

Caring about carepaths

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Abstract

This short paper describes an experiment in the use of clinical pathways for orthopaedic patients at Cairns Base Hospital. We rapidly found they improved the management of cost and quality, and that there were many beneficial side-effects. Our approach was subsequently adopted in other departments. Unfortunately, external support for further developments has not been forthcoming and we argue that this may be an unwise move.

Carepaths

Carepaths have been used in USA since 1985 and later in UK, Canada, Australia and Singapore (Choo & Cheam 2000:77). Carepaths are known as *clinical carepaths*, *clinical pathways*, *critical carepaths* and *care maps* which should be distinguished from clinical protocols according to Lau et al (1996:107). The term “clinical carepaths” is used here as the critical path aspect will probably await electronic pathways; protocol is a prescriptive term and maps include more dimensions than we have undertaken.

Michael Gorton (2001) succinctly covers five basic processes in health care, albeit from a lawyer’s perspective: proper skill and care, prompt identification of problems, proper record keeping, review and audit and communication. He noted that “communication” contributed to over 85% of complaints handled by the Victorian Health Service Commissioners Office, according to the recent annual report. Gorton concluded that “... clinical pathways provide a useful framework on which to limit and document care based on best available evidence and in a collegial and multidisciplinary environment.”

Suffice to say that successful carepath implementations depend critically on commitment from the sponsor, the clinicians and a team approach to defining, introducing, using and reviewing the carepaths. Valuable information can be provided for variance and other analysis but a commitment to maintain quality data is necessary. Some of the issues, big and small, over which our implementation stumbled, are mentioned to assist future specification writers!

Background and history

Cairns Base Hospital (CBH), Tropical North Queensland (or Far North Queensland depending on the viewpoint) was funded to introduce a computer system for clinical carepaths in the Orthopaedics department and beyond in 1997-98. The project has continued to provide value in ways sometimes unexpected.

Carepaths for the major elective procedures in Cairns, hip and knee replacements, were introduced first as they are the most standard, their expected lengths of stay being eight days. Fifty-three other carepaths were developed and introduced over the next eight months.

Issues of privacy, legality and consolidation of information were resolved with the help of various hospital committees. Problems with outlying patients and day surgery were locally resolved. Within a year, all orthopaedic patients were on carepaths. Our carepaths incorporate the patients’ notes and have become the record for each episode of care.

“The pathway format promotes exception reporting which is more targeted, more focused and more efficient than the traditional often unbridled narrative form” (Gorton 2001, p24).

The database system grew rapidly to maintain and print carepaths, to collect carepath information on admissions and variances, to print discharge summaries and provide reports. Subsequent developments included the migration of the system to the General Surgery Department, automatic uploads of demographic data from the corporate database, downloads of carepath and variance information into the Transition (TII) patient costing database, capture of discharge information directly from resident doctors and the provision of solid data for research. A bridge into the TII system to capture ICD information has been built. Introduction of carepaths prior to admission occurs at pre-admission clinics but involvement of consultants awaits co-location of ward and clinic. The hospital is being rebuilt around us!

Intended outcomes of our pathway work

We moved into carepaths with a sense of adventure, and we were willing to see where experience would take us. However, 7 outcomes were expected as described below.

1. Co-ordinated clinical carepaths

Our carepaths were designed to incorporate standard activities for best practice care, and allow for deviations. Following discussions of the initial test carepaths, prototypes were introduced and progressively refined. Initially there was an overused carepath, “generic”, for the staff to fill in; all patient episodes have now been transferred to appropriate carepaths. The computer system can print a standard carepath with the patient name, number and date of birth on each page or a pre-printed version may have bar-coded labels attached. Additional pages on the carepath include the outpatient examination, pre-assessment, consent to procedures, a disclaimer form for discharge at own risk and information on comorbidities and medications on admission and discharge.

A printed carepath normally allows a page per day of stay in hospital, accompanied by an optional extra page for patient's notes as some like a narrative and some occurrences need further explanation. The final two or three days of a long-term stay are amalgamated as there is usually little variation. Activities for each day are listed within categories; the responsible person signs and may enter a major or minor variance. “Major” implies that the patient carepath will change, the variance will be included in the discharge report and will be reported during the audit.

We found it inappropriate to categorise activities under either a *responsible group* (eg, consultants, nurses, or pain management team) or the *type of activity* (eg, investigations, observations, or nutrition). Our categories include both, such as “physiotherapy and occupational therapy” and “patient education and discharge planning”. The list of categories is table driven: the Surgery Department uses a special category “Wound Management” while in Orthopaedics “Treatments” includes wounds. It quickly became clear that a standardised set of “activities” was desirable. For instance, ‘QID’ and ‘TPR BP 6/24’ mean (to nurses) “Take the blood pressure and temperature four times per day”, although there is a slight difference.

How much information should be included? We have encountered the derogatory dismissal of carepaths as “cookbook medicine” with little appreciation of the depth of information that may be expressed in a recipe book as “Make a custard with 450ml milk, 4 eggs, 1 tsp cornflour (optional), 60 gm sugar”. This could be explained in a cookery book as:

Separate the eggs and put the whites aside. Gradually beat the sugar into the egg yolks and continue beating until it is pale yellow and forms the ribbon. Beat in the optional starch. Heat the milk to boiling point. While beating the yolk mixture, very gradually pour on the boiling milk in a thin stream of drops so the yolks are gradually warmed. Pour the mixture into the saucepan and place over a moderate heat, stirring slowly and continuously with a wooden spatula or spoon until the sauce thickens just enough to coat the spoon with a light creamy layer. Do not let the mixture come anywhere near simmering point or the yolks will scramble. Maximum temperature is 165° (170° if the starch was included) (Beck et al 1966, pp618 and 628).

Within a professional group, shorthand like 'QID' is appropriate but where, for example, the physiotherapist specifies patient exercises, they must be defined for nurses to understand.

The printed carepath thus contains relevant information for one hospital episode. In physical terms, to manage privacy and convenience issues, each carepath, with appropriate investigation results and observations, is kept just outside patient bays, in view of staff.

The full patient record or chart is seldom accessed. Initially the printed carepath included a form for an RMO to write additional discharge information; this has been supplanted by a satellite database into which the discharge information is entered by the RMO and uploaded later.

The disparate information – from the patient carepath and chart, the RMO database and the hospital information system – is drawn together into the computer system and a discharge summary produced in two to five minutes by an experienced administrator.

Discussion of best practice and a decision to adjust one or more carepaths may follow an audit. The computer system is designed to simplify adding and amending carepaths: for instance, a new activity like "Ensure patient understands pain management" can be introduced to twenty carepaths on post-operation day one in half a minute. There is not universal agreement on "best practice" and in at least one case, a consultant has designed his own carepaths; the computer system enables the administrator to copy a new carepath from the original and tailor it in several minutes. In this situation, the carepath is vital for junior doctors and nurses to differentiate their patients' treatment.

2. Variance Identification.

A variance is "an unanticipated event, often a warning sign of problems ahead, rather than a failure of care" (Gorton p23). The initial set of variances was gleaned from experience and from other carepath systems. The computer system is table driven and most "pick lists" include an "other" option; selection of "other" generates a request for further information.

Many "other" variances were initially recorded and later re-coding of common variances was undertaken; unused variances were culled at the same time; and now there are few "others". Re-admissions are of particular interest and a group of seven have been included, covering wound infection, dehiscence and other wound problems, non-union of a fracture, joint dislocation, infected prosthesis and still the ubiquitous "other". The carepath computer system prompts the administrator with previous patient episodes within the department to allow for recording a readmission variance against a previous admission when appropriate. Whilst the hospital's patient computer management system does report re-admissions, these are hospital-wide and thus inappropriate for our analyses.

Variances are tagged with a "date": pre- or post-operation, post-operative day 1, 2, ...post-operative day 9. It was soon appreciated that "intra-operation" should be included: we have fourteen serious variances on ten patient episodes that occurred during operations. For episodes that do not involve an operation (that is, conservative treatment) the variances are tagged Day 1, Day 2. This tagging of days is also used to define activities on carepaths.

Comorbidities like asthma, diabetes and smoking have been defined and refined similarly. In database terms, comorbidities relate to a patient whereas variances relate to a patient episode.

3. Discharge summaries.

A summary of the patient episode is forwarded to the referring doctor or hospital, sometimes to several sources including the Royal Flying Doctor Service. A copy is kept in the patient record. The summary includes the patient information, dates, diagnosis and operation(s) performed, the names of the consultant and surgeon(s), comorbidities and variances (called complications here). This information is entered by the responsible administrative person and augmented by a summary of significant investigations, medications prescribed and advice for the referrer entered by a junior doctor - with the cause and location where relevant. As doctors in general practice become more accustomed to electronic communication, it will be simple to transmit the summaries in this way.

4. Audit Information.

While there is a CBH computer system for theatre operations, the information is not easy to access and use. We have therefore furnished the theatres at CBH with coded lists of orthopaedic diagnoses, sites and operations. Registrars enter the codes on the theatre computer; the carepath administrator checking feasibility when entering these data into the carepath system. The carepath and operation data underlie the clinical audits conducted regularly in the departments of Orthopaedics and General Surgery although these sessions are primarily concerned with carepaths and variances. Apart from chart perusal, this is the only means of performing the audit. The process also assists in correcting any data problems.

5. Variance analysis.

Analysis of the variances ensuing from clinical procedures enables informed discussion of causes and remedial action and furthers the definition of “best practice”, for instance, Dalton (2000:146) noted that the actual number of cardiac events following total hip and total knee replacement procedures were unexpectedly high. Figure 1 provides an indication of the incidence of some major variances in six monthly periods.

Figure 1: patterns of variances in total knee and hip replacement pathways

Statistic	1998/1	1998/2	1999/1	1999/2	2000/1	2000/2	2001/1
Number of patients episodes	57	61	58	55	58	57	57
Number of serious variances	12	16	29	25	22	23	12
Length of Stay	9.7	9.9	11.0	9.9	9.1	9.4	8.9
3 period moving average LOS		10.2	10.3	10.0	9.4	9.1	
Urinary tract infection			2	1		1	1
Cardiac Condition	3	2	1	3	2	4	2
Chest Infection		3	2	1	1	1	2
Unplanned return to OR	2	2	1		1	1	
Re-admissions	3	6	14	8	7	10	3
Death	1			1			
Operating theatre cancelled			2	1	3	3	3

Unfortunately the incidence of cardiac complications has not decreased. The incidence rates of chest infections and unplanned returns to the operating theatre are decreasing over time while the number of instances of the operating theatre being cancelled have risen. The average length of stay is decreasing.

Some variances must be carefully considered, and re-admissions in particular. In the first half of 1999, two patients were each re-admitted four times and two patients twice; thus only 6 patients were readmitted. The 1998 and 2001/1 figures may be low because they were not being collected early in the period and in the later period, they have not had time to re-present! The system provides a useful tool for exploratory data analysis but knowledge and judgement are needed to draw valid conclusions.

6. Reports.

A wide variety of reports, graphical and tabular may be produced, and examples are available on request. Summaries are available and patient listings may be sorted on name, admission date or several other criteria. Relevant graphs include pie charts depicting the breakdown of operations on different areas of the body; such a plot is a profile of the hospital orthopaedic activity, for instance at CBH, 40% are upper limb operations of

which 53% are on hands. Most graphs are scatter plots (eg, length of stay against patient age) and bar charts (eg, the number on a particular carepath per month per year).

Reports may be selected on the basis of time span, consultant, surgeon, and/or patient age, sex, home location and indigenous status. Comorbidities, one or many, may be selection criteria as well as variances, operations and diagnoses. Any criteria may be imposed simultaneously, but it is usual to select one or two only as numbers are small. One example is to consider length of stay for patients undergoing total hip or knee replacements with different comorbidities as illustrated in Figure 2.

Figure 2: patterns of length of stay and comorbidity, hip or knee replacements

Comorbidity	Number	AverageLOS	Average Age
Any or none	423	9.8	67
Diabetes (IDDM)	3	11.7	66
Asthma	30	10.1	64
Angina	45	10.4	71
Congestive Cardiac Failure	10	13.2	71
Smoking	26	9.0	66

This supports the argument that smokers are keenest to leave hospital to resume smoking. Their age is almost average. Incidentally these smokers have an average of nearly three other comorbidities each.

7. Research data.

Indigenous health continues to be a major issue and cannot be separated from related social issues (Johnstone 1996:53). As illustrated in Figure 3, statistics on life expectation at birth (Johnstone 1996:49) indicate that the situation is deteriorating.

Figure 3: patterns of health in the Indigenous and other Australian populations

Statistic	Indigenous	All Australians
Expectation of life at birth (males 1971)	58.4	68.0
Expectation of life at birth (males 1991)	56.3	74.6
Expectation of life at birth (females 1971)	62.7	75.0
Expectation of life at birth (females 1991)	60.6	80.4

Far North Queensland has a large number of indigenous residents, both Aboriginal and Torres Strait islanders. They comprise 12% of the population of the catchment area of CBH (from the Torres Strait Islands south to Cardwell) but their trauma admissions are 23% of the total. Self-mutilation and interpersonal violence have emerged in the last two decades (Hunter 1993, p193); the reasons are complex but were summarised by Tatz as a syndrome manifesting the pervasive ambiguity of Aboriginal life:

“first a feeling of frustration; then a sense of alienation from society, or of not belonging, of foreignness; then *withdrawal* from that society, no longer caring about membership, a separation from that world; then *violence*” (Hunter 1993, p185).

Our data shows that patterns of injury differ markedly in cause and prevalence between indigenous and non-indigenous, male and female patients. The four most common reported causes of trauma for these populations are as shown in Figure 4.

Figure 4: illustrative analysis of trauma patterns in our pathway database

Indigenous female	%	Indigenous male	%
Fight/Assault	34	Fight/Assault	34
Fall	28	Object Contact (accid)	25
Object contact (accid)	16	Fall	21
Other	13	Other	12
Non-indigenous female	%	Non-indigenous male	%
Fall	52	Object contact (accid)	31
Other	16	Fall	25
Object Contact (accid)	14	Other	15
Motor vehicle accident	13	Motor bike accident	13

“Fall” includes those related to sporting activities, non-powered aircraft and parachuting. “Object Contact” includes knives, power tools, glass, machinery, gun discharge, and crushing.

“Other” includes accidental contact with a human or animal, pedestrian, pushbike accidents, and self-harm.

A paper on patterns in indigenous trauma (by Macintosh and Pearson, not yet published) investigates age-specific trauma rates in the local populations, and is augmented by Transition data. TII is a useful source of information and a bridge has been built, using a Crystal report, between the two systems to enable matching of ICD10 and DRG information and costs to patient episodes.

Serendipitous outcomes

There have been several. Six are worthy of mention, as follows.

1. For continuing accreditation.

Registered consultants provide an annual list of operations under their control to the Royal Australasian College of Surgeons. The Australian Orthopaedic Association (AOA) also requires a list of the operations performed by registrars and the level of supervision involved in each. The dual focus in our system, carepaths and operations, allows logs to be printed for all registrars with the AOA details and consultant lists. These reports are also used in the hospital accreditation process.

2. Turning data into information.

Through the audit process and ad-hoc reports, the data has been analysed and causalities investigated, and discrepancies have been resolved. This data is a good basis for research.

3. Assisting coding.

In particular, our methods support the production of ICD-10-AM diagnosis and procedure (and therefore Diagnosis Related Groups) information. There has been no attempt to incorporate “coding” into the computer system. However the discharge summary has proved invaluable to coders, reducing considerably their time spent searching the chart.

4. Nurse assistance.

Casual and newly graduated nurses with minimal orthopaedics or general surgical experience have found that carepaths successfully provide succinct guidelines to local procedures.

5. Focussed discussions.

Our carepaths have encouraged and facilitated communications among and between doctors, nurses, physiotherapists and occupational therapists in order to define best practice as the basis of carepaths.

6. Ad hoc queries.

“Who was that bloke Fred whose wound was infected last month?” Such queries can be answered within a couple of minutes.

In total, we have been very satisfied with the progress that has been made. Others have made favourable comments. To quote a German clinician who recently visited our hospital:

“It was the first hospital which we visited where clinical pathways are being used on a daily basis. I think that your hospital can be proud of what has been achieved” (personal communication, J Braid, May 2001).

Less than serendipitous outcomes

It is a maxim of risk management that loss of sponsor support is one of a system's major risks. The carepath project was initially funded under the Queensland Department of Health “Surgery on Time” program and was subsequently supported by Cairns District Health Service. Continuation funding under the Quality Improvement and Enhancement Program was sought but the bid was unsuccessful. During this period, numerous presentations on the value of carepaths and this system were provided to senior management in Brisbane and Cairns but the CBH carepath system was never formally assessed.

This year, there is no further funding for the project work and maintenance of the database is doubtful.

Allocation of scarce resources is always subject to contention but decisions might be made closer to the coalface. A specialist registrar with an MBA could be seen as partisan, but he makes a valid point:

“In difficult times, (health care) resources should be allocated to doctors who have been taught to manage rather than managers who are paid to save on costs” (Greenbaum 2000, p196).

There are useful directions in which the CBH project would have grown, especially integration of Emergency Department information for trauma inpatients and consultant input prior to elective surgery admission. At the other end, extension of the carepath to post-separation clinics was to be tested. It is doubtful whether the departments can continue to develop the content or even use the current carepaths in the absence of “... a person with the time and energy to guide the process” (Schiefer, quoted by Newman 1995).

These losses are not the only casualties. Clinicians will not initiate systems to deliver effective and efficient aids to quality improvement if, whilst they must continually compete for scarce resources, their efforts appear to be neither appropriately evaluated nor appreciated.

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