Cost-effective clinical pathways at The Alfred Hospital: international lessons from Bayside Health, Australia

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Objectives of the paper

The paper "Caring about carepaths" by Pearson and Macintosh (2001) is an interesting article for those considering the implementation of clinical pathways. The authors have attempted to describe the experiences and lessons learned in trying to introduce clinical pathways at Cairns Base Hospital (CBH). The paper is not a research report. Rather, it is a story of what was hoped to be achieved versus what actually was achieved. Hence, the term "experiment" was used in a non-technical sense. In our commentary of that paper below, we also outline our own experience in clinical pathways at The Alfred by way of comparison, drawing upon lessons learnt that may be of interest to other hospitals.

What is a carepath or clinical pathway?

Pearson and Macintosh (2001) try to point out the difference between carepaths and clinical protocols. Much of the literature refers to 'clinical pathways' rather than carepaths. We use the latter in The Alfred, and will therefore use it here.

It is useful to distinguish between protocols and clinical pathways. Protocols are recommendations to guide physicians, often including a stepwise series of decisions and algorithms (Gadacz et al 1997). Clinical pathways are systematically developed written statements of the agreed sequence of diagnostic and therapeutic processes which, in light of available evidence and stated resource constraints are essential for achieving nominated outcomes for specified clinical conditions (Hindle and Degeling, 2001). There can be linkages between clinical pathways and protocols where complex medical decision making is required (via a protocol) beyond a treatment plan inherent in a clinical pathway. For example, a clinical pathway for unstable angina may include an instruction on day 2 'initiate chest pain protocol for chest pain'. This initiates protocols for complications. Such standard protocols in place for common problems allow for easy management (US Advisory Board Company, 2001).

How were clinical pathways developed, endorsed and implemented?

It would have been useful to obtain an overview of the clinical governance and organisational committee structures involved in clinical pathways at CBH, including the lines of accountability for pathway development, approval, implementation and evaluation. Clearly specified clinical governance has proven crucial to The Alfred's success in the clinical pathway area and has involved keen commitment from senior management and senior clinicians. Our Clinical Pathways Working Group (CPWG) has responsibility for these processes with reporting lines to the Alfred Executive Committee through its Patient Services and Care Committee and finally to the Chief Executive of Bayside Health Services. CPWG is chaired by a representative from the Office of the Chief Executive, Bayside Health.

The CPWG is a large multidisciplinary committee involving membership of up to 20 senior representatives of medical, nursing, allied health, health economics, academic, finance, information technology, administration, health policy and health information management. CPWG has also collaborated with Monash, Melbourne and Deakin Universities and the Victorian Government. Key linkages have also been established with world-leading Institutes in Europe. A Policy and Procedure Manual on clinical pathways prepared by the CPWG has been disseminated hospital-wide. It covers legal considerations, criteria for pathway development, developmental processes, organisational accountability, planning, directions on how to use a pathway, staff education, pathway implementation, variance analysis design and evaluation. We have made much use of the National Health and Medical Research Council (1999 and 2001) materials on the development of clinical guidelines.

Our clinical pathways are developed using the key processes of retrospective clinical data, mapping out current practice, use of gold standard published Clinical Practice Guidelines and the integration of best practice cost-effectiveness Evidence Based Medicine (EBM) findings. This involves assessing the need for the clinical pathway, referral to CPWG and selection of all relevant published Clinical Practice Guidelines (CPGs) in close consultation with medical opinion leaders. Systematic review of the cost-effectiveness literature is undertaken by the CPWG and medical opinion leaders for key related interventions and used to assess CPGs. Compendiums of the EBM review literature are disseminated hospital-wide to key stakeholders, including medical opinion leaders and clinical teams who map out current practice. These teams involve key medical physicians, allied health and nurses, led by our Clinical Pathway Co-ordinator.

Brief issues papers identifying the key issues are also disseminated widely. This is followed up by discussion papers that identify the implications of the cost-effectiveness literature for the published CPGs. This is a crucial step as the pathways and protocols developed use the CPGs, and consider necessary revisions, along with the mapping out of current practice. The implications of the evaluated CPGs are integrated into the pathways when final endorsement is sought from leading clinical experts, such as medical Department heads. It is also considered at earlier stages when key EBM information is disseminated to the clinical teams. See Antioch, Chapman and Wilson et al (forthcoming) for a detailed discussion of our development process and the integration of cost-effectiveness evidence based medicine literature.

Pearson and Macintosh (2001) do not detail how the medical evidence behind the pathways was reviewed and assessed although there is some discussion of consensus in practice. Clarification of the extent of integrating 'best practice' literature is required. We note that 53 carepaths were developed in only 8 months. The extent to which the pathways reflect both 'current practice' and 'evidence based practice' is not stated.

The authors note that the first pathways developed were Orthopaedic. These paths are often the first to be developed because of the standardised nature of some Orthopaedic procedures such as elective hip or knee arthroplasty. The identification of high risk, high cost, high volume DRGs is a useful starting point when selecting which care paths to develop first. Given the resources, energy, and the amount of change management required, it is a challenge to implement even 2 or 3 pathways at any one time. Much depends on the resources available and the momentum and enthusiasm at the time. The fact that they were able to develop an electronic system which linked to other databases and systems such as Transition II was of huge benefit here.

In The Alfred's experience, there was also an initial focus on orthopaedic pathways. More recently, we are developing complex respiratory and cardiology pathways including chronic obstructive pulmonary disease (COPD), pneumonia, cystic fibrosis, coronary artery bypass graft surgery, acute myocardial infarction and unstable angina. The choice of these pathways was made in close consultation with key clinicians and will facilitate optimising care for clinically complex cases.

There is a clear linkage here also with our risk adjustment budgetary work in the context of casemix funding negotiations with State government where we experience large budget deficits for respiratory and cardiology (Antioch and Walsh, 2000). The linkages between high deficit DRGs for clinically complex cases and the need for related pathways and protocols as leading strategies for progressive programs is mirrored by key US approaches by The US Advisory Board Company's (2001) cardiac cost reform initiative. Here deficits are also identified for high cost outliers and 'negative margin inliers' for very similar types of cases and pathways are developed in related areas.

Do clinical pathways work?

When dealing with sponsors, it generally helps if there is background literature regarding clinical pathways. We provide some evidence below based on the literature and also our own evaluations of orthopaedic pathways at The Alfred.

Several studies have demonstrated that clinical pathways reduce length of stay and costs without compromising quality (Muto and Konishi, 2000; Kucenic and Meyers, 2000; Chen, Callender and Mansyur et al, 2000; Rohrbach 1999 and Hann, Schultz and Doctor et al 1999). International studies found organisational culture and multidisciplinary treatment was greatly facilitated using both stroke (Awad, Fayad and Abdulrauf, 1999) and orthopaedic pathways (Williams, DeRiso and Figallo et al 1998), focussing on avoiding complications rather than crisis management.

International evaluations of orthopaedic pathways are promising. US hospitals using pathways after orthopaedic surgery had lower ALOS by up to 41%, with lower complications (Todaro and Schott-Baer, 2000). Pathways at St Vincent's hospital in Melbourne reduced LOS and complications after hip and knee arthroplasty (Dowsey, Kilmour, Santamaria et al 1999). Another Victorian study by Choong, Langford and Dowsey et al (2000) reported a randomised controlled trial where patients with a fractured neck of femur treated according to a clinical pathway had a significantly shorter length of stay and no greater rate of complications or readmissions than controls. A total hip replacement pathway in China significantly reduced ALOS and charges while maintaining quality and patient satisfaction (Lin, Chuany and Lu et al 1999). Wammack and Mabrey (1998) found that a pathway for total hip arthroplasty significantly reduced complications, LOS by 46% and hospital costs by 38%.

The CPWG has addressed the crucial issues of risk adjusting evaluations of clinical pathways at The Alfred. We have controlled for casemix differences within a pathway by undertaking analyses by DRG whereby 'pathway' patients are compared with a control group of non-pathway patients.

We have also included variables that may be inter-related such as length of stay, costs, readmissions and mortality. We have evaluated four of our pathways currently in use – stroke, chronic heart failure, total hip replacement and fractured neck of femur – over the period from July 1999 to June 2000. Our study design involves NHMRC Level 111-2 of evidence; that is, evidence obtained from a non-randomised comparative study with a concurrent control group (NHMRC, 2000).

Orthopaedic pathways had the highest uptake – as high as 40% for fractured neck of femur under DRG 409 (Hip and Femur procedures excluding major joint > 54 without CCs). Uptake for total hip replacement was 34% for DRG 404 (Hip Replacement with CCs). These analyses are hospital-wide and by DRG (which can include many principal diagnoses) and therefore in some cases underestimate the actual pathway uptake in particular wards using the pathways.

The Fractured Neck of Femur pathway was analysed using mainly AN-DRG 408, AN-409 and AN-DRG 404. For AN-DRG 408 (Hip and Femur procedures except major joint with CCs) the 15 patients (22% uptake) on this pathway cost on average $3231 lower than 'non pathway' and had ALOS at 4.71 days lower.

The readmission rate of 7% was lower than for 'non-pathway' (11%). There were no deaths for 'pathways' compared to 8% for 'non-pathways'. The results were reversed for those on the same pathway in DRG 409 where an additional 15 pathway patients (39% uptake) cost on average $2,182 more and had an ALOS 3.37 days longer, but with no readmissions for pathways compared to 9% readmission rate for non-pathway patients within this DRG. There were no deaths for either the 'pathway' or the 'non-pathway' groups.

There were another 13 pathway patients grouping to DRG 404 (Hip Replacement with CCs) representing 22% update and costing on average $2,274 more than 'non pathway' patients. Pathway patients had a longer ALOS by 9 days but a much lower readmission rate of 8% versus 42% for 'non-pathway' patients. Mortality rate was 8% versus 4% in the non-pathway group.

For the total hip replacement pathway, the highest uptake was for DRG 404 (Hip Replacement with CCs). The 20 patients cost on average $2,861 less than 'non pathways', with a lower ALOS by 3 days. 'Pathway' had a 50% readmission rate compared to 42% for non-pathways in this DRG. There were no deaths for the pathway group, but the mortality rate for the 'non-pathway' group was 4%.

We have also analysed and prepared computerised variance reports. We generate tables for each pathway showing the proportion of patients that experienced a specified variance at least once during their hospitalisation. Clinically meaningful variance codes were developed for these reports, in close consultation with senior clinical staff, from an extensive list of variance codes used. The codes are shown separately for clinical, community, patient/family, practitioner and system variances. When analysed over time, one would expect that the proportion of variances to decline as feedback is provided to clinical staff and as the pathways facilitate a better-integrated system of care. These data can therefore provide an important input into the evaluation of pathways in addition to alerting clinical staff of major problems in system issues.

Data for the fractured neck of femur pathway are shown in Table 1. We also provide graphic representation for each type of variance showing the volume of variance on the day of pathway when a variance occurred. See Figure 1 for clinical variances for Fractured Neck of Femur relating to 73 patients for eleven months from June 1999. This highlights any inter-relationships between key variances. Results of the evaluations of costs, utilisation, outcomes and variance for The Alfred's pathways have been disseminated hospital-wide and presented to key clinical teams to facilitate clinical practice change and revisions of pathways.

Cairns Base Hospital's use of pathway information

It is important to provide feedback of meaningful variance analysis and changes implemented as a result of the pathway. This means you must consider what information you want out of the pathway and design it to capture that information prior to implementation.

It is impressive that analysis of readmission rates and comorbidities have been incorporated into CBH pathway work. There is potential for a wide variety of reports to be produced, but the focus should be on those reports that can meaningfully demonstrate what has been achieved or what requires rectification. For example, when reporting that 53% of the upper limb operations are on hands, it would be helpful to know if this is of any significance and, if so, how has this information been used.

The authors describe documenting tasks such as QID, or 6/24 vital signs. It is important to emphasise an outcomes focus when discussing clinical pathways. It is vital to document abnormal vital signs as a variance, rather than whether the task was undertaken. At The Alfred, we document on pathways by exception, and the exceptions become variances that are analysed in the database. Outcomes consistent with the clinical pathways are not recorded. Not only does the discharge summary assist coders, but so does the clinical pathway in general because it is legible, clearly outlining any procedures and/or complications (variances) the patient encountered.

It would be useful to explore further the data presented by the authors in Figure 2 on patterns of LOS and age by co-morbidity for hip or knee replacement. For example, it might be analysed further by DRG to attempt some degree of risk (or casemix) adjustment of the data. The authors note that the ALOS of smokers at 9 days 'supports the argument that smokers are keenest to leave the hospital to resume smoking' but the assertion is unsubstantiated. Analyses of patterns of LOS per se do not constitute a basis to identify underlying causes of LOS differences. There is also a comment that the 'final 2 or 3 days of a long term stay are amalgamated as there is little variation'. This could be an opportunity to explore alternative care provision to the acute hospital stay for these patients.

The data in the authors' Figures 3 and 4 are useful because they associate the achievements of CBH in national data. Whilst the data collection on trauma is interesting, it is not clear why they are only available as a result of

having a pathway in place. The information is not central conceptually to a pathway framework or analysis. The rationale for its inclusion is unclear, but perhaps the aim is to emphasise the 'injury plight' of indigenous people in Queensland.

It would have been beneficial to hear more about any processes that were improved as a result of the pathway and implementation other than LOS. Did the variance analysis (eg, chest infection rates) initiate changes in practice to decrease chest infection? An elaboration of the quality improvement processes facilitated through variance analysis and the subsequent change in practice as documented on the evolving clinical pathway is required.

Analyses of pathway data can identify specific trends in the frequency of patient variances on each day of stay. For example, if a high percentage of patients experience high pain rates on Day 1 post-operation, what changes in pain management could be implemented to address this variance?

We have also analysed the inter-relationship between important variances. In our Figure 1 for fractured neck of femur, we observed a very similar trend for frequency of variances for particular days of stay for delayed mobilisation and constipation. This information was discussed with clinical staff from the various wards to facilitate practice change. Our next round of analyses will identify whether there have been any improvements.

The authors note that CBH can electronically trigger an update to all pathways to improve, for example, pain management. It would be interesting to know more about the processes that trigger and implement such updates. For example, are evidence-based reviews or the results of previous audits used in this regard? Further, did one treating doctor or a management decision endorse the change? It would be useful to undertake some form of cost-benefit or cost-effectiveness analysis of pathway implementation given the availability of cost data.

Cookbook medicine?

The authors' commentary about 'cookbook medicine' is interesting. The cookbook comments have subsided somewhat at The Alfred. Less experienced staff rarely make these statements. Whilst senior clinicians (medical consultants nursing, and allied health) have much experience, the junior staff could be guided by the senior staffs' knowledge if it is expressed in the form of a pathway. As a teaching hospital, we have a responsibility to teach and supervise the care given by these staff. Given fewer expert staff available to do this and decisions regarding timing of care and specialised decision making becoming more critical, these tools provide both staff and patients with an important safety net.

The cookbook comments can be refuted by presenting baseline data on areas that could be addressed with a pathway, adequate explanation of variance analysis and what this can mean. Evaluation data on pathways along the lines we have described earlier provide a sound basis for meaningful discussion and stimulate high level interest amongst medical staff. The integration of the latest cost-effectiveness EBM findings into pathways, analysed in papers co-authored by key medical opinion leaders also facilitates ownership and endorsement of the process.

Commitment from staff

The authors have also highlighted the difficulty of introducing change in clinical practice even when the evidence of the value of the change is relatively strong. Clinical champions are critical for the successful implementation of pathways. They engender enthusiasm and provide leadership with expectations that the pathways will be utilised by the management team. It also provides an opportunity for review of practice to explore where improvements can be made not only to practice but also systems issues. It is impressive that medical staff at CBH are using the pathway documents as this has proved to be challenging in many organisations.

The project appears to have originated from within one clinical department. This demonstrates the enthusiasm for the benefits of pathways being understood at this level. However, the difficulty such projects have in transmitting their enthusiasm to other departments, into management and across disciplines, is not surprising. Pathway champions need not only be conscious of clinical issues with pathways but also management's perspective. A key advantage of the approach used at The Alfred to date has been the effective oversight and co-ordination of activities by the CPWG.

Indigenous issues

The authors placed their work in the context of the higher burden of disease borne by many indigenous people and its psychosocial context. This is always appropriate and shows that information systems at their most useful can assist to build understanding among health service providers of the real determinants on outcomes of care paths.

The reported data on indigenous residents was interesting but it is not clear how it was used to support pathway work. The authors' work might be enhanced by the authors indicating how this data will be used. For example, they might consider the implications for integrating their findings into the pathway (eg, socially and culturally appropriate admission or discharge planning, contact with Aboriginal health or community organisations, or flagging the attendance of relatives at the bedside).

Pathway sustainability

Staff education and ongoing sponsorship and funding of this work is crucial for success. Sustainability is an issue for many organisations. Pathways involve key change and change management and at this point require drivers. Furthermore, until we are all electronic where information (eg, variances) is directly entered by all staff at the time of healthcare delivery, we are reliant on data entry staff, analysts and feedback of data to the healthcare teams.

Funding support is a common theme with pathway development. Frequently clinicians and administrators identify a need for change and they have to be able to demonstrate that such an approach is beneficial and cost-effective. In order to ensure future funding, Health Department and hospital executives require evidence that care paths are a cost-effective approach, for example by improving patient outcomes, reducing length of stay and readmissions. By linking the care path database with Transition II, much evidence to support the above is available.

Our evaluations at The Alfred have highlighted trends towards greater cost-effectiveness in terms of lower costs, lengths of stay, mortality and readmissions for some of our DRGs. This evidence has been presented to State government, along with our strategic approach to pathway development and implementation. We have successfully obtained external funding to expand our pathway vision to other institutions within Bayside Health and to more fully develop our computer infrastructure and databases as a consequence. This outcome clearly underscores the need for providing evidence of pathway effectiveness as a way of ensuring ongoing sponsor support. We have worked with the Victorian State government to make the vision of effective pathways in Australia a reality.

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Table 1: variances for fractured neck of femur, The Alfred Hospital

Variance type	% of patients experiencing variance(at least one occurrence of the variance) (N=73)
Clinical	
1.003 Confusion	16.4
1.007 Pain	20.5
Chest infection	2.7
Hypotension	16.4
Peripheral oedema	-
Constipation	37.0
Delayed mobility	50.7
Wound infection	-
Complications related to co-morbidity	5.5
Community	
2.3 Rehabilitation bed unavailable	6.8
2.4 Interim care bed unavailable	-
2.5 Nursing home bed delay	-
2.8 Community Services delay	-
Patient/family	
Patient more advanced than critical pathway	-
3.18 Carer unavailable/no carer.	1.4
Practitioner	
4.1 Pathway not followed	28.8
4.3 Discharge planning incomplete	6.8
Medication issue	-
4.6.1 Delay in rehabilitation review	4.1
4.6.2 Delay in ACCS Registrar review	-
4.6.3 Delay in ACCS VMO review	-
Systems	
Physiotherapist unavailable	13.7
O/T unavailable	12.3
5.2.3 X-ray unavailable	1.4
5.2.4 Parent unit unavailable	1.4

Figure 1: Neck of femur:
Day of pathway when clinical variance occurred