impact in a short time frame.

KPI Toolset: The pilot identified a set of key performance indicators (KPIs) that could be potentially applied to monitor and improve operational processes in ambulatory chemotherapy service provision. The resulting hypothetical tool set has the potential to provide detailed information on throughput, utilisation, workload, waiting times and billing management and could be easily integrated and accessed via standard desktop format.

While the establishment of a common and consistent set of KPIs was found to be an effective approach to sustaining improvement for radiotherapy units as a result of the RT BIS, a similar roll out to ambulatory chemotherapy units is considered not feasible at this stage for the following reasons:

- Even if the development of the toolset occurred for the units having MO systems currently in place, the coverage would not exceed 50 per cent.
- The maintenance of a KPI tool set would be a challenge given that a statewide information management position for chemotherapy does not yet exist.
- The current considerable diversity of MO systems makes it difficult to have a universally compatible standalone KPI tool set.
- Challenges in engaging IT resources to install and maintain such a toolset.

Future business improvement opportunities recommended by the consultants

Patient education: The system survey identified that patient education for chemotherapy patients is varied and often poorly coordinated, leading to treatment delays. On the basis of these findings, the consultants recommended that further work is required in this area to review current resources. The range of delivery mechanisms for patient education needs to be concurrently explored, considering patient diversity and varying skills in utilising technology.

Online improvement community: The consultants also suggested the establishment of an online improvement community for chemotherapy staff. Sharing of resources has the potential to educate units on alternative and possibly more efficient service models and process improvements.

PCV as a consistent KPI measure: The patient chemotherapy visit (PCV) was developed as part of the 2005 review to selectively measure chemotherapy activity by separating it from other services delivered at ambulatory chemotherapy units.

The ACBIS pilot undertook data analysis from the CRGH linking Medicare Benefit Scheme (MBS) codes to PCV episodes of varying length as a proxy for complexity. A recommendation of the pilot was that these time-weighted PCVs could possibly be used to assist in operational management.

Time-weighted PCVs could also be used for inter-unit comparisons and therefore have potential in statewide planning and performance improvement. In recommending this approach, the consultants highlighted the following weaknesses:

- Billing data is often collected for financial rather than operational time periods, and so may not map precisely to actual levels of activity in a specific period. In particular, where billing data is only available monthly, the data granularity may not be sufficient for some operational decision-making in the units.
- The MBS bands are very wide, and may not map well to the actual complexity of a procedure, particularly in the middle band.
- Excluding non-chemotherapy procedures may affect operational planning such as assessing staff workload.

The consultants emphasised the potential of the PCV as an operational management tool, but recommended further refinement and validation.

CONCLUSION

Using a process improvement approach, we developed and trialled four high level solutions to address identified process bottlenecks in NSW chemotherapy units across a set of eight representative sites. We now have recommendations for possible roll out of solutions beyond the pilot sites and have identified further opportunities for business process improvement in patient education and the development of time weighted PCV as an activity measurement tool to support operational decision making.

A major outcome of the ACBIS pilot is the statewide chemotherapy information systems survey. The results provide information on the current landscape of chemotherapy data systems across the state, which will inform future process improvement projects linked to information systems.

Importantly, we found that 50 per cent of chemotherapy units in NSW are paper based, substantiating the need to explore a solution to assist these units (especially with patient scheduling), while at the same time aligning the solution with broader statewide chemotherapy data / information strategies.

The outcomes of the ACBIS pilot including process analysis, solution development, chemotherapy information survey results and future roll out recommendations provide important input not only for the next stage of the ACBIS, but for the wider statewide strategy to improve chemotherapy services for the people of NSW.

ABBREVIATIONS AND ACRONYMS

ACBIS	Ambulatory Chemotherapy Business Improvement Strategy
BIS	Business Improvement Strategy
ClinCR	Clinical Cancer Registry
CRGH	Concord Repatriation General Hospital
EMR	Electronic Medical Record
FTE	Full Time Equivalent
IT	Information Technology
KPI	Key Performance Indicator
MBS	Medicare Benefits Scheme
MO	Medical Oncology
MODU	Medical Oncology Delivery Unit
NSW	New South Wales
NUM	Nurse Unit Manager
OMIS	Oncology Medical Information System
OOS	Occasions of Service
PCV	Patient Chemotherapy Visit
RMIS	Radiation Oncology Information System
RT	Radiotherapy
RTBIS	Radiotherapy Business Improvement Strategy

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APPENDICES

Appendix 1: System Survey Questionnaire
Appendix 2: System Survey Results

Appendix 1.

Medical Oncology and Haematology Systems Inventory Questionnaire

Introduction and Background
The Cancer Institute NSW's Smarter Models of Care Program under the NSW Cancer Plan 2007-2010 aims to examine and redesign key clinical service provision models in cancer care.

A major element of this program is the Business Improvement Strategy which works with cancer service staff at all levels to analyse operational processes and then embed and sustain improvement. The Ambulatory Chemotherapy Business Improvement Strategy (AC BIS) is the third program of its type in NSW. The Radiotherapy BIS (RT BIS) ran from 2006 to 2008, and involved all public ROTCs. The Anatomical Pathology BIS (AP BIS) has moved from the pilot stage, and is underway at Royal North Shore Hospital, Gosford Hospital and John Hunter Hospital.

The AC BIS takes the Review of Ambulatory / Outpatient Chemotherapy and Haematology Services in NSW (2005) as its start point. The first task of the project was to confirm the impact of the bottlenecks identified in the review at a single unit, and identify solutions. The next task is to determine the information and medical record systems in use at each of the Medical Oncology units in NSW. This questionnaire will be used to collect this information.

Instructions for use
The questionnaire consists of 3 sections covering 20 questions.
Section 1 covers the system(s) in use at your unit (if any) and asks for your view on the level of support available to the unit to fix problems, make changes, and produce reports from the systems in use.

Section 2 focuses on the key steps in the process of delivering Ambulatory Chemotherapy and Haematology. The format of each of question in this section comprises:

1. A multiple choice question covering which information system you use during the process step. If you use a system which is not mentioned, please write in the system name in the space provided. Please indicate if you use more than one system.
2. A rating question covering how well the information system meets your requirements in this process step
3. A comments area for recording your views on key areas for improvement, recurring problems etc

Section 3 relates to the management of oral chemotherapy.

For all questions please respond by ticking the box that best reflects your view of the current situation. Use the comments section at the end of each section to clarify or expand your positions.
It will take between 20 - 30 minutes to complete.

There are no right or wrong answers to the questions.

Section 1: System(s) currently in use, and view on the level of support available to the unit to fix problems, make changes, and produce reports from the systems in use.

Q1a: Medical Oncology System

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know

Q1b: Electronic Medical Record

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
The system(s) in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments
Areas for improvement / recurring problems etc. If known, please record the software version in use at your unit.

Q2: Data items collected

What are the data items currently collected in your unit?	☐ All the standard data items for our system(s) ☐ Some of the standard data items ☐ All the standard data items, plus some additional items ☐ Some standard items, plus some additional items ☐ Don't know ☐ Not applicable

Additional comments

If you are using non standard data items, please comment if you are aware of any process (such as compliance with state, national or international standards) which was used to authorise the additional items.

Who has the final say on what data items are collected?

Q3: Responsibility for building, modifying or adding additional data items to your system(s)?

Who is responsible for building, modifying or adding additional data items to your system(s)?	☐ IT Staff ☐ Data Manager ☐ Medical Staff ☐ Nursing Staff ☐ Admin Staff ☐ Other (please specify)_____ ☐ Don't know ☐ Not applicable

Additional comments

Please comment on whether your system is maintained by a specialist data manager.

Q4: Support for resolving systems problems

Please indicate the extent to which you agree or disagree with the following statement - The unit can access the resource it needs to resolve any systems problems quickly and easily	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q5: Support for producing reports from the existing systems

Who is responsible for producing regular and ad hoc reports from your system(s)?	☐ IT Staff ☐ Data Manager ☐ Medical Staff ☐ Nursing Staff ☐ Admin Staff ☐ Other (please specify)_____ ☐ Don't know ☐ Not applicable

Additional comments

Please list the reports currently being extracted from you system(s.)

Section 2: Which systems do you use in each of the following process steps involved in the process of delivering Ambulatory Chemotherapy and Haematology.

Q6: Booking clinic appointments, including appointments for Medical Oncologists and Haematologists

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Areas for improvement / recurring problems etc.

Q7: Reception, including recording patient details, recording key aspects of patients' medical history, recording vital signs, recording referral information and recording pathology results, where necessary.

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree
Additional comments	

Areas for improvement / recurring problems etc. Please note if you record Pathology results in your EMR system.

Q8: Consulting with patients, including securing and recording consent.

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q9: Booking treatment appointments, including initial appointments and patient education appointments (if these are booked as separate sessions.)

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree

	☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q10: Ordering Drugs, including deciding on protocols, calculating dosage, preparing scripts, delivering scripts to pharmacy etc

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ EviQ ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following	☐ Strongly Disagree ☐ Disagree

statement - The system in use fully meets the needs of the unit	☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q11: Ordering blood work or other tests

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following	☐ Strongly Disagree ☐ Disagree

statement - The system in use fully meets the needs of the unit	☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q12: Ordering Radiology

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know

Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Q13: Preparing patient bills

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel ☐ Paper (manual) recording ☐ Other (please

	specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments
Areas for improvement / recurring problems etc.

Q14: Producing reports and statistics

Systems in use (Please check all that apply)	☐ Charm ☐ Cerner ☐ Aria ☐ Mosaiq ☐ Varis ☐ Odyssey ☐ Excel

	☐ Paper (manual) recording ☐ Other (please specify)_____ ☐ Don't know
Please indicate the extent to which you agree or disagree with the following statement - The system in use fully meets the needs of the unit	☐ Strongly Disagree ☐ Disagree ☐ Somewhat Disagree ☐ Somewhat Agree ☐ Agree ☐ Strongly Agree

Additional comments

Areas for improvement / recurring problems etc.

Section 3: Management of Oral Chemotherapy

Q15: Who is responsible for identifying patients on Oral Chemotherapy?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist

	☐ Hospital Pharmacist ☐ Retail Pharmacist

Q16: Who provides education to patients on Oral Chemotherapy?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist ☐ Hospital Pharmacist ☐ Retail Pharmacist

Q17: Who advises patients on Oral Chemotherapy of blood test results?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist ☐ Hospital Pharmacist ☐ Retail Pharmacist

Additional comments
Areas for improvement / recurring problems etc.

Q18: Who records the dose for Oral Chemotherapy?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist ☐ Hospital Pharmacist

	☐ Retail Pharmacist

Q19: Who records the toxicity for Oral Chemotherapy?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist ☐ Hospital Pharmacist ☐ Retail Pharmacist

Q20: Who records and manages does reductions for Oral Chemotherapy?

(Please check all that apply)	☐ Oncology Doctor ☐ General Practitioner ☐ Register Nurse ☐ Oncology Pharmacist ☐ Hospital Pharmacist ☐ Retail Pharmacist

Additional comments
Areas for improvement / recurring problems etc.

Thank you for this information. If you need more space, please append an additional page/s

Appendix -2 The Systems Survey

The Systems Survey was developed to allow roll out planning for ACBIS to be informed by the current systems and process landscape in NSW Ambulatory Chemotherapy units.
It was initially designed to establish:

- which Medical Oncology systems, if any, were in use at the units,
- which process steps benefitted from system support at the units,
- where the units identified process weaknesses and opportunities.

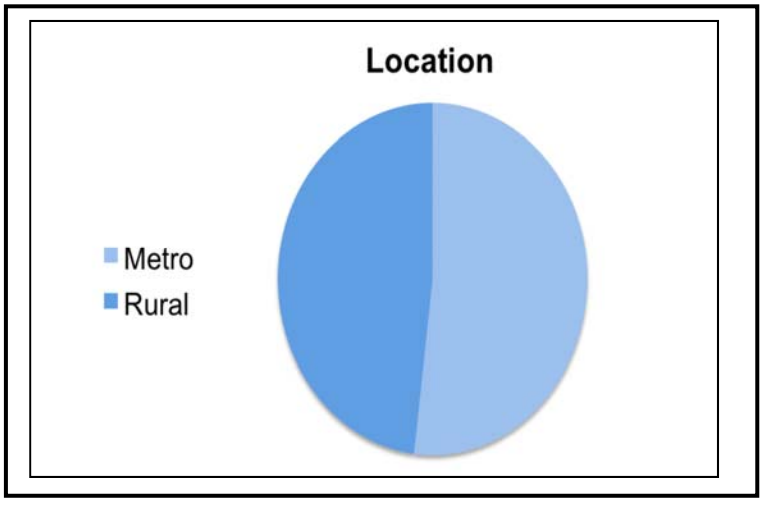
A specific section on Oral Chemotherapy section was added at the request of the Chemotherapy Steering Group, and this survey was successfully tested with the pilot units during April 2010.

On feedback of the results, a number of additional systems questions were added at the request of the Institute's Clinical Cancer Registry (ClinCR) team. The Directors of Area Cancer Services (DACS) were briefed by letter, following which, in July 2010, the survey was sent to the NSW public units – the primary target of the survey.

71 units were surveyed in total with a response rate of 69%. 56 public units were invited to participate in the survey. 52 responses were collected, of which 5 were excluded as duplicates. The remaining 47 unique responses give a response rate for public units of 84%. 15 private units were invited to participate in the survey, 2 responses were collected giving a response rate for the private units of 13%. As a result, the private segment is considered as too small for unique analysis

Survey responses were collected almost equally from rural and metropolitan units, as is shown in Figure 1 below.

Figure 1. Split of responses, by location of unit



The Systems Landscape:

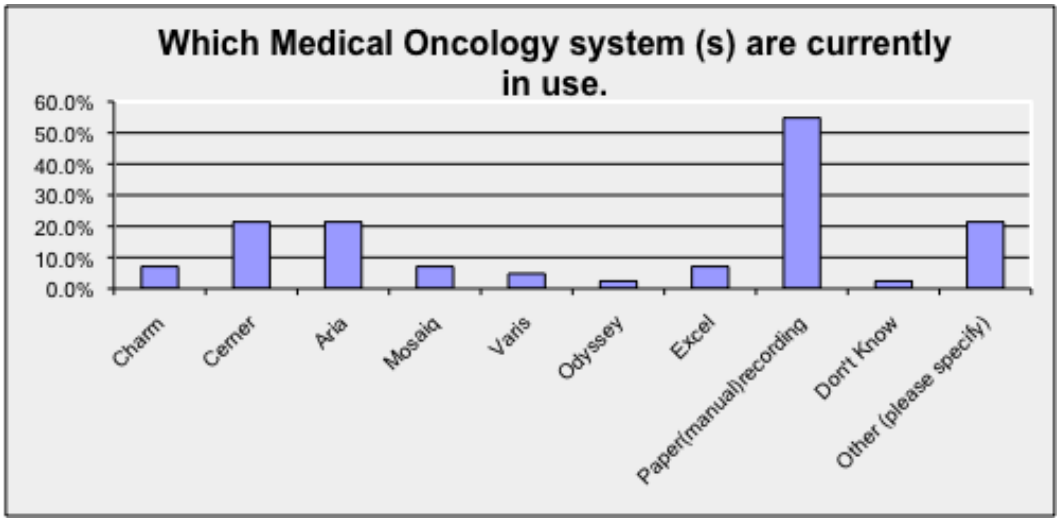
Results in this section include:

a. Medical Oncology systems in use,
b. Electronic Medical Record (EMR) Systems in use,
c. Units running more than one system,
d. Data items in use,
e. Responsibilities for amendments to data items,
f. Resource adequacy,
g. Reporting Responsibilities,
h. Recording pathology results in the EMR.

***a)Medical Oncology systems in use*:**

Just over 50% of units reported that they primarily used paper to record some information during a patient's period of treatment. Of these units, 66% had no Medical Oncology system. Of those units which do employ a Medical Oncology system, roughly 20% of units noted that they used Cerner, and a further 20% noted that they used Aria. The systems in use are as shown in Figure 2 below.

Figure 2. Medical Oncology Systems in use

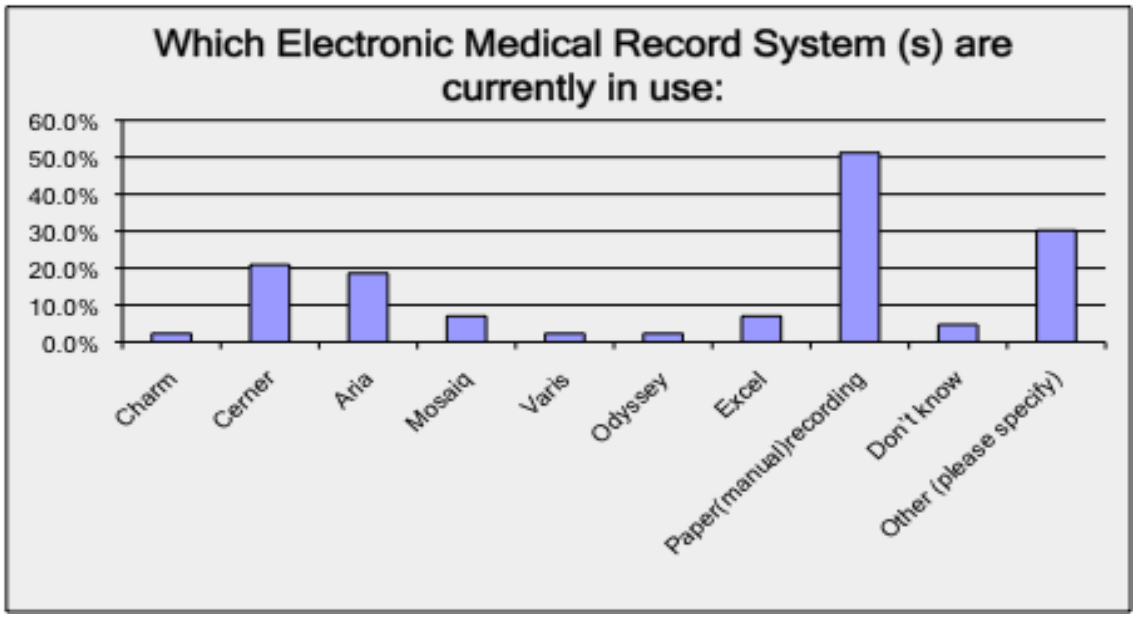


A further 20% of respondents indicated that they used a system not identified in the survey question. Systems noted included DMR and IPM;Ferret and IPM;Medical Director;Lantis;Practix and Blue Chip.

b)Electronic Medical Record Systems in use

The responses to the survey questions on the use of Electronic Medical Record (EMR) systems were very similar to those on Medical Oncology systems. Just over 50% of units reported that they primarily used paper to record some information on a patient's medical record. Of these units, approximately 70% had no EMR system. Of those units which do employ an EMR system, roughly 20% of units noted that they used Cerner, and a just under 20% noted that they used Aria. The systems in use are as shown in Figure 3 below.

Figure 3. Electronic Medical Record Systems in use



A futher 20% of respondents indicated that they used an EMR system not identified in the survey question. Systems noted included DMR and IPM;RIMS;CAP;Ferret; Lantis and Blue Chip.

c)Units using more than one system

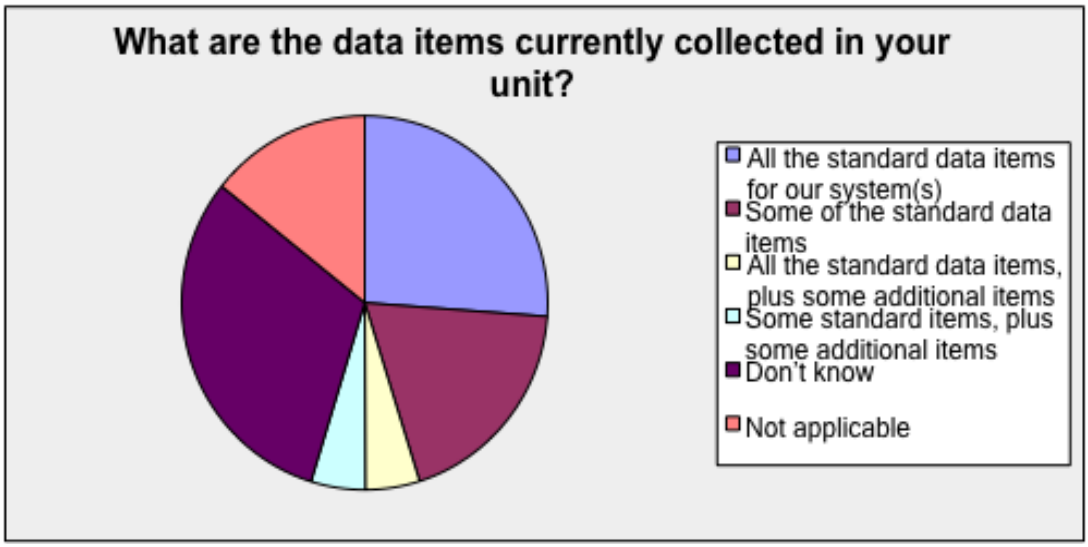
75% of units using a Medical Oncology system use the same system for their EMR. 20% of units using a Medical Oncology system have no EMR system. A single unit has an EMR system, but no Medical Oncology system. A single unit has a Medical Oncology system and a different EMR system.

None of the respondents to the survey was able to identify the software version in use for either their Medical Oncology or EMR systems.

d)Data items in use

Survey respondents appear to be well informed as to what data items are in use in their systems, as shown in Figure 4 below.

Figure 4. Data items in use



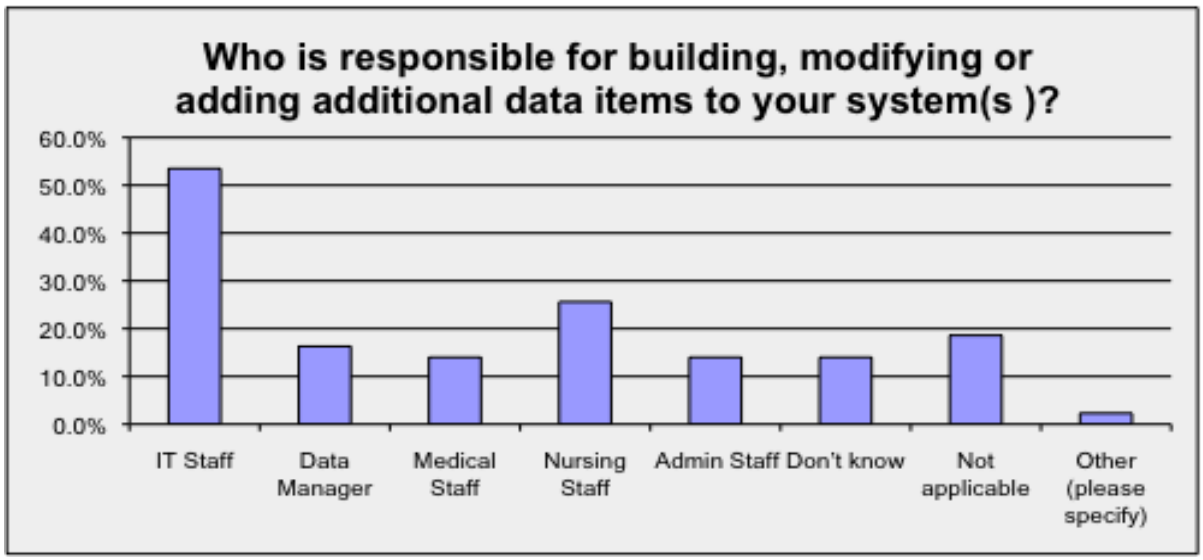
Of those units employing either a Medical Oncology system or an EMR system, 92% responded positively to this question. 83% of these respondents indicated that they do not use any data elements in addition to the standard data elements available within their system. 17% of units employ non-standard data elements. No unit commented on the process by which the addition of non-standard data items was approved.

43% of units do not make use of all the standard data elements within their systems.
The final say on which data items are collected lies principally with the Area Health Service (47% of responses.) 20% of units indicated that medical staff have the final say.

e)Responsibilities for changes to data elements

There is a significant spread of responsibility for implementing changes to data elements, as shown in Figure 5 below.

Figure 5: Responsibility for changes to data elements

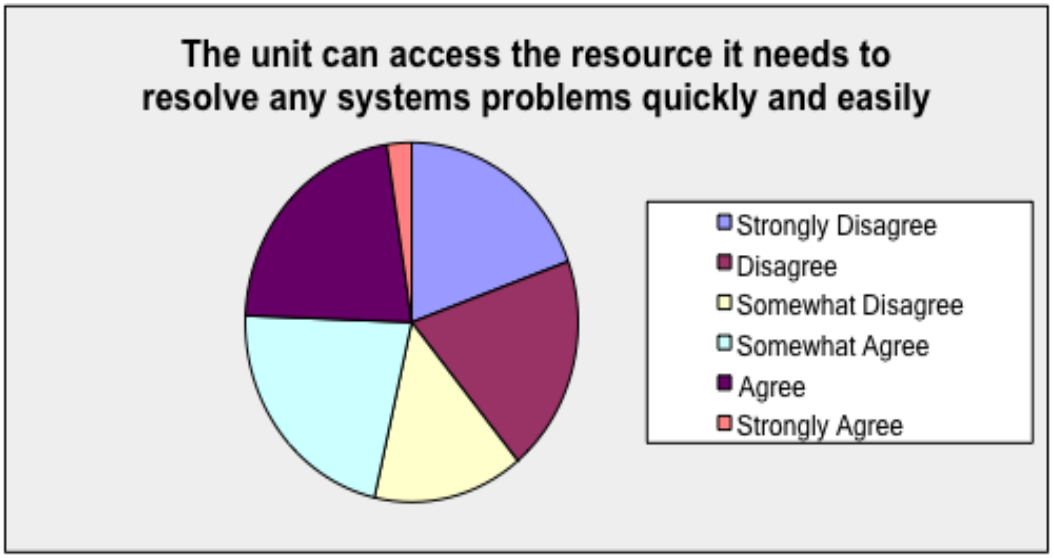


Responsibility is shared by more than one department at 40% of units. At 20% of units, professional IT staff are not involved in implementing changes to data elements. 43% of units indicated that medical staff are responsible for implementing changes in data elements.

f)Resource adequacy

54% of units disagreed that there were adequate resources to resolve systems issues quickly and easily, as is shown in Figure 6 below

Figure 6: Resource Adequacy

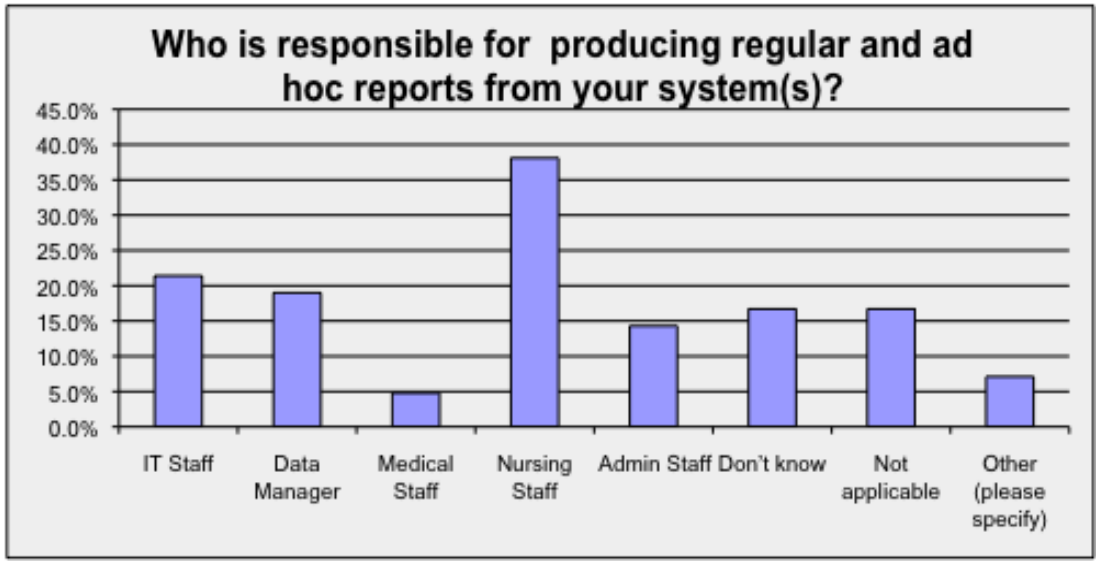


This result was considerably more positive than that of the pilot units, none of whom agreed with the survey question.

g)Responsibility for reporting

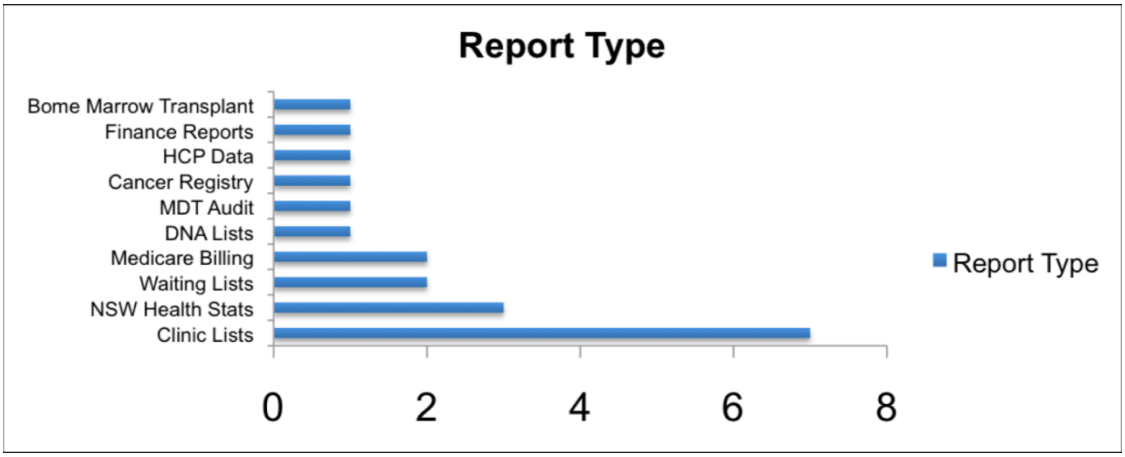
The responsibility for producing regular and ad hoc reports falls most heavily on unit nursing staff, as is shown in Figure 7 below.

Figure 7: Responsibility for reporting



Nursing staff are responsible for reporting in 60% of those units providing a positive response to the survey question. Respondents were asked to describe the types of reports which are produced by their unit. The responses showed significant variation between units, as shown in Figure 8 below.

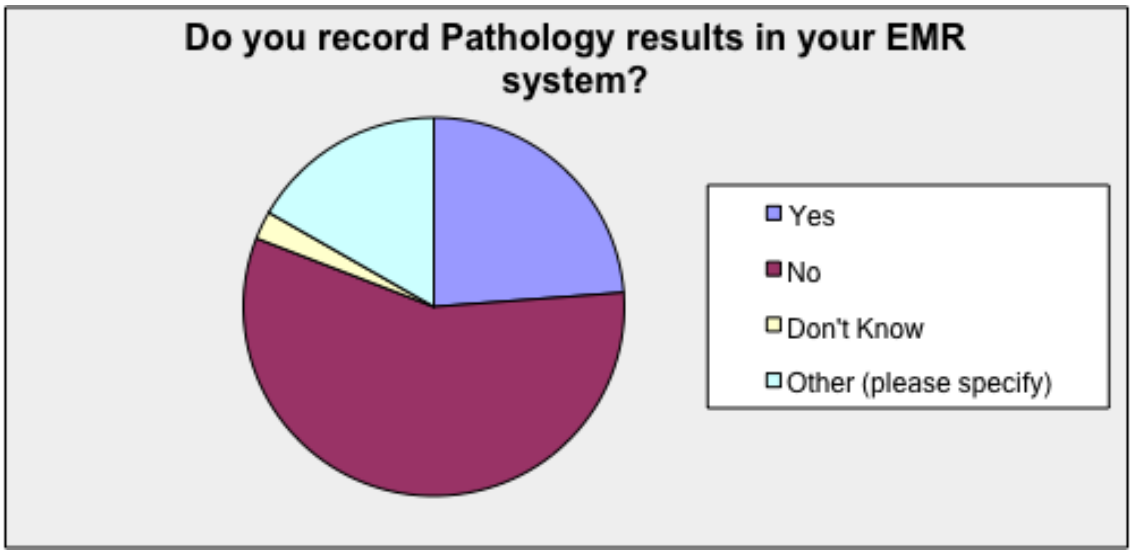
Figure 8: Count of units producing particular report types



Recording Pathology result in the unit's EMR system

The practice of recording Pathology results in a units EMR system is not widespread, as shown in Figure 9 below.

Figure 9: Recording Pathology results in the EMR



Of units which use an EMR system, 63% do not record Pathology results in the EMR.

The Process Landscape

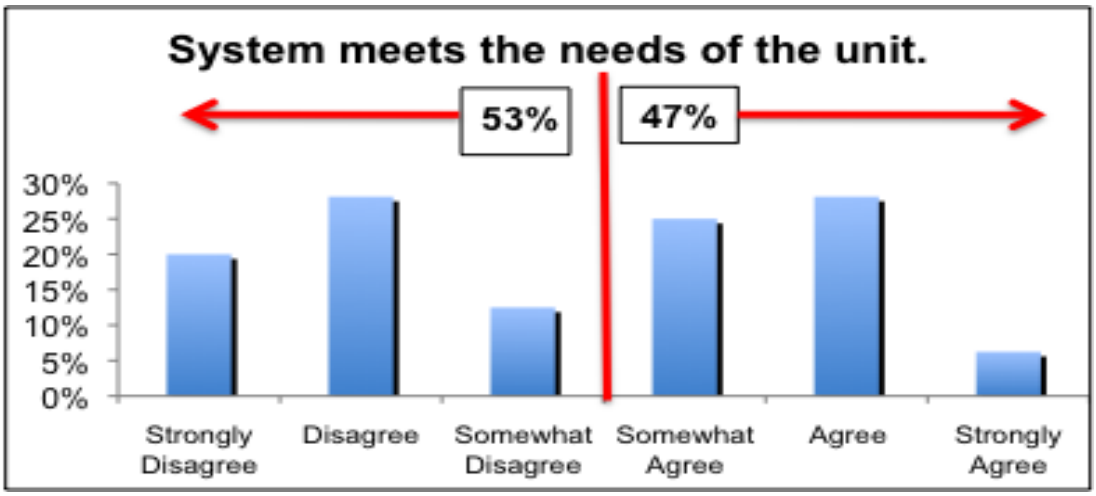
Results in this section include:

a. User satisfaction, by system,
b. User satisfaction, by process,
c. Gaps in system coverage – process steps covered,
d. Fitness for purpose – the highest rated system, by process step,
e. Paper users, by location.

a)User satisfaction, by system

The survey respondents reported a mixed view as to the extent to which their systems met the units needs, as is shown in Figure10 below.

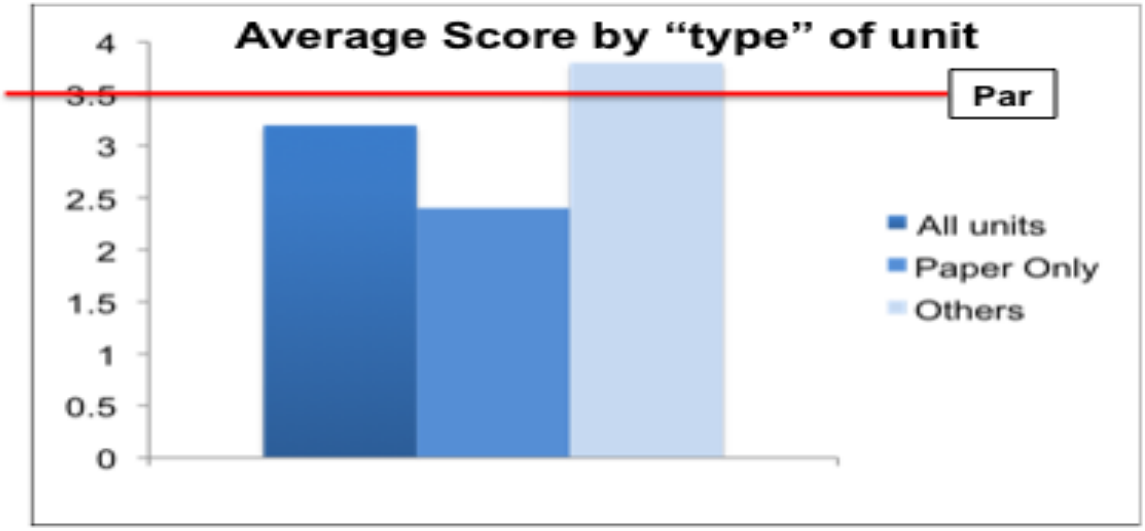
Figure 10: User satisfaction – all respondents



Just over half the respondents disagreed that their systems met the units needs. All the survey questions in the Process Satisfaction section were framed in a consistent manner as positive statements, so the scores arrived at by the above method allow some degree of comparability between questions, and between segments.

Figure 11 below shows the average score for all units on the proposition, “The Medical Oncology System in use meets the needs of the unit.”

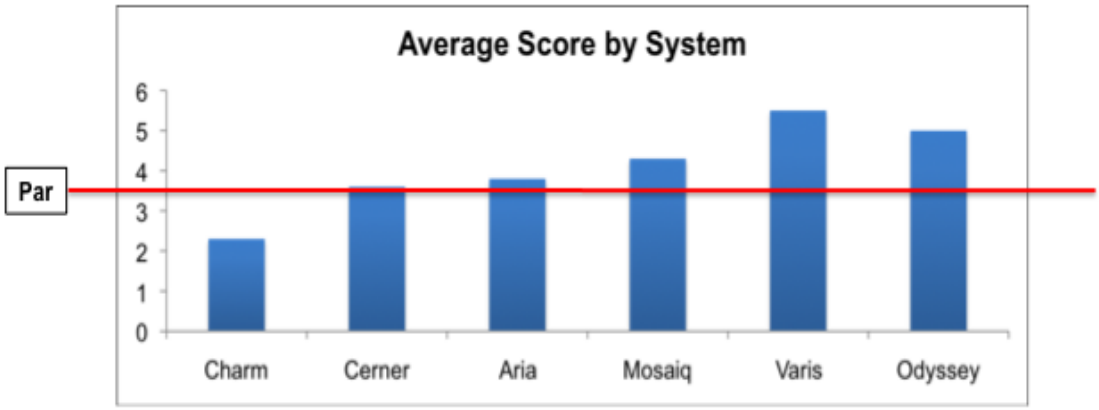
Figure 11: User satisfaction: Systems users vs Paper users



The average score for all users is below “par” at just over 3 – on average, respondents “slightly disagree” that the Medical Oncology system in use meets the needs of the unit. As Figure 11 shows, the segment of users with no Medical Oncology indicates significantly more disagreement than the segment with a Medical Oncology system. However, even respondents whose units have a Medical Oncology system recorded an average score less than “4” – the score given to “slight agreement” with the proposition.

The level of agreement varied depending on the system in use at the unit, as is shown in Figure 12 below.

Figure 12: User satisfaction, by Medical oncology system



b)User satisfaction, by process

Respondents were asked to indicate their level of agreement with the proposition that “the Medical oncology system in use meets the needs of the unit” for the following process steps”

- Booking patient appointments,
- Recording pathology results,
- Consulting with patients,
- Ordering blood work,
- Ordering drugs.

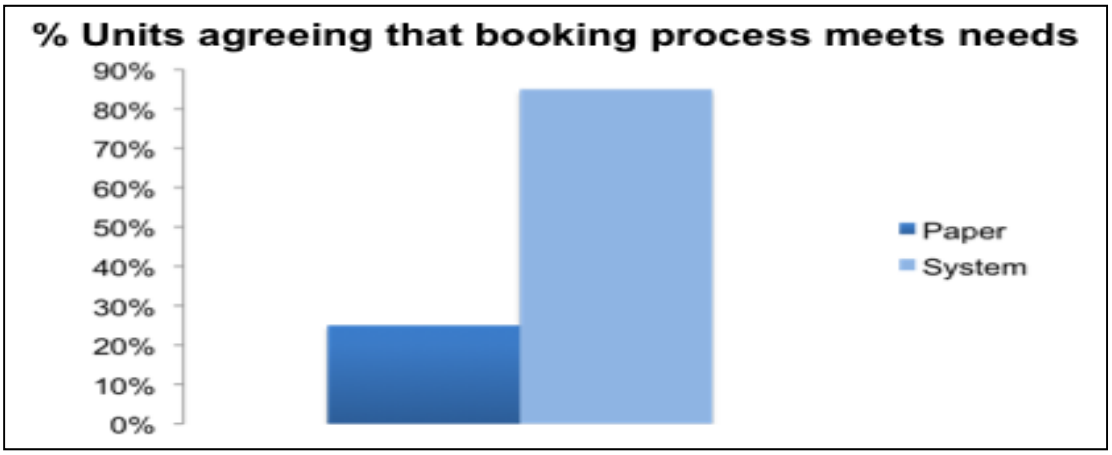
Figure 13 below shows the results, by process.

Figure 13: User satisfaction, by process

For all units, there is little variation in satisfaction by process steps. This result is not consistent with anecdotal evidence offered by the NUMs of the pilot units, with the process analysis carried out in this project, or with the results of previous studies of Ambulatory Chemotherapy in NSW. The inconsistency is particularly apparent in the process of booking patient appointments.

A supplementary analysis of the patient booking process was carried out and the breakdown of results by system vs paper users is shown in Figure 14 below.

Figure 14: User satisfaction, booking patient appointments



84% of units with Medical Oncology systems agree to some extent with the proposition that the system meets the unit's needs. Only 25% of units operating paper booking systems agree to any extent that the system meets the unit's needs.

Figure 15 below shows the differences between users with Medical Oncology systems and paper users for all 5 process steps.

Figure 15: User satisfaction by process, System vs Paper

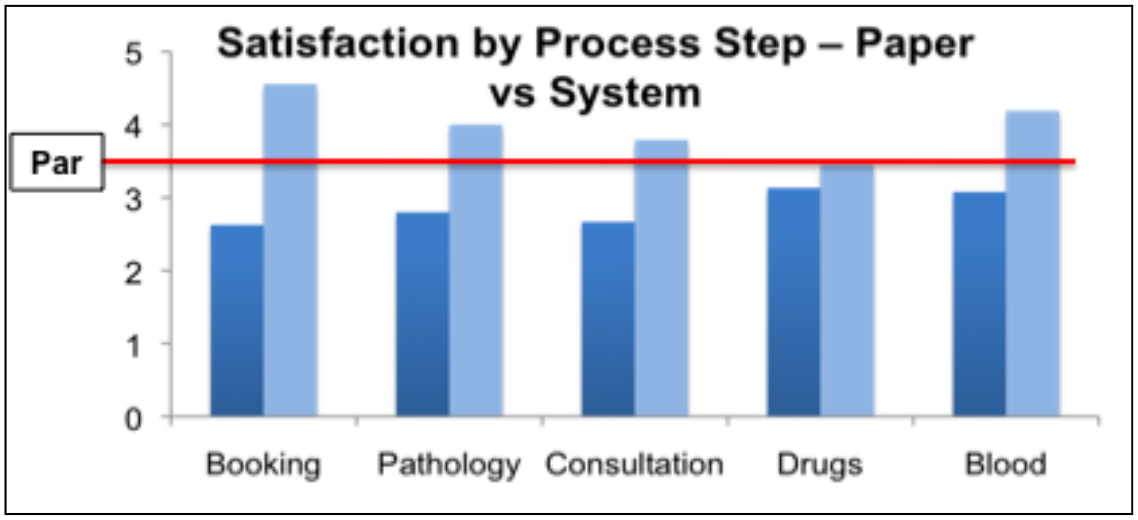
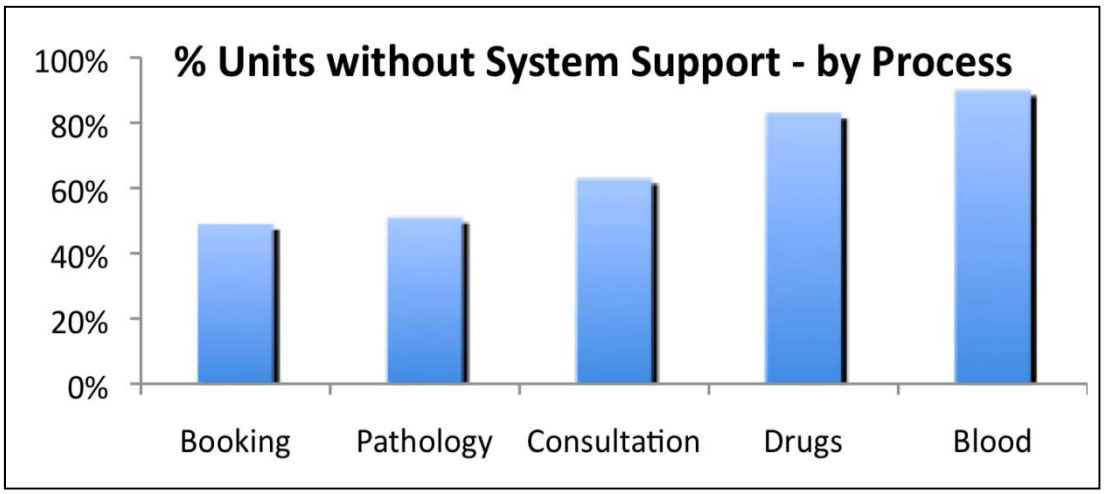


Figure 15 suggests that the implementation of a Medical Oncology system has a measurable positive impact on the performance of all key process steps; the difference is most marked for booking patient appointments. This result is consistent with the other evidence gathered during this project, as described above.

c)System support, by process step.

The range of processes supported varies by Medical Oncology system, and not all units utilise the full functionality of the systems, the result is that the percentage of units benefiting from system support varies considerably by process step. This is shown in Figure 16 below.

Figure 16: System support, by process step



Ordering of blood work and drugs is most often paper based.

d)Highest rated Medical Oncology systems, by process step.

This section focuses on analysis on the three most common Medical Oncology systems Cerner, Aria and Varis used by the survey respondents:

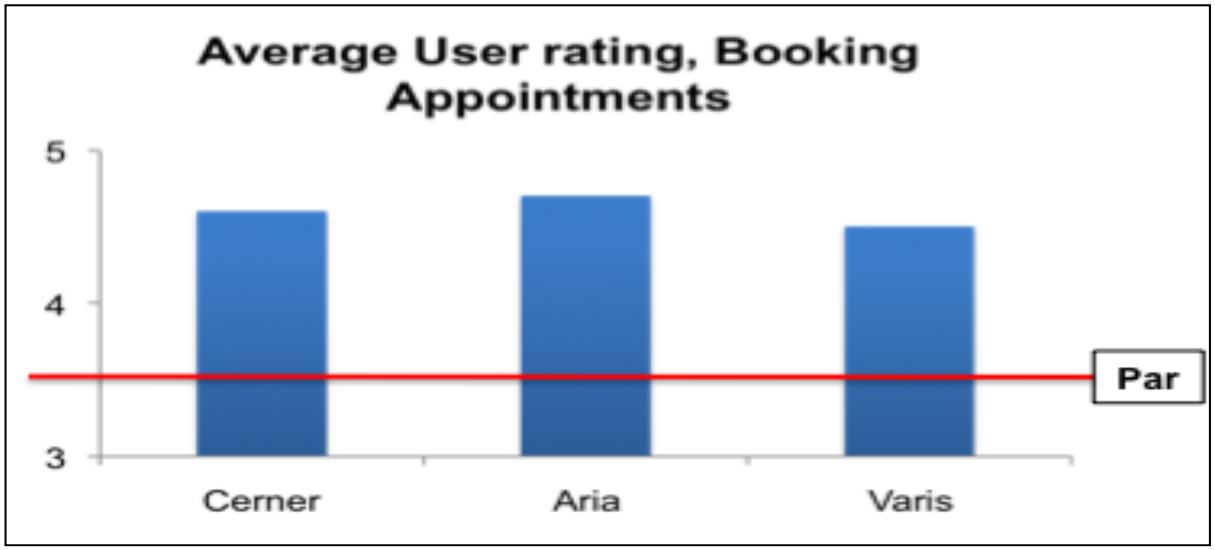
It considers the following three process steps most often identified by survey respondents as having systems support:

- Booking patent appointments,
- Recording pathology results,
- Consulting with patients.

Sample sizes for other systems and process steps were considered too small for meaningful analysis.

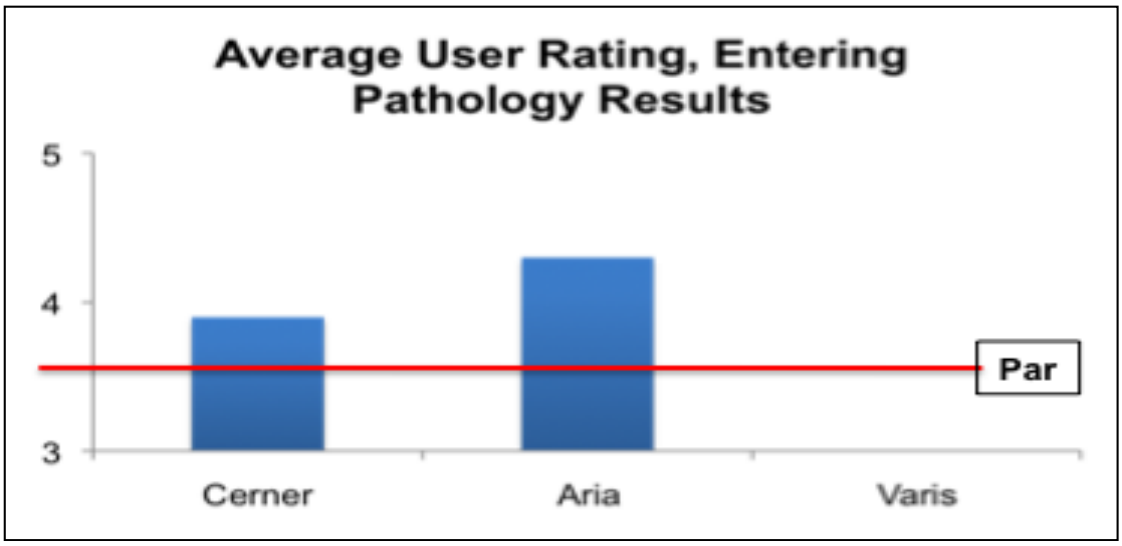
As shown in Figure 17 below, respondents with using the three most common Medical Oncology systems are relatively satisfied with the support they provide for booking patient appointments. The system in use has little impact on the level of user satisfaction.

Figure 17. User satisfaction by Medical Oncology system: Booking patient appointments



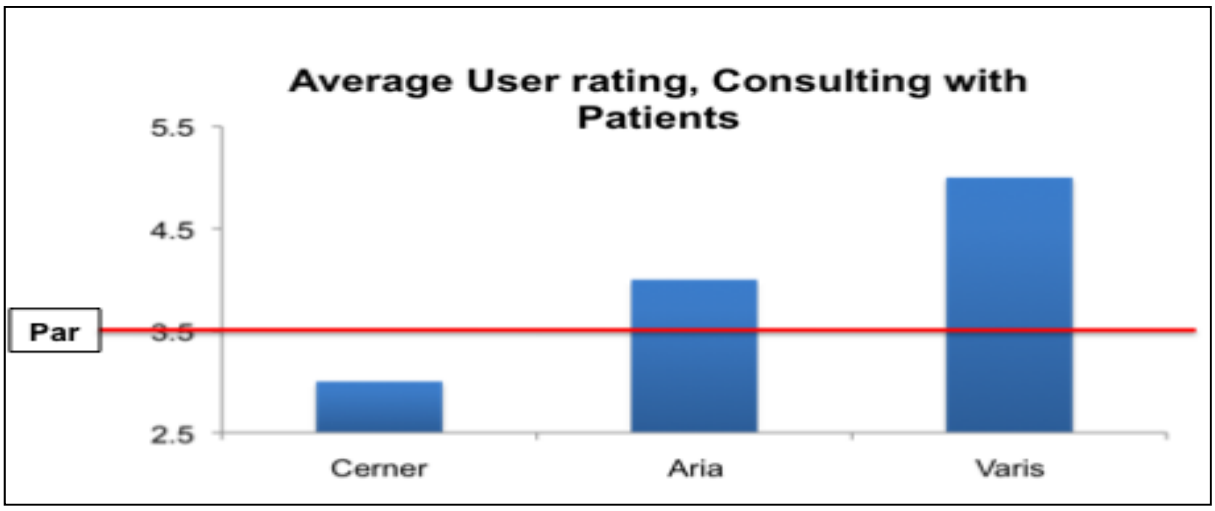
No respondents to the survey record pathology results in Varis. As shown in Figure 18 below, Aria users believe that their system meets the needs of the unit to a slightly larger extent than Cerner users.

Figure 18. User satisfaction by Medical Oncology system: Recording pathology results



Average user ratings for the “Consulting with patients” process step varied considerably by system, as shown in Figure 19 below. The result for Cerner users was virtually identical to those for users who do not have a Medical Oncology system.

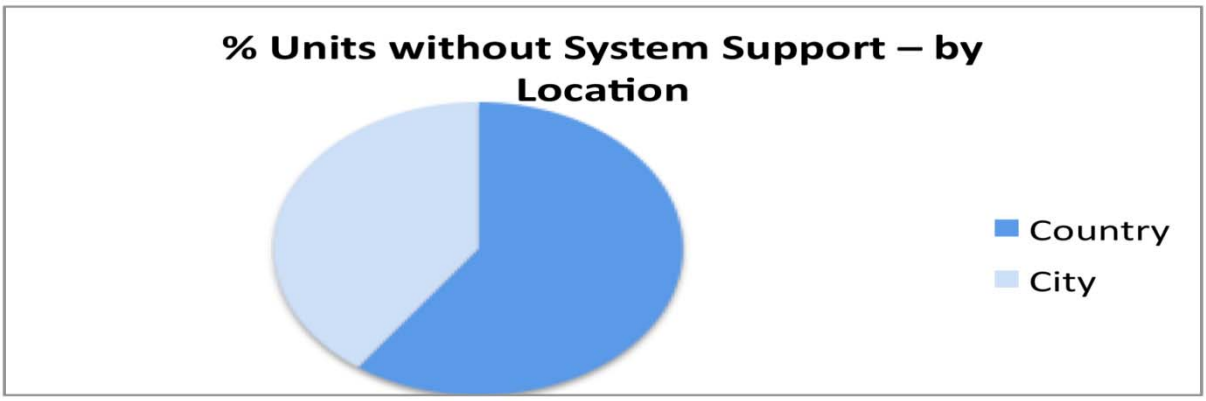
Figure 19. User satisfaction by Medical Oncology system: Consulting with patients



e)<u>Location of units which do not have a Medical Oncology system</u>.

As Figure 20 below shows, units which do not have a Medical Oncology system are more likely to be located in rural areas.

Figure 20: Location of units without Medical Oncology systems



Rural units are less likely to have a Medical Oncology system. 33% of rural units indicated that they operated only paper systems, compared to 25% of metropolitan units.