
PUBLIC HEALTH RESEARCH

Clinical Pathways: Development and Implementation at a Tertiary Hospital in Malaysia

Aniza Ismail^{1*}, Saperi Sulung¹, Syed Mohamed AlJunid², Nor Hamdan Mohd Yahaya¹, Husyairi Harunarashid¹, Oteh Maskon¹, Andrea Ban¹, Roslan Harun¹, Ismail Mohd. Saiboon¹, Ikafaizura Mohd. Nor¹

¹ Universiti Kebangsaan Malaysia Medical Centre.

² United Nation University – International Institute of Global Health.

*For reprint and all correspondence: Assoc. Prof. Dr. Aniza Ismail, Department of Community Health, UKM Medical Centre, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Cheras Kuala Lumpur, Malaysia.
Email: draniza@gmail.com

ABSTRACT

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Introduction	Clinical pathways have been implemented in many healthcare systems with mix results in improving the quality of care and controlling the cost. CP is a methodology used for mutual decision making and organization of care for a well-defined group of patients within a well-defined period.
Methods	In developing the CPs for a medical centre, several meetings had been carried out involving expert teams which consist of physicians, nurses, pharmacists and physiotherapists. The steps used to develop the pathway were divided into 5 phases. Phase I: the introduction and team development, Phase II: determining the cases and information gathering, Phase III: establishing the draft of CP, Phase IV: is implementing and monitoring the effectiveness of CP while Phase V: evaluating, improving and redesigning of the CP.
Results	Four CPs had been developed: Total Knee Replacement (TKR), ST Elevation Myocardial Infarction (AMI), Chronic Obstructive Airways Diseases (COAD) and elective Lower Segment Caesarean Section (LSCS). The implementation of these CPs had supported the evidence-based medicine, improved the multidisciplinary communication, teamwork and care planning. However, the rotation of posts had resulted in lack of document ownership, lack of direction and guidance from senior clinical staff, and problem of providing CPs prior to admission.
Conclusions	The development and implementation of CPs in the medical centre improved the intra and inter departmental communication, improved patient outcomes, promote patient safety and increased patient satisfaction. However, accountability and understanding of the CPs must be given more attention.
Keywords	Clinical pathway - quality of care - medical cost - evidence-based medicine - multidisciplinary communication

INTRODUCTION

In recent years, healthcare managers and organizations are facing intense pressures and challenges in minimising the cost of healthcare while maintaining its quality. As a result of this awareness, it has warranted healthcare managers, providers and healthcare organizations to explore ways and means to strategise and overcome these issues.

One of the most recommended ways to deal with this issue is the introduction of Clinical Pathway (CP). It is a well documented and widely known tool that has been implemented with the objective to control the healthcare cost without compromising the quality.¹⁻³ In healthcare services, CP has been proven to be able to reduce the cost and time spent in hospital while maintaining the best quality of services that can be offered to patients.³⁻¹⁰

CP is a methodology used for mutual decision making and organization of care for a well-defined group of patients within a well-defined period.¹¹ The pathway can be elaborated as an integrated plan of care for group of patients with particular diagnosis designed to avoid delays, optimally utilize available resources and provide high quality of care that are based on the best clinical practice where multidisciplinary aspects are taken into account.^{1,12-13} The main objective of the CP is to enhance the quality of care and minimize cost incurred by improving patient outcomes, promoting patient safety, increasing patient satisfaction and optimizing the use of resources.¹¹

Studies on the development and implementation of the CP are mostly carried out in the United States, Canada, Australia and the United Kingdom. Only a few studies are known to have been initiated in Asia, and we trust that our study is the first of its kind in Malaysia. Numerous studies have concluded that CP has its own pros and cons effects in healthcare system. Most of the studies on CP had shown positive impacts by reducing length of stay and medical cost. Several CPs have been developed and extensively used in the management of elective joints replacement,^{7-8,14-15} asthma in pediatric cases,¹⁶⁻¹⁷ management of uncomplicated acute myocardial infarction,²⁻⁵ management of congestive cardiac failure^{6,18-19} and management of pneumonia.²⁰

The intention of this article is to share the experience in developing and implementing CPs for ST Elevation Myocardial Infarction, Total Knee Replacement, elective Lower Segment Caesarean Section and Chronic Obstructive Airway Diseases at UKMMC.

METHODS

A series of meetings and workshops comprising various team of experts were held while developing the CPs. They were the Cardiologists, Respiratory

Physicians, Orthopaedic Surgeons, Obstetric & Gynaecologists, Public Health Medicine Specialists, Nurses, Pharmacists and Physiotherapists. The cases selected for development of CP was based on availability of the Clinical Practice Guidelines (CPG) in line with the best practices from literature reviews and experts consensus. In developing the CPs, our teams had incorporated the following seven steps:

1. Select an important area of practice
The topic selection in general, concentrates on the homogenous care cases, high volume cases, high cost cases, interest from practitioners, and those cases with variations in practice that affect patients' outcome.
2. Gather support for the project
In order to incorporate CP into practice, the project must receive undivided support and agreement from the healthcare providers and managers. This is crucial for the successful implementation of the CP.
3. Form a multidisciplinary group / team
CP is a holistic approach in healthcare that involved multidisciplinary care. Active physicians' participation and leadership is very critical to the development and implementation of the pathway. The lack of involvement of physicians has been cited as the main obstacle and cause of failure of the pathway.
4. Review practice and literature
Experts from various disciplines involved in managing the patients have to review current practices in comparison with best practices available in order to generate the CP. It is the result of collective effort by all team members.
5. Participation of local staff
Participation of local staff who is involved in providing the care is important. Their involvement should begin right from beginning by providing input on guidelines and local set up.
6. Development of the clinical pathway
All the specialists involved define the appropriate goals to satisfy the multidimensional needs of the patients. Results of the reviews are translated into elements of care detailed in local protocols and documentation, including the sequence of events and expected progress of patients over time.

7. Pilot implementation of the clinical pathway
 CP implementation is very challenging and may cause a major problem if not handled properly. A very common anticipated problem is almost always the failure to follow the CP procedures. Concerns and misconceptions of the pathway are addressed through effective communication.

time-task matrix is outlined in Gantt chart format. The list of care activities is along the vertical axis while timeline is along the horizontal axis. Clinical pathway includes components of expected outcomes and variance; in turn the care activities include assessments, investigations, medications, procedures, diets, referrals, educations and discharge planning. The timeline refers to location of patient and days while the outcome refers to the expected outcome of the treatment given to patient each day.

The above steps are summarized in Table 1. The suggested patient care process based on a

Table 1 General format of Clinical Pathway

TIME ACTIVITIES	Day 1 Date:	Day 2 Date:	Day 3 Date:	Day 4 Date:
Assessment Investigations Treatment Medications Diet Teaching Referral Outcome Discharge Plan				

Note: X axis – timeline, Y axis - activities

Using the format as shown in Table 1, the teams managed to developed four CPs; ST Elevation Myocardial Infarction (STEMI), Total Knee Replacement (TKR), Elective Lower Segment Caesarean Section (LSCS) and Chronic Obstructive Pulmonary Diseases (COPD). Table 2 and Table 3 show some of the activities that took place during the development of the TKR and

COPD CPs. Each CP developed consists of detailed information on the roles and responsibilities of each healthcare providers involved in managing the cases; as illustrated in Table 4. Any care activities in the CP that is not in line with the expectations would be recorded as variance.²¹⁻²²

Table 2 The Activities for Total Knee Replacement (TKR) Clinical Pathway

	Date : CLINIC	Date : PRE OP	Date: OP Day	Date: POD 1	Date: POD 2
Documentation & Assessment	<input type="checkbox"/> Indication for surgery - Optimize medical problems	- Note tracing - Pre & post Op Orientation - Nursing care planning - Vital signs 6Hrly <input type="checkbox"/> Indication for surgery Knee Score - Optimize medical problems - Templating - Rule out local/systemic infection - Review Ix	- Nursing care planning - Vital signs post op protocol - APS chart - Circulation chart - I/O chart - Drain chart - Post op Wound assessment - Nursing report	- Nursing care planning - Vital signs 6Hrly - Circulation chart - I/O chart - Nursing report	- Nursing care planning - Vital signs 6Hrly - Circulation chart - Wound inspection and Dressing - Review Check X ray and blood result if any - Nursing report

		- Consent - Financial settle			
Investigations	- FBC (OPTIONAL) - RP (OPTIONAL) - CXR (OPTIONAL) - ECG (OPTIONAL) - Knee X-rays	- FBC - RP - RBS - Confirm GXM - CXR - ECG - U-FEME - Knee X rays - C spine X ray	- Post op Hb	- Post op Knee X rays	

Table 3 Activities for Chronic Obstructive Airway Disease (COAD) Clinical Pathway (Day 1)

Activities	Day 1
Assessment	Chest assessment Medical history ¹ Clinical assessment of severity ¹ Done () Done () Done () Not done () Not done () Not done ()
Observations	Baseline vital signs then QID Baseline SaO2 (pulse oximetry) then QID Done () Done () Not done () Not done ()
Mental Health	*select ONLY one Alert () Disorientated () Drowsy ()
Mobility (filled up physiotherapist)	*select ONLY one Ambulant () walks with assistance () chair bound () Bed bound ()
Physiotherapy	Chest assessment Exercise / education/advice Chest physio (optional) Done () Done () Not done () Not done ()
Oxygen Therapy	O ₂ therapy Yes () No () If Yes, Oxygen therapy (to maintain SaO ₂ > 90%) Mask () Fio ₂ : ____ OR Nasal prong () FiO ₂ : ____
Treatment	1. Bronchodilator therapy <ul style="list-style-type: none"> • 2-4 hourly (More frequently if patient does not respond) Yes () No () • Nebuliser (air-driven)1 ml of Salbutamol (5mg/ml) in 2 ml of normal saline Yes () No () OR • MDI salbutamol 400 to 800 ug/day (through spacer) Yes () No () • Add on ipratropium (if poor response), 1 ml of ipratropium 500mcg/2 ml Yes () No () • Add IV Aminophylline 250mg/10 ml (if still not responding) Yes () No () 2. Corticosteroids IV hydrocortisone 100 mg TDS Yes () No () OR Oral Prednisolone 30mg to 40 mg OD (total 7 - 14 days) Yes () No () 3. Antibiotics <ul style="list-style-type: none"> • 2 out of 3 cardinal symptoms : Increased dyspnoea, sputum volume and sputum purulence • Total duration 7-10 days Azithromycin IV / PO () OR Erythromycin IV / PO () PLUS *Please select one

	Amox/ clav IV / PO () Cefuroxime IV / PO () Ceftriaxone IV () Cefotaxime IV () If patient is at risk of Pseudomonas infection: Consider antipseudomonal treatment: Ciprofloxacin IV/PO () Cefepime IV () Tazocin® IV () Others___: 4. Consider DVT prophylaxis SC heparin bd if patient bedridden > 4 days and age > 50yo: If needed: Yes () No (), If Yes, Done () Not done ()
Fluid therapy	IVD regime, if needed Yes () No (), Allow Orally () NBM ()
Tests	ABG: Done () Not done () If Yes, Room air () oxygen () ECG: Done () Not done () Chest xray: Done () Not done () Renal Profile: Done () Not done () Full Blood Count: Done () Not done () Random Blood Sugar: Done () Not done ()
Consults/ referral	Physiotherapy: Done () Not done ()
Patient education	Ward orientation: Done () Not done ()
Discharge plan	Nursing discharge plan: Done () Not Done ()

Table 4 Roles of healthcare provider in COPD clinical pathway

CHRONIC OBSTRUCTIVE PULMONARY DISEASE CLINICAL PATHWAY	Stick patient sticker here
INCLUSION CRITERIA:	
<ul style="list-style-type: none"> • Adult patients, aged 12 years and above admitted to the medical wards with a clinical diagnosis of acute exacerbation of COPD • They must not require ventilator support on admission 	
EXCLUSION CRITERIA:	
<ul style="list-style-type: none"> • History of current diagnosis of <i>co morbidities</i> which contribute to the patient's worsening symptoms. Examples are. <ul style="list-style-type: none"> ○ Congestive cardiac failure ○ Use of long term oxygen therapy >or = 15 hours/ day ○ Underlying malignancy ○ Active tuberculosis <ul style="list-style-type: none"> ○ Known interstitial lung or pulmonary thromboembolic disease 	
HOW TO USE THE CLINICAL PATHWAY	
<ol style="list-style-type: none"> 1. This is a proactive tool to avoid delays in treatment and discharge. These are not orders, only a guide to usual orders. 2. Place the Clinical Pathway in the patient case note. All health care personal in charge of the patient should fill in the required part in the clinical pathway. Sticker each page of the Pathway. 3. COPD CP includes general assessment, observations, mental health record, mobility, physiotherapy, oxygen requirement, treatments, fluid therapy, tests, consultations, patient education assessment, and plan of discharge 4. PHYSICIANS/DOCTORS: need to fill up the general assessment, mental health record, oxygen requirement, treatment, consults/referral, patient disease knowledge in patient education part and plan of discharge. 5. NURSES: need to fill up observation part, ward orientation, fluid therapy, test, nurses discharge plan and arrangement of follow up date. 6. PHARMACIST: need to fill up pharmacist assessment in patient education part 7. PHYSIOTHERAPIST: need to fill up physiotherapy assessment part 8. A case manager will collect and ensure the collections are completed by the various health care personnel involved. This will be done on a daily basis. 9. Any deviation from the clinical pathway will be documented as a variance in a separate sheet. 	

All patients admitted with the above diagnoses were screened and those who fulfilled the inclusion criteria were recruited into the study. All respondents were required to furnish written consent. Respondents were allowed to withdraw from the study at any time they so wish if they were to change their mind. Once recruited, the handout of clinical pathways was inserted to the case note. The clinical pathway commenced from the moment the respondents were diagnosed until they were discharged.

RESULTS

A pilot study was done to implement the newly developed CPs of ST Elevation Myocardial Infarction (STEMI), Total Knee Replacement (TKR), Elective Lower Segment Caesarean Section (LSCS) and Chronic Obstructive Pulmonary Diseases (COPD). The implementation began in Mac 2009 until December 2010. The designated departments involved in implementing this CPs were Emergency Department, Coronary Care Unit, Medical, Orthopedic and Obstetric wards.

Each CP team was tasked to educate and inform all doctors, nurses and other care providers who were not directly involved in the development of the pathway through a Continuous Medical Education (CME) program. They were briefed on the mission, goals and objectives of the CP, method of data collection and variance recording. The head nurse in each ward was appointed as the case manager, who would be responsible to document, coordinate, monitor and compile the entire CP. The case manager was also required to record any variance occurred in each CP using the variance sheet. The data and variance collected would then be analyzed by the researchers and physicians involved in the CP.

There were pros and cons in implementing the CP in the selected wards. On the positive note, the execution of CPs at these wards had lent support to the introduction of evidence-based medicine and use of clinical guidelines, improve multidisciplinary communication, teamwork and care planning, support training, maximize the efficient use of resources without compromising the quality of patient care.

On the other side, there were some inevitable minor setbacks encountered while implementing the CPs. These setbacks such as the rotation of posts that led to lack of document ownership, lack of direction and guidance from senior clinical staff, CP patients were not provided with sufficient information prior to admission and unrecorded variance, could have been avoided if only every detail was attended to. But these issues were and will be resolved as the study progressed to minimise the negative impact.

DISCUSSION

Clinical pathway was introduced in 1985. It is now being used in the United States, the United Kingdom and worldwide. We trust that we are the pioneers in developing and implementing the clinical pathway in Malaysia, certainly at UKMMC. Clinical pathway has been proven as an effective tool in healthcare management where patient care delivery can be improved and total healthcare cost can be controlled in developed countries.

CP is beneficial and effective in improving healthcare management where every important step in patients' care is examined and taken into account. However, a third of the articles reviewed concur that CP is not suitable to be applied and implemented on patients with complicated surgery and surgical illness.^{1-2, 16, 18} The clinical pathways for strokes and chronic renal failure patients had shown some unfavourable outcomes.¹⁰

In developing and implementing the CP, the team members were made up of case managers, physicians and other healthcare providers who were involved in managing the patients. Those involved in the study were expected to fully understand their roles and responsibilities; otherwise the clinical pathway application and implementation would not achieve its goals and objectives. Hence, empowerment of learning processes within an organization; intra- and inter-department have been implemented in this study, as a result of which the professionals and supporting staff have better understanding on their roles and responsibilities. The empowerments of learning also promote integration in patients' care in order to improve quality of care and reduce variations and substandard care.

There were mixed responses during the application and implementation of the CPs. The CPs were excellent in improving patients management, able to support evidence-based medicine and clinical practice guidelines as described by doctors and physicians. The findings were in full agreement with other previous studies.^{3, 12-13, 23} Clinical pathways also improve multidiscipline communication (intra and inter-department), commitment and teamwork – the three vital aspects in patients' care. These positive findings were revealed in this study especially in STEMI and TKR CPs. Similar findings were reported in other studies.^{2-3, 7, 14, 23}

Further, the clinical pathways had proven to increase the level of awareness among doctors in cost control by avoiding unnecessary investigations and medications. Efficient resources utilization without compromising the quality of patient care is

a positive note resulted from the implementation of CP; and other studies have also reported similar findings.^{1-3, 14, 23}

However, there were also some setbacks encountered during the CPs implementation which required immediate solution. This study realized that most of the setbacks encountered were a misunderstanding in nature – among healthcare providers and supporting staff who were handling the CP. In one of the case, the nurses were the only members of the team who used the CP, while other healthcare providers did not. This was due to misunderstanding that CPs are for nurses only. It was also discovered that there was a lack of direction and guidance from senior clinical staff in two of the CPs implemented. Majority of the articles reviewed stated that the physicians and practitioners are the key players in any pathway development and implementation;^{1-3, 12-13, 23} and based on our own experience, we agree to that.

The study also detected that the CP form was not provided to the patient's folder prior to admission, and the activities were not charted and recorded properly. The shortcoming was due to the patient's admission in the early hours of the morning, weekend and public holidays. About one third of the CP forms was not properly documented and was not taken into account; otherwise we could have a bigger sample size. For this reason, our sample size was slightly smaller than anticipated; though the findings remain valid. Similar discoveries are also detected by other previous studies.^{3, 7, 23}

Working in rotation among the healthcare providers and supporting staffs have also contributed to the non-continuity of the CPs usage. The CPs was often overlooked and the documents' ownership among staff were also lacking. Responsibility and accountability of healthcare providers and supporting staff in using and implementing the CP is critical to the success of CP. These aspects were part of missing and incomplete data documentation and recording; fortunately the number was too small to disturb and offset our findings.

CONCLUSIONS

As a tertiary hospital, it has developed, launched, and implemented the clinical pathways for ST Elevation Myocardial Infarction, Total Knee Replacement, Elective Lower Segment Caesarean Section and Chronic Obstructive Pulmonary Diseases. And we trust that this study is the first of its kind in Malaysia. There are obvious pros and cons in its application and implementation. Nevertheless, in order to attain better results, the hospital should anticipate, identify, co-ordinate and monitor the application and progress of the CPs regularly, consistently and rigorously. Additional analysis and evaluation will be carried out to assess

its effectiveness in controlling the medical cost and to further improve the quality of care.

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