THE IMPACT OF CLINICAL PATHWAY IMPLEMENTATION ON LENGTH OF STAY AND HOSPITAL COST: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Clinical Pathway (CP) is a method of clinical documentation that reflects clinical practice standards for physicians, nurses, and other members of healthcare team. Clinical pathways are increasingly being used by hospitals to improve efficiency in the care of certain patient populations. This study aimed to review systematically the impact of CP implementation on length of stay and hospital cost.
Subjects and Method: A systematic review was conducted by searching published articles from 2010 to 2019 from databases including: Proquest, Scopus, and Pubmed. The keywords for this review "impact, implementation, clinical pathways, critical pathways, care pathways, integrated care pathways, hospital costs and length of stay". The dependent variables were length of stay and hospital cost. The independent variable was CP. There were 7 articles obtained after implementing the inclusion criteria.
Results: There was a significant reduction in hospital costs and length of stay after the implementation of CP. There was no significant difference between before and after the application of CP in aspects of complication, mortality, readmission, and clinical outcome.
Conclusion: Implementation of CP can significantly reduce hospital length of stay and cost without reducing the quality of health service.

Keywords: clinical pathway, length of stay, hospital cost

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BACKGROUND

In the era of medical care competition in treating patients, a doctor wants to provide maximum and varied services according to the knowledge he has. This variation is sometimes needed, but not infrequently provided is an unnecessary service and risks to burden the patient, especially in terms of cost, this condition can be controlled by the application of clinical pathway as the most popular initiative to reduce costs and length of stay can even improve the quality of care and patient satisfaction (Pearson et al., 1995; Rahma, 2013).

Clinical pathway (CP) is a structured multidisciplinary treatment plan with minimum service standards that shows in detail the important stages of health care from receiving patients to returning patients, ensuring that no services are forgotten and implemented on time (Kinsman et al., 2010; Lawal et al., 2010; Rahma, 2013). Clinical pathway aims to improve patient outcomes, improve patient safety, improve quality of care, reduce risk, increase patient satisfaction, reduce length of stay and costs and optimize resources (Ban et al., 2012; De Bleser et al., 2006; Luc & Kitchiner, 2001; Rotter et al., 2008).

Clinical pathway has many other names such as: Critical Care Pathway, Integrated Care Pathways (ICPs), Coordinated Care Pathways, Caremaps, Anticipated Recovery Pathways (ARPs), Critical Care Pathways, Clinical Pathways, Care Tracks,

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Clinical Care Pathways, Critical Care Pathways Method, Clinical Algorithm, Multidisciplinary Pathways of Care (MPC), Care Protocols, Care Models, Evidence-based Care, Collaborative Care Plans, but in the UK the terms Clinical Pathway and Integrated Care Pathways are most often used (Bayliss et al., 2009; Kinsman et al., 2010; Luc & Kitchiner, 2001; Rahma, 2013).

The United States first implemented clinical pathway (CP) in the 1980s to standardize the results of care and control costs, in the late 1980s, the application of CP in the UK for reasons of quality improvement (Bayliss et al., 2009).

Although the effectiveness of CP was still being argued, the use of CP has spread to various countries in the United States, Australia, Canada, Europe and Asia, 80% of hospitals in the United States have applied CP to several diseases (Rotter et al., 2008).

Although there have been many studies on the impact of CP implementation, various results have been obtained. This systematic review is to find out the impact of the implementation of Clinical Pathway on length of stay and hospital costs in several cases of the disease.

SUBJECTS AND METHOD

1. Study Design

This study was a systematic review of articles on the impact of clinical pathway implementation on length of stay and hospital costs. In the search for articles, it used a database of PubMed, Scopus, and ProQuest with keywords “impact” AND “implementation” AND “clinical pathways” OR “critical pathways” OR “care pathways” OR “integrated care pathways” AND “hospital costs” AND “length of stay”.

2. Inclusion and Exclusion Criteria

Inclusion criteria is the impact of implementing clinical pathway on length of stay and hospital costs, research comparing care before and after application of clinical pathway, English language articles and articles can be accessed, while exclusion criteria are systematic review methods, only assessing one of the variables. Searches were limited to English language articles and published from 2010 to 2019 and open journal access.

3. Article Extraction

The initial identification process based on the search limit found 125 articles and 7 articles according to the eligibility criteria would be reviewed. The systematic review process used the PRISMA (Prefer-red Reporting Items for Systematic Reviews and Meta-analysis) protocol. The search and selection process is explained in Figure 1.

RESULTS

The grouping of important data in articles was done by analyzing data based on title, author's name, country, journal, method and results. The results of data extraction can be seen in table 1.

1. Impact on length of stay and costs after applying CP

Overall studies consisting of 6 invasive treatments and 1 non-invasive treatment prove that there was a reduction in hospital days and total hospital costs after applying CP (Bartlett et al., 2017; Chung et al., 2012; Kagedan et al., 2017; Lin et al., 2011; Peng et al., 2018; Zhang et al., 2019; Zhu et al., 2014). Can be seen in Table 2.

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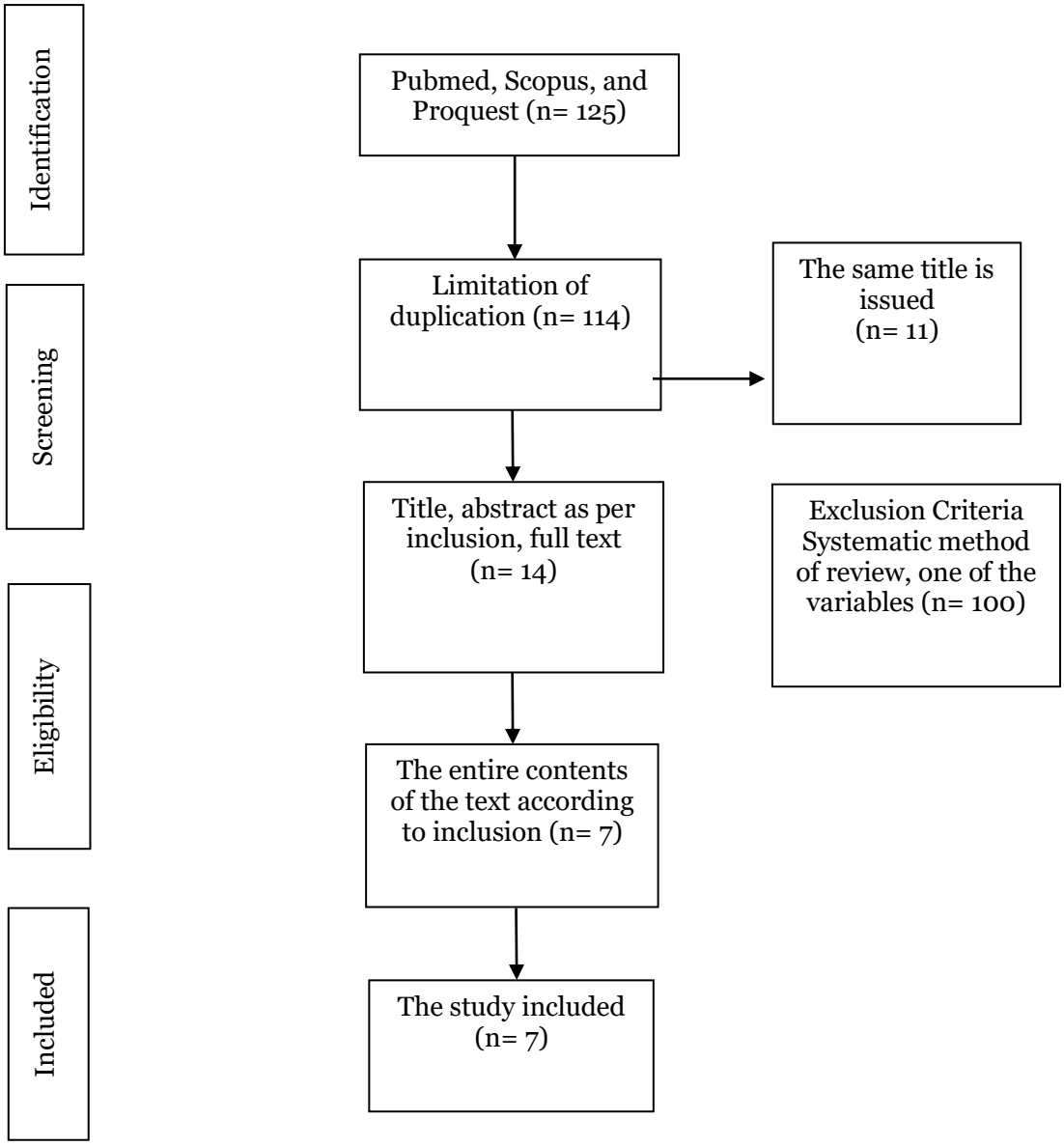

Figure 1. PRISMA Flow Diagram

Table 2. The impact after applying CP to the length of stay and hospital costs.

Authors	Cases	Total Sample	After CP	
			LOS	Cost
Invasive Treatment				
Zhu et al (2014)	Hepatocellular Carcinoma	133	↓	↓
Zhang et al (2019)	Common Bile Duct Stones	2663	↓	↓
Chung et al (2012)	Lumbar laminectomy	119	↓	↓
Lin et al (2011)	Heart resection	117	↓	↓
Peng et al (2018)	Uterine Leiomyoma	1432	↓	↓
Kagedan et al (2017)	Pancreaticoduodenectomy	195	↓	↓
Non-invasive treatment				
Bartlett et al (2017)	Asthma Children	297	↓	↓

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2. Other impacts

There were no significant differences in patient clinical characteristics, postoperative complications, mortality and readmission between the CP and non-CP groups. (Lin et al., 2011; Zhu et al., 2014; Bartlett et al., 2017; Kagedan et al., 2017; Zhang et al., 2019). Antibiotic use and complications in the CP group were significantly lower than those in the non-CP group in common bile duct stones patients undergoing retrograde cholangiopancreatography (ERCP) endoscopy (Zhang et al., 2019). The level of patient satisfaction was increased after the application of CP (Chung et al., 2012).

DISCUSSIONS

This study was not limited to certain diseases to see the impact of clinical pathway (CP). The application of CP was an effective way of maintaining the quality of medical care, minimizing unnecessary practices so as to minimize risk, practice evidence-based care, reduce length of stay and hospital costs. It can also improve treatment efficiency and has been widely applied in surgical and non-surgical cases, especially for high volume disease cases. (Bryan et al., 2017; Dey et al., 2013; Jeong et al., 2011; Luc & Kitchiner, 2001; Pearson et al., 1995; Sung et al., 2013).

All these systematic review studies reported significant reductions in hospital stay and hospital costs when compared between before and after CP application. This was in line with 22 studies on joint replacement cases (Barbieri et al., 2009), cases of supracondylar humerus fractures in pediatric patients by electronic medical record methods (Sung et al., 2013) and 17 studies conducted by Rotter (2008) on the effects CP. Length of stay and costs showed a positive impact, especially length of stay in invasive care decreased significantly and there was no evidence of differences in complications and readmission.

However, in the case of gastrectomy, CP cannot be applied because most upper gastrointestinal operations often have postoperative complications and require additional medical care when compared to non-intestinal or non-invasive diseases, according to Jeong's pre-operative consultation and pre-operative examinations in outpatients have a significant impact on LOS and costs (Jeong et al., 2011).

Whereas 7 studies on the treatment of CP heart failure had an impact on the reduction in length of stay and death rates but there were no differences in the costs of hospitalization and readmission. (Kul et al., 2012).

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Table 1. Data extraction results

No	Title	Author	Country	Journal	Method	Results CP vs Non-CP
1	Impact of a Clinical Pathway on Hospital Costs, Length of Stay and Early Outcomes after Hepatectomy for Hepatocellular Carcinoma	Liang Zhu et al. (2014)	China	Asian Pacific Journal of Cancer Prevention	Retrospective and prospective Study	• Length of stay decreased by 12.3 vs 8,3 days ($p < 0.001$). • •Hospital costs were reduced from 24.844 RMB to 19.761 RMB ($p < 0.01$). • There were no significant differences: patient clinical characteristics, postoperative complications, mortality and readmission.
2	Big-data analysis: A clinical pathway on endoscopic retrograde cholangiopancreatography for common bile duct stones	Wei Zhang et al. (2019)	China	World Journal of Gastroenterology	Retrospective Study using univariate and multivariable regression/ linear	• Length of stay decreased ($P <0.001$) • Hospital costs decreased: Hospitalization, surgery, care, medication, and medical consumption materials ($P <0.001$). • Antibiotic use and complications decreased. • There were no significant differences: clinical outcome, readmission, level of secondary surgery.
3	Implementation and outcomes of a critical pathway for lumbar laminectomy or micro discectomy	Sang-Bong Chung et al (2012)	South Korea	Journal of Korean Neurosurgical Society	Retrospective Study	• Length of stay of 5.4 days vs. 6.9 days, reduction of 20%, ($p\leq0.000$). • Total hospital costs decreased insignificantly ($p= 0.815$). • Significant reduction in bed and maintenance costs ($p = 0.002$) • Increases in drug and prescription costs and operating-related costs were not significant. • The level of patient satisfaction

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						increased
4	Implementation of a Fast-Track Clinical Pathway Decreases Postoperative Length of Stay and Hospital Charges for Liver Resection	De-Xin Lin et al (2011)	China	Cell Biochemistry and Biophysics	Retrospective Study	• The duration of postoperative care decreased (7 vs 11 hari, P < 0.01). • Perioperative hospital costs decreased from 26.626 RMB to 21.004 RMB (P < 0.05). Less postoperative complications . • • There were no significant differences: morbidity, mortality and readmission .
5	Can single disease payment system based on clinical pathway reduce hospitalization costs in rural area? A case study of uterine leiomyoma in Anhui, China	Jing Peng et al. (2018)	China	BMC Health Service Research	Retrospective with stratified random sampling	• Length of stay decreased from 9,96 ± 2,39 days to 8,83 ± 1,95 days (p<0.01). • Total inpatient costs decreased from 919,08 ± 272,92 USD to 834,92 ± 225,29 USD. • Costs of medication, care, testing were reduced, while the costs of surgery and examinations were increased.
6	Improving the Efficiency of Care for Pediatric Patients Hospitalized With Asthma	Kathleen W. Bartlett et al. (2017)	America	Hospital pediatrics	Retrospective Study	• Length of stay decreased from 2,9 days to 2,3 days . • Costs indicate savings $ 1543 per cases. • Readmission remain stable.
7	The economics of recovery after pancreatic surgery: detailed cost minimization analysis of an enhanced recovery program	Daniel J. Kagedan et al. (2017)	Canada	Hpb (Hepato-Pancreato-Billier)	Cohort Retrospective	• Length of stay decreased (9 vs 11 days, p = 0.005). • Total post-operative hospital costs decreased (CAD $ 15.678,45 vs CAD $ 25.732,85, p = 0.024), Significant cost savings areas include laboratory tests and imaging investigations.

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CP compliance factors also play a role in reducing the length of stay and hospital costs, this has been proven by studies conducted by Bartlett (2017) in cases of pediatric asthma and Bryan (2017) cases of bronchiolitis. In a study in 54 hospitals in Hubei Province and Gansu Province in China, the positive effect of CP was not felt by most hospitals or managers or doctors there, this was due to low involvement and adherence to CP, but 5 hospitals showed that compliance against national CP can reduce the length of days of stay and medical costs of hospitalization (Bai, Bai, Zhu, & Xue, 2018).

The health financing system in each country required hospital management to be able to streamline costs and control quality through the implementation of clinical pathways (Peng et al., 2018).

It can be concluded that implementing CP can result in cost savings by reducing unnecessary investigations, reducing length of stay and improving the quality of care through standardization of processes and reducing variations in practice without reducing the quality of health services. Compliance with CP implementation is important so that positive impacts can be felt. Clinical pathway must be widely implemented, with clinical pathway implementation it is expected that patients will receive services as needed, costs incurred in accordance with the care received and results as expected.

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