

Utilization of clinical pathway on open appendectomy: A quality improvement initiative in a private hospital in the Philippines

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ISSN: 1658-3639

PUBLISHER: Qassim University

ABSTRACT

Objective: This study was done to evaluate the utilization of clinical pathway (CP) on open appendectomy as a quality improvement (QI) initiative.

Methods: The CP document was developed from the clinical practice guideline created by the Philippine College of Surgeons using an event-timeline tabular checklist format. After a hospital-wide education, the CP was implemented on January 1, 2010, as the QI intervention. Appendectomies done 4 years before the intervention were assigned to the pre-pathway group while those done 5 years after were assigned to the post-pathway group. Demographic data were collected including the different clinical outcomes such as the average length of stay (ALOS), comorbidity, diagnostic modality used, hospital cost, and variance rate. Data were presented as mean \pm standard deviation and percentage which ever were applicable. Statistical analysis was done using Student *t*-test for numerical data and Chi-square for dichotomous data. Significance was set at $P < 0.05$.

Results: Two hundred ninety-five patients were included in the study. Separate analysis was done for uncomplicated (Pre-pathway Group, $n = 49$ and Post-pathway group, $n = 139$) and complicated (pre-pathway Group, $n = 38$ and Post-pathway Group, $n = 69$) open appendectomies. Results showed that diagnosis was achieved through history and physical examination. Ultrasound use did not significantly differ between groups and types of open appendectomy. Major findings showed a significant decrease in ALOS, hospitalization cost, and variance in the post-pathway group compared with the pre-pathway group ($P < 0.05$).

Conclusion: These findings supported the use of CP in QI of health care in commonly done surgeries like appendectomy.

Keywords: Appendectomy, clinical pathway, quality improvement

Introduction

Patient care safety is one of the quality standards advocated by the Philippine Health Insurance Corporation or PhilHealth. This ensures the quality care being provided by its accredited institutional health-care members or hospitals. It also requires the use of integrated and organized multi-disciplinary approach in health-care delivery, which could be in the form of clinical practice guidelines (CPGs) or clinical pathways (CPs). This requirement is important for the continued accreditation of hospitals with PhilHealth and licensure with the Philippine Department of Health (DOH). PhilHealth is the largest third-party payer of health care in the Philippines.^[1] The two forms of such an approach in health-care delivery are through the use of CPGs and CPs.

CPGs promulgate the details and important aspects of the diagnosis and treatment of a disease or a procedure. CPGs are usually done by national medical societies like the Philippine College of Surgeons (PCS) to serve as guides for its constituents to follow. These guidelines are based on the current scientific evidence with the intention of improving the quality and lowering the cost of health-care provision. The use of CPGs is considered very difficult since it is not easily demonstrable. This form of document only informs the medical professional members of the health-care team regarding the evidence-based clinical aspects of the diagnosis and treatment of a disease or a procedure. This form of evidence-based health-care practice is limited only to the medical professional members of the health-care team who know the clinical aspects of a disease or procedure. The other members like the nurses and other allied health professionals just follow the written orders of the

doctors in the patient chart.^[2] The development of CPGs entails extensive work such as detailed literature search, review by a panel of experts who appraise the literature and recommend the use of it in clinical practice by the level of evidence. This approach is cost and labor extensive. Its adoption by the small to medium-sized hospital is very challenging.^[3]

The other form of such approach in integrated health-care delivery is the use of CP. CP is a document, which allows all members of the health-care team to know the various clinical aspects of diseases or procedures throughout the patient's stay in the hospital. CP incorporates CPGs agreed on by experts in the field of the disease or procedure like national medical societies. It integrates the best clinical practices, which are patient-centered and evidence-based in a CP document. This document outlines the type of clinical events such as services and interventions the patient should receive and the time at which these are to be accomplished through the course or stay of patients in the hospital. It generally standardizes the health-care provision.^[4] In the absence of a document like CPs, the patient experience in the hospital is very difficult to document. Documentation is an important part of continuous quality improvement (QI) of the hospital and for accreditors and surveyors of PhilHealth and DOH.

CPG only states the appropriate diagnostic modality, treatment option, and other aspects of health-care provision in the form of text or answers to questions regarding the diagnosis, treatment and rehabilitation of a particular disease or procedure. This gap in the implementation standard on documenting and evaluating clinical outcomes of patients receiving health care led our hospital to use an easier way of developing integrated health care in the form of CP. CP is a document that allows easy accomplishment and documentation of patient's stay in the hospital. All members of the health-care team know the clinical aspects of a disease or the clinical events of a procedure as these are clearly indicated in the CP document as event-timeline. The document clearly informs every member of the health-care team the needed admission, pre-operative, and post-operative diagnostic procedures and preparation necessary to ensure quality health care are being provided to the patients. It also indicates the important aspects of health care such as nutrition, education, and preparation of patient's discharge from the hospital. The patient is also included in the CP implementation as part of the patient education process. It is written in a clinical event-timeline tabular checklist form used by our hospital. This form becomes a legal part of the patient chart. The clinical events follow the timeline in which such event should be done.^[2,5]

There are other forms of CPs. These can be done in different forms such as algorithms, workflows, graphs, and timeline checklist in tabular forms.^[5-9] Our hospital used the event-timeline tabular checklist form. All members of the health-care team can accomplish the form provided they put their annotation and signature. It is easily used by simply checking

the box corresponding to the clinical event, and the time it has to be accomplished. It also provides a way of recording any adverse incident, patient education and patient satisfaction. The clinical events include medical intervention, assessment, physical activity, medications, nutrition and intravenous fluid, health education and teaching, and variance. The timeline axis starts with admission, pre-operative, operative, and post-operative periods [Figures 1 and 2].

The *de novo* creation of CPG is time-consuming and labor intensive when done by the individual hospital. It needs a panel of experts in a particular field of interest. This endeavor can be daunting for a small to medium-sized hospitals with limited resources. Unlike in other countries, CPGs are available for public use through national repositories of CPGs and can be easily accessed online. In the US, the Agency for Healthcare Research and Quality (AHRQ) curates the National Guideline Clearinghouse™. It keeps updated summaries of CPGs across the different fields of specialization of medicine which are also taken from medical societies and QI literature.^[10] Although other countries can use this public resource, CPGs are important to be based on a country's local health setting and particular need. Hence, we used a mechanism of adopting an established CPG created by a national medical society like the PCS and used it to create a CP document. In this mechanism, hospitals with few specialists in its medical staff and limited resources can easily create a CP document. We have chosen the approved CPGs from national medical societies as our major source of local CPGs for practically all cases or disease-related groups or surgeries in the Philippines. We used and incorporated the guidelines regarding clinical events of a particular disease or procedure and formed a checklist table for each disease or procedure. Our hospital has successfully implemented this simplified approach in creating a CP on open cholecystectomy based on the evidence-based CPG (EBCPG) of the PCS on the diagnosis and treatment of cholecystitis.^[11,12]

In November 2013, Phil health changed its payment mechanism to its health-care providers from fee-for-service to case-based scheme. In the new scheme, both institutional and professional provider-members of PhilHealth are paid by a certain amount corresponding to the disease-related groups or procedures. The amount per case is similar across the different levels of hospitals. This payment scheme is known as the All Case Rates Program of PhilHealth. It aims to improve health-care service given by health-care providers of PhilHealth. It hopes to rationalize health-care provision and the conduct of surgery and other medical procedures. It aims to make the health-care cost-beneficial and cost-efficient. PhilHealth believes that quality health-care delivery can be improved using CPGs and CPs. It mandates all hospital to use CPGs and CPs to all diseases, procedures and other disease-related groups as a prerequisite for accreditation with PhilHealth. Hence, the use of CPG and CP became mandatory and required for all hospitals. It allows easy documentation for efficient monitoring by DOH and PhilHealth.^[13]

San Diego De Alcala General Hospital			
Clinical Pathway on Appendectomy			
Name: _____ Age: ____ Sex: ____ Hospital Number: _____			
Admitting Diagnosis: _____			
Attending Doctors: _____			
Level of Care/ Clinical Activity	Admission (/ /)	Operation Day (/ /)	1 st Post-op Day (/ /)
Medical Intervention	See CP form for IM order prior to OR if patient has co-morbidity: () none With orders, specify: _____ _____ _____	Appendectomy done by: _____ Anesthesia given by: _____ _____	() change dressing done by: _____ _____
Assessment	Complete Hx and PE done by: _____ Pre-op assessment by nurse done by: _____ Pre-anesthesia visit done by: _____ Lab done: CBC _____ Blood Typing _____ Urinalysis _____ UTZ _____ CT-Scan _____	Diagnosis arrived at by: _____ Hx and PE alone _____ With the help of : _____ ULZ for unequivocal case (all ages) _____ CT-scan for elderly cases _____	S _____ _____ O _____ _____ A _____ _____ (See plan on Medications/Treatment)
Activities	No restrictions	() if patient is placed in the RR, restricted; () if patient is transferred to ward, flat on bed for 8 hours	() start ambulation from sitting to walking around bed
Medications/Treatments	() started with antibiotic () with, specify: _____ _____ () others in IM order noted in CP form, specify _____ _____	For Uncomplicated Acute Appendicitis () Chloramphenicol 500 mg TIV q 6 hrs ANST () For other diagnosis, specify: _____ _____	() consume IVF for uncomplicated acute appendicitis and shift to oral () continue IVF and IV antibiotics For other diagnosis, follow order of surgeon, specify _____

Figure 1: First page of the clinical pathway on open appendectomy (the whole document is not shown and available as a supplementary file)

As we follow the mandates of PhilHealth and DOH, our hospital used this same approach by doing an online search of all CPGs developed by medical societies, PhilHealth and international CPG clearinghouses. After limiting it to those that are applicable to our local setting, we transformed them into CPs. These CPs were implemented in our hospital to comply with the mandates of PhilHealth and DOH. One of the CPs is the CP on Open Appendectomy, which was based on the EBCPG on the Diagnosis and Treatment of Acute Appendicitis developed by the PCS, the national medical society of surgeons in the Philippines.^[14]

Acute appendicitis remains to be the most common abdominal surgical procedure performed among pediatric and adult patients below 50 years old. It peaks during the first two decades

of life. This surgical condition is treated by laparoscopic and open appendectomy. There is a significant increase in the use of laparoscopic appendectomy in the past two decades. However, open appendectomy remains to be the surgical option of choice as shown by the PCS' EBCPG on the diagnosis and treatment of acute appendicitis in the Philippines.^[14]

Appendectomy is one of the top 10 commonly performed surgeries claimed for PhilHealth reimbursements. Being a frequently performed surgery, it is important that the surgical community use it in a cost-effective and beneficial manner. From the standpoint of the medical community, the use of CPGs and CPs is perceived as a way of improving the quality of health-care provision to our patients. Hence, the use of CP in daily medical care will be the norm of

	specify: _____ _____ _____ _____	specify: _____ _____ _____ _____	specify: _____ _____ _____ _____
Nutrition/Fluids	() DAT	() DAT	() DAT
Teaching	() on wound care done by _____	() on wound care done by _____	() on wound care done by _____
Discharge Planning	() Follow-up discussion done by _____ () Possible suture removal if any discussed by _____	() Follow-up discussion done by _____ () Possible suture removal if any discussed by _____	() Follow-up discussion done by _____ () Possible suture removal if any discussed by _____
Variance	Specify Variance noted: _____ _____ _____ Action Taken: _____ Name and Signature of Responsible Staff: _____ _____	Specify Variance noted: _____ _____ _____ Action Taken: _____ Name and Signature of Responsible Staff: _____ _____	Specify Variance noted: _____ _____ _____ Action Taken: _____ Name and Signature of Responsible Staff: _____ _____
<p>Note: For uncomplicated acute appendicitis, the target day of discharge is the 2nd and 3rd post-days For complicated acute appendicitis, the target day of discharge is the 5th and 6th post days</p>			

Figure 2: Last page of the clinical pathway on open appendectomy (the whole document is not shown and available as a supplementary file)

clinical practice.^[14]

In January 2010, our hospital has implemented the CP on Open Appendectomy as a requirement for the initial implementation of All Case Rate Scheme of PhilHealth and after a hospital-wide education of its staff.^[15] As part of the continuous improvement activities of our hospital, this study was done to evaluate the utilization of CP on open appendectomy and its effect to the patient’s clinical outcomes.

Methodology

This study was conducted at San Diego de Alcala General, a private level 1 hospital with the capacity to perform major surgeries and approximately 2,500 admissions per year. This study was done as part of the hospital’s QI Program and approved by the Institutional Research Committee of San Diego de Alcala General Hospital. It was registered to the Research Institutional Development Office of the University of the Philippines-Manila. This study used a quasi-experimental research design involving patients who underwent uncomplicated and complicated open appendectomy from January 1, 2006 to December 31, 2015. All eligible patients enrolled in the study gave their informed consent. The QI Committee of our hospital developed the CP

on Open Appendectomy. It was based on the EBCPG on the diagnosis and treatment of acute appendicitis by the Surgical Infection Committee of the PCS.^[14] It was formalized after being introduced to the hospital staff in a hospital-wide education seminar for proper dissemination together with all the other CPs being used by the hospital.

This QI initiative was done by the hospital for PhilHealth compliance. The CP was implemented on January 1, 2010. Open appendectomy done 4 years before this date was assigned to the pre-pathway group when CP on Open Appendectomy was not yet being implemented by the hospital while those done 5 years after this date were assigned to the post-pathway group. All charts of these patients were retrieved. Demographic data were collected including the different patient’s clinical outcomes such as the average length of stay (ALOS), comorbidities, diagnostic modality used, complication rate, and variance rate. Variance does not refer to the statistical term but is defined as the event that causes the patient to deviate from the expected clinical outcomes during the patient stay and prolonging the patient’s stay in the hospital. Patient’s clinical outcomes were analyzed separately for uncomplicated and complicated open appendectomy to avoid disease severity bias. Uncomplicated open appendectomy was done for diagnosis of acute appendicitis with International Classification of Disease-10 (ICD-10) code of K35.9. Complicated open

appendectomy was done for diagnosis of acute appendicitis with ICD-10 codes of K35.0 and K35.1 for accurate chart retrieval.^[16] Incidental open appendectomy with other surgical procedure done was excluded. Negative or normal open appendectomy was also excluded.

Data were presented as mean \pm standard deviation and percentage which ever were applicable. Statistical analysis was done using Student *t*-test for numerical data and Chi-square for dichotomous data. Significance was set at $P < 0.05$ with a confidence interval of 95%. This study followed the guidelines as set forth in the Standards for QI Reporting Guidelines version 2.0 (SQUIRE 2.0).^[17]

Results

Two hundred ninety-five patients were included in the study. 10 patients were excluded for an incidental open appendectomy. There was no normal open appendectomy noted. Analyses were separated for those who underwent uncomplicated (Pre-pathway group, $n = 49$ and post-pathway group, $n = 139$) and complicated (Pre-pathway group, $n = 38$ and post-pathway group, $n = 69$) open appendectomy [Tables 1 and 2]. The demographic data did not differ significantly between the pre-pathway and post-pathway groups for both types of open appendectomy ($P > 0.05$). Results showed that diagnosis was mainly achieved through history and physical examination while the use of ultrasound did not significantly differ between groups and types of open appendectomy. Abdominal computed tomography scan was not used in any patient to arrive at the diagnosis of acute appendicitis.

Major findings showed a significant decrease in ALOS, cost of hospitalization, and variance (those who strayed off the pathway) in the post-pathway group when compared with the pre-pathway group in both uncomplicated and complicated open appendectomy ($P < 0.05$). The significant reasons for the variances noted were all patient-related which include in decreasing order:

(1) failure to settle hospital bill on time, (2) patient's request due to absent caregiver at home, and (3) incomplete PhilHealth forms before discharge. Although the percentage of comorbid clinical conditions was significantly higher in the pre-pathway groups for both types of open appendectomy than in the post-pathway groups, these comorbidities were not the reason for prolonged hospitalization for these patients.

There were no complications noted in all groups and no readmissions within 30 days after discharge.

Discussion

In this study, we have shown that the utilization of a CP on open appendectomy based on an established EBCPG created by a national medical society like the PCS resulted in lower health-care cost, improved patient's clinical outcomes with no adverse incident and shortened hospital stay. Our simplified approach of using a CP in a clinical event and timeline checklist form can be done in a short period of time and less financial output from the hospital management. This approach could be easily adopted by all hospital across different levels of hospital category. However, it is most important for Level 1 hospitals (secondary in the old classification of DOH) and other smaller health-care facilities (primary and lying-in in the old classification of DOH), which constitute the majority of institutional health-care providers in the Philippines.^[18]

The use and continuous evaluation of CPs in health-care settings contribute to the institutionalization of culture of quality in our hospital. This is a very important initiative in the health-care service to our patients. The multi-disciplinary health-care team becomes aware of any clinical decision to make and avoids unnecessary delay in the request for laboratory examinations and the plan for surgical intervention. This empowers not only the medical staff but also the allied health professionals like nurses who have the first contact and longest time spent with our patients.

Table 1: Comparison of patient's demographics and clinical outcomes between the pre-pathway and post-pathway groups who underwent uncomplicated open appendectomy

Variables	Pre-pathway group	Post-pathway group	P
Age (mean \pm SD)	25.8 \pm 12.9	25.2 \pm 16.2	>0.05
Male	84.0	76.5	>0.05
Diagnosed by			
History and PE only (%)	68.4	77.8	>0.05
With ultrasound (%)	30.6	24.0	>0.05
Comorbidity (%)	11.0	4.1	<0.05
ALOS (mean \pm SD)	5.2 \pm 1.7	3.9 \pm 1.1	<0.05
Hospital cost in Philippine peso*			
(Mean \pm SD)	38,190.0 \pm 3,640.0	30,440.7 \pm 7,675.6	<0.05
Variance (%)	58.9	26.0	<0.05

*Hospital cost in Philippine Peso adjusted for Peso to US Dollar exchange in May 2015. SD: Standard deviation

Table 2: Comparison of patient's demographics and clinical outcomes between the pre-pathway and post-pathway groups who underwent complicated open appendectomy

Variables	Pre-pathway group	Post-pathway group	P
Age (mean±SD)	23.8±13.2	25.0±16.7	>0.05
Male	82.0	76.0	>0.05
Diagnosed by			
History and PE only (%)	58.0	67.7	>0.05
With ultrasound (%)	42.0	34.3	>0.05
Comorbidity (%)	16.9	6.8	<0.05
ALOS (mean±SD)	6.2±2.0	4.5±1.3	<0.05
Hospital cost in Philippine peso*			
(Mean±SD)	45,795.4±8,800.0	35,141.0±10,113.5	<0.05
Variance (%)	62.0	45.7	<0.05

*Hospital cost in Philippine Peso adjusted for Peso to US Dollar exchange in May 2015. SD: Standard deviation

This study also shown that CP can be used as a standardized form of health care for a disease with a wide range of disease severity. There was improvement of patient's clinical outcomes despite the significantly higher comorbidities seen in complicated open appendectomy than in uncomplicated open appendectomy. This CP allows uniformity in the provision of health care in cases where there are different morbidity rates. Morbidity and mortality rates are reported to be higher in acute perforated appendicitis than acute non-perforated appendicitis.^[19]

With the decrease in hospital stay and health-care cost using CP on open appendectomy, open appendectomy may be viewed as the surgical procedure of choice to treat acute appendicitis. The ALOS of patients who underwent open appendectomy in this study did not differ so much from the reported ALOS of laparoscopic appendectomy in the literature. Laparoscopic appendectomy is more expensive when compared with open appendectomy. Its only advantages are early return to productive work and esthetic reasons.^[20] But open appendectomy, when done in the context of CP, will remain as the surgical procedure of choice in our country.

CP as a QI tool should be considered as a standard of care.^[21,22] It is not due to the mandates of regulatory agencies such as Philhealth and DOH but the social responsibility of institutional health-care providers toward quality health care. This QI initiative standardized the health-care provision in our hospital.

In the Philippines, still at its infancy, the National Center for Patient Safety and Quality Healthcare (NCPSQH) was established by the University of the Philippines-Manila, College of Medicine. Its mandate is similar to that of the AHRQ. This agency could provide the important function of providing the Philippine medical community with updated CPGs from which CPs can be based. In the future, we hope that the NCPSQH as a national center would take on the function of AHQR in the Philippines. This will help the medical

community, especially the small to medium-sized hospitals in their efforts to develop CP from well-established CPGs and provide quality health care to its patients.

Conclusion

These findings supported the use of CP in improving the quality of care given to patients in common surgeries like open appendectomy. The simple approach of creating CP based on established EBCPGs by national medical societies like the PCS can be used by small to medium-sized hospitals with limited resources in the *de novo* creation of CPs. In summary, the utilization of CP on open appendectomy based on the EBCPG on the diagnosis and treatment of acute appendicitis by PCS is an economical and sound approach to ensure patient care safety and improvement of clinical outcomes.

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