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Experiences of using clinical pathways in hospitals: Perspectives of quality improvement personnel

Jee-In Hwang[1] | Ha Jin Tchoe[2] | Soojin Chung[3] | Eunji Park[2] | Miyoung Choi[2]

[1]Kyung Hee University College of Nursing Science, Seoul, South Korea

[2]National Evidence-Based Healthcare Collaborating Agency, Seoul, South Korea

[3]Department of Nursing, Suwon Science College, Hwaseong, South Korea

Correspondence
Miyoung Choi, Division of Healthcare Technology Assessment Research, National Evidence-Based Healthcare Collaborating Agency, 3-5F Neungdong-ro, Gwangjin-gu, Seoul 04933, South Korea.
Emails: myhams95@gmail.com; https://twitter.com/gracecmy/

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Abstract

Aim: This study aimed to explore the experiences of quality improvement personnel in implementing clinical pathways (CPs) in Korean hospitals.

Design: A qualitative study using focus-group interviews was conducted with healthcare professionals in charge of CP development and management in hospitals.

Methods: Sixteen quality improvement personnel from eight tertiary and seven general hospitals were recruited using purposive sampling. The verbatim transcribed data were analysed using qualitative content analysis.

Results: Three key themes emerged: (1) the primary focus of CP development on surgeries through concerted efforts between management and frontline healthcare professionals; (2) CP fidelity management using indicators and feedback to relevant staff or departments; and (3) positive outcomes, despite concerns about system safety. The factors affecting CP use included availability of clinical evidence, flexibility of CPs, top management and clinical leadership, physicians' perceptions of CPs, computerized support systems, and external policies and regulations.

1 | INTRODUCTION

Clinical pathways (CPs) are used to improve care processes and maximize positive patient outcomes through efficient use of healthcare resources in hospitals (Rotter et al., 2012; Vanhaecht et al., 2009). A CP is a structured, multidisciplinary care plan that outlines the essential steps in providing healthcare for a specific patient group within a specified time frame (De Bleser et al., 2006; Lawal et al., 2016). It reflects relevant practice guidelines and requirements stipulated in health policies and regulations and by hospital accreditation bodies.

Various CPs, ranging from acute surgical procedures to chronic diseases, have been introduced in hospital settings (Campbell et al., 1998; Chawla et al., 2016; Dy et al., 2005; Hindle & Yazbeck, 2005; Mohamed et al., 2019; Vanhaecht et al., 2006; Vanhaecht et al., 2009). These CPs are intended to reduce patients' length of stay, readmissions, and costs, and improve clinical outcomes. However, progress in the development, implementation, and evaluation of CPs varies internationally (Hindle & Yazbeck, 2005; Vanhaecht et al., 2006; Vanhaecht et al., 2009).

A systematic review of CP effectiveness showed that, while their use resulted in reduced in-hospital complications and improved documentation compared with usual care, there were no differences in hospital readmission or mortality rates (Rotter et al., 2012). Other studies reported that using CPs in hospitals reduced the length of patient stays, without an increase in adverse events (Foni et al., 2020; Oh et al., 2014; Smith et al., 2014; Tarin et al., 2014). However, some studies found no significant differences in the length of patient stays (Siswanto & Chalidyanto, 2020; van der Kolk et al., 2017; Vanhaecht

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et al., 2016). Ultimately, these inconsistent findings indicate the necessity of conducting additional studies, as the use of CPs in hospitals and its effects may vary depending on contextual factors.

Local contextual factors, healthcare policies, and regulations may facilitate or hinder CP use. Specifically, the successful implementation of CPs is facilitated by clinical and management staff involvement, financial incentives, staff training, and flexible operations (Bai et al., 2019; Evans-Lacko et al., 2010; Rosstad et al., 2015). Barriers to CP implementation include physicians' lack of awareness of CPs, negative attitudes towards standardizing care, reluctance of staff to embrace changes in practice, insufficient information technology, lack of evaluation and feedback mechanisms, and lack of encouragement from external parties (Chawla et al., 2016; Evans-Lacko et al., 2010).

In Korea, there are no standardized CPs tailored to medical diagnoses or conditions at a national level. However, some hospitals have voluntarily implemented CPs to improve their internal care processes and thus achieve high-quality care. Others have developed CPs in response to external authoritative organizations, such as the government and accreditation bodies. As such, the diagnosis-related group (DRG) payment system has been implemented for seven groups across four clinical departments: cataract surgery, tonsillectomy and adenoidectomy, appendectomy, inguinal and femoral hernia surgery, anal surgery, uterine and uterine appendectomy, and caesarean section. Furthermore, the Hospital Accreditation Program (HAP) requires all tertiary and general hospitals in Korea to use CPs (Korea Institute for Healthcare Accreditation, 2018). In this context, the demand for developing CPs in hospitals has increased. Certain clinical departments in Korean hospitals have implemented CPs by linking them with computerized physician order entry (CPOE) or electronic medical record (EMR) systems to improve quality of care (Oh et al., 2014; Park et al., 2016; Sung et al., 2013). However, limited research exists regarding the experiences associated with the development and use of CPs. Understanding the factors affecting the use of CPs is necessary to facilitate its dissemination in clinical practice.

Therefore, this study aimed to explore the experiences associated with implementing CPs in hospitals, and to understand the factors affecting the use of CPs. The research questions were as follows: (1) "What were the experiences of hospitals during the development and use of CPs?" and (2) "What factors affected the implementation of CPs?" To understand how CPs work in hospitals, we considered four components from the European Pathway Association framework: intervention mechanism, fidelity, care context, and outcome (Seys et al., 2019). The findings of this study will provide useful information for the successful development and dissemination of CPs.

2 | METHODS

2.1 | Design

This qualitative study used focus-group interviews (FGIs) and was conducted as part of a large project on the "Development of strategies and dissemination systems for implementing and prioritizing CPs in Korea." We used the consolidated criteria for reporting qualitative research (COREQ) to describe this study (Tong et al., 2007; Appendix A).

2.2 | Ethics

The overall research protocol was approved by the institutional review board of the National Evidence-based Healthcare Collaborating Agency (no. 16–014).

2.3 | Participants

The participants were healthcare professionals who managed CP development and use in hospitals. Participants were recruited using purposive sampling. We contacted experts from the Korean Society for Quality in Health Care who had provided education regarding CPs or had experience in CP research as key informants on CP implementation. We explained the purpose and methods of this study. Sixteen healthcare professionals (eight from tertiary hospitals and eight from general hospitals) were recruited via telephone or email. Each focus group comprised eight participants. There was no dropout. This sample size was considered adequate for FGIs (Krueger & Casey, 2009).

2.4 | Data collection

Two FGIs were conducted in May 2016. Both were held in a private conference room with a one-way mirror. A moderator (JH), facilitator (MC), and eight participants were seated at a round table in the conference room. Other researchers observed the FGIs from the other side of the one-way mirror. Before the FGIs commenced, informed consent was obtained from the participants. A semi-structured interview consisting of open-ended questions was conducted (Krueger & Casey, 2009). The questions included the following: "What types of CPs have been developed?," "How did your hospital develop CPs?," "How did your hospital manage the CPs that were developed?," and "What were the outcomes of the CP use?" These questions reflect the CP mechanism, fidelity, context, and outcome (Seys et al., 2019). An additional question was: "What factors facilitated or hindered CP use?" Our research team reviewed the interview guide and pilot-tested it prior to conducting the FGIs.

The moderator and facilitator both had experience in qualitative research. The moderator also had expertise in quality improvement and patient safety. All information was recorded using audio and video formats. The moderator and facilitator wrote field notes. Each FGI lasted approximately 2 hr. Digitally recorded material was transcribed verbatim. Data saturation was assessed by examining whether conceptually similar content emerged from the interviews, without adding new information. At the end of the interviews, we summarized and confirmed the discussion. The transcripts were not returned to the participants for comments or corrections.

2.5 | Data analysis

Qualitative data were analysed using conventional content analysis (Hsieh & Shannon, 2005). This process involved securing meaningful statements and using open coding, categorizing, and theme derivation. To understand the meaningfulness of participants' responses and obtain a sense of the whole, we read all the data repeatedly, extracted the meaningful units, and coded them with labels. The codes were categorized based on their relationships with other codes. Finally, the categories were grouped into higher-order main categories based on their relationships with subcategories. The initial coding was performed by two researchers (JH and SC). The resulting codes were reviewed for consistency and categorized. Themes were arranged by confirming the relationships between the categories during our research team meetings.

2.6 | Validity and reliability

To ensure the trustworthiness of this qualitative study, we examined its credibility, conformability, transferability, and dependability (Elo et al., 2014; Sandelowski, 1986). First, we summarized the interview data and confirmed them with the participants after each FGI to ensure that the data accurately represented the information participants provided. The extracted codes, subcategories, and main categories were reviewed and checked during our research team meetings. The analysis was performed by two researchers to ensure the conformability of our interpretation of the data. In the case of disagreement, researchers reached a consensus by reviewing the original data. To ensure transferability of the study findings to different contexts, we reported the participants' characteristics. To ensure the dependability of the data, an external researcher – who is a content expert in CP development – reviewed our findings, including the decision trail used by our researchers. The statements are quoted in the text, followed by the identification of the focus group (e.g., G1) and the participants (e.g., P2).

3 | RESULTS

3.1 | Participants' general characteristics

Fifteen participants were female, and their average age was 46.9 years (*SD* = 5.9). Their mean number of years was 20.8 years (*SD* 6.9) in clinical practice and 10.0 years (*SD* 5.8) in CP management, respectively. Participants were fifteen nurses and one physician who worked in the quality improvement (n = 14), CP (n = 1), and clinical (n = 1) departments. Their hospitals had a mean of 929.4 beds (*SD* 420.2).

3.2 | Experiences of using CPs

The following three themes emerged from the data. These comprised six categories and 19 subcategories (Table 1).

3.3 | Theme 1: Development of CPs focusing on surgical procedures through concerted efforts between administration and frontline healthcare professionals

Participants' experiences of CP development were sorted into two categories: the selection of target diseases for CP development, and the development process of CPs. The target diseases for CP development focused on DRG-related and surgical CP. The number of CPs varied widely across hospitals, ranging from 3 to 180. Most participants mentioned having CPs for all seven diseases in the DRG system. Some hospitals also had CPs for other surgical procedures. The target diseases for CP development in internal medicine were selected when a standardized treatment for a specific disease existed.

> "In addition to the DRG CPs, we have developed approximately 3 non-DRG CPs that are being applied to clinical practice, … (which are) cholecystectomy laps; and in the urology department, transrectal ultrasound-guided prostate biopsy."
>
> (G1, P5)

The CPs were developed through top management initiatives and frontline healthcare professionals' involvement. CP development was initiated either as a voluntary quality improvement (QI) activity in hospitals, or as a response to external demands, such as the DRG system and the HAP. The most frequently mentioned initiators were the hospitals' top management, such as presidents and chief executive officers. In some hospitals, the shortage of medical residents, as well as positive experiences of using CPs, were the main motivators for CP development. The developers were primarily physicians and nurses in the related departments.

Hospitals had supporting systems for developing and disseminating CPs. The QI department played a coordinating role; otherwise, an independent committee oversaw this task. In some hospitals, funding was provided to the development teams. In addition, because it was difficult to apply CPs without a computerized system in place, a computer program for CPs was developed. During CP development, relevant departments including the insurance review team, pharmacy, and infectious disease section of the internal medicine departments, followed established procedures to review and approve each CP.

Some hospitals had different versions of CP developed for patients and healthcare professionals. CPs for patients usually included informative educational leaflets, and nurses were responsible for the development of these materials.

> "It is sent to the relevant departments, including the insurance review team, the infectious disease section of the internal medicine department related to antibiotic use, the pharmacy department, etc.; and if they approve it, then the development is finalized. The developer ensures the content is consistent and

TABLE 1 List of themes, categories, and codes of experiences of using clinical pathways in hospitals

Theme	Category	Subcategory	Code
Mechanism of CP development: Focusing on surgical procedures through concerted efforts between administration and frontline healthcare professionals	Target diseases: focusing on surgical procedures and 7 diseases in diagnosis-related group system	DRG group	Cataract surgery, tonsillectomy and adenoidectomy, appendectomy, inguinal and femoral hernia surgery, anal surgery, uterine and uterine appendectomy, caesarean section
		Invasive procedures/surgeries/internal medicine	Laparoscopic cholecystectomy, TRUS guided prostate biopsy, breast conservation surgery, thyroid surgery, hip and knee replacement surgery, stomach surgery, colectomy, strabismus, procedures in internal medicine
	Development process: Concerted efforts	Initiation	Top management, external demands (DRG system, HAP), shortage of medical residents, QI activities, physician's positive experiences using CPs
		Main developer	Physicians, nurses
		Support systems	Financial support, managerial support by QI department, OCS link, EMR link
		Review by relevant departments	Insurance review team, infectious disease section of the internal medicine department, pharmacy department
		CP format	Different versions of CPs for healthcare professionals and patients, physician order set, handbook, educational leaflet
Management of CP fidelity and context: Decisions regarding the use of CPs by physicians, and operation management using monitoring indicators and feedback	Application of CPs	Time	Physicians can use only one CP any time a patient's condition matched the CP's indication.
		Decision maker	Physicians
	Management activities	Management authority	QI department, CP manager
		Monitoring and feedback	Regular monitoring schedule (quarterly or monthly). Indicators: use rate, completion rate, interruption rate, reason for early termination, length of stay, reasons for interrupting CPs, prescription compliance, patient satisfaction, user satisfaction, complications
		CP master management	Master programs for CPs Revision, deletion, re-evaluation
		Education	CP workshops Educational programs for resident physicians
		Utilization of results	Physician or clinical department performance appraisal
Outcomes of CP uses: Positive outcomes, despite concerns about system safety	Positive impacts	Efficiency	Efficient use of beds, shorter length of stay
		Standardization	Timely application of the physicians' orders
		Predictability	Patients' trajectories in the hospitals, including medical costs
		Patient safety	Eliminating or reducing redundant prescriptions, omissions of prescriptions, and errors in drug dosage Filling prescription orders on time
	Concerns about system safety	Risk to patient safety	Medication error due to stock shortage in the automated prescription system

Abbreviations: CP, clinical pathway; CPOE, computerized physician order entry; DRG, diagnosis-related group; EMR, electronic medical record; HAP, Hospital Accreditation Program; QI, quality improvement; TRUS, transrectal ultrasound.

> complete … That is what comes to us as a map. If the approval key is pressed, it is converted into a form for use in the field."
>
> (G1, P2)

3.4 | Theme 2: Decisions regarding the use of CPs by physicians and operation management using monitoring indicators and feedback

Participants' experiences regarding the operation management of CPs were sorted into two categories: using CPs through physicians' decisions, and managing CP operations using monitoring indicators and feedback. Physicians were the decision-makers in the use of CPs; they decided when to enrol patients or drop them out of CPs due to complications. Enrollment time depended on the physician's clinical judgement. Physicians could use a CP whenever a patient's condition matched the CP indication. However, it was impossible for patients to use two CPs simultaneously. All participants explained that the opinion or approval of the patient was not considered when using CP.

> "If the doctor has criteria for whether this patient should be included, then he/she will make a decision based on it. The doctor makes all the decisions related to complications or whether to drop patients for various reasons."
>
> (G1, P6)

CPs were managed using monitoring indicators and feedback. Most hospitals have designated full-time staff or specific departments to manage and support CP operations. For example, a QI team or relevant clinical department were responsible for CP management. Full-time staff played major roles in managing, reviewing, and revising master CPs.

The participants stated that they had a monitoring and feedback system to assess whether the CPs were used properly. Some hospitals had regular monitoring schedules (quarterly or monthly). Frequently used indicators included the use, completion, and interruption rates of CPs. Others included rates of delayed discharge, length of stay, reasons for interrupting CPs, prescription compliance, patient satisfaction, user satisfaction, complications, and postoperative infections. After these indicators were assessed, feedback was provided to each department for the relevant staff in order to review and address related problems.

CPs were reevaluated through monitoring and feedback. Requests for revisions of CPs from relevant clinical departments were reviewed, and CPs were revised almost immediately. Cases related to antibiotic use were revised after obtaining approval from the relevant departments, such as the infectious disease section of the internal medicine department, insurance review team, and pharmacy department. CPs with the lowest usage rates were discontinued. When a request was made to reuse the discontinued CP, a re-evaluation was conducted, and the CP was re-registered in the master CP. Most hospitals revised their CPs as often as needed, while others revised them at fixed time intervals (annually). In some hospitals, the department overseeing CP provided CP workshops or educational programs for trainee physicians to promote the use of CPs.

In addition, some hospitals utilized CP monitoring results for physician evaluations, such as performance appraisal and management by objectives, and linked them to incentives, such as performance awards. Other hospitals provided incentives and awards to clinical departments, rather than to individual physicians.

> "I analyze it monthly. The content of the analysis includes the enrollment, completion, and interruption rates. Then I analyze the causes of the interruptions… We provide feedback to the department because the people need to know."
>
> (G2, P6)

3.5 | Theme 3: Positive outcomes, despite concerns regarding system safety

The outcomes of CP implementation were positive, including improved efficiency, standardization, predictability, and patient safety. Participants mentioned the efficient use of beds and shorter length of stay as the key advantages of CPs. Care processes using CPs were standardized and managed through timely application of physician orders. The CPs guided patient management, which enabled the prediction of patient trajectories in hospitals, including their medical costs. Participants stated that medical errors, such as redundant prescriptions, omissions of prescriptions, and errors in drug dosage were eliminated or reduced; moreover, prescription orders were filled promptly.

> "It seems to me that it is beneficial to standardize the prescriptions. That way nurses can share information, and from the patients' perspectives… it is good to know the costs of treatment in advance, how many days the patient can expect to be in the hospital, and how much it will cost."
>
> (G2, P1)

However, there were concerns regarding the system safety associated with risks to patient safety, due to the rapid automated processing of preplanned prescriptions. Several participants mentioned the failure to supply certain medicines in CPs. For example, if specific medicines are temporarily out of stock, staff would recommend an alternative to the prescribed medicine. However, when computerized CPs were used, the CP was implemented automatically and rapidly for the patient, regardless of the medicine supply system. In such cases, standardized CPs could pose risks to patient safety. Thus, the CP staff directly informed the relevant clinical department by telephone and had to revise the computerized systems to address the medication problem.

> "Because the clinical environment is constantly changing, the (computerized CP) system can be more dangerous; for example, if a drug is out of stock, the solution is to suggest an alternative medicine and have the physician simply change the order. However, in actual clinical practice, this does not work. Real practice is very challenging and busy, and because the practice is already standardized using CPs … In this case, it can become more dangerous because it is standardized."
>
> (G1, P2)

3.6 | Factors affecting the use of CPs

Factors affecting CP utilization in hospitals were categorized as facilitating factors and barriers (Table 2).

3.7 | Facilitating factors

The participants pointed out that the availability of clinical evidence was the salient factor in developing CPs. They noted that CPs should be developed using evidence-based guidelines; however, it was difficult to find evidence regarding specific CPs. Information from textbooks was sometimes used as evidence for CP development. The participants proposed that expert groups or relevant academic societies should actively develop clinical practice guidelines.

Implementing flexible CPs was a positive factor in promoting CP use. One participant stated that her hospital had flexible CPs that were adaptable to individual patient conditions; thus, fewer patients were dropped out of the CPs. Various CPs were developed by branching out from a generic CP to generate a different care plan.

Hospital leadership, which comprised the president, chief executive officer, and clinical directors, was the key facilitator in the development and use of CPs. Strong encouragement from the directors of clinical departments was also a facilitating factor in CP use.

Moreover, when physicians recognized the necessity of CPs for their patients and were enthusiastic about them, the CPs were rapidly implemented in practice. Physicians' positive experiences of using CPs during their residencies promoted their involvement in developing and using CPs. Furthermore, when the relationships between medical professors and professionals in other specialties were good, the consultation process was easier and the development and implementation of CPs proceeded smoothly.

Participants indicated the necessity of computer systems to support the utilization of CPs. For example, a pop-up window informing physicians of a relevant CP during patient admissions alerted them to the need to use CPs. Furthermore, participants stated that CP systems should be integrated with EMR systems to be user-friendly.

External healthcare policies and regulations, such as the DRG system, Public Hospital Evaluation Program, and HAP, affected the use of CPs. These requirements were linked to mandatory or voluntary evaluations of hospital performance.

> "If they think it is really necessary for the clinical department, then in some cases, it takes <3 weeks. If a medical professor really thinks he needs this CP for the patient's care, things proceed quickly… The executive's willingness and the IT infrastructure are all important, but the most important thing is the needs of the users."
>
> (G2, P2)

3.8 | Barriers to the use of CPs

Participants stated that many clinicians lacked awareness of CPs and its effects on the quality of care. The use of CPs decreased when physicians lacked enthusiasm about their use. One participant stated that the degree of CP use was an indicator of physician performance; however, CP use declined when physicians did not consider them as an important activity.

Negative perceptions of CPs' objectives were frequently mentioned as barriers to CP implementation. Most hospitals had introduced CPs in conjunction with the DRG system; thus, negative perceptions of their primary purpose prevailed (i.e., to maximize profits for hospitals or the national health insurance system through cost reductions in patient care, rather than to benefit patients). Clinicians felt a sense of being controlled through the standardization of medical care. Participants stated that some clinicians expressed concerns regarding the trials to standardize patient care using a simple framework because there were discrepancies between reality and the theory of practice. Moreover, certain medical professors believed that using CPs negatively affected residents' education and training.

The participants indicated that the lower acceptance of CPs by medical residents was a barrier to CP implementation. Residents rotated through various subspecialties in their departments and were sometimes dispatched to different hospitals. Thus, they were not obligated to continue CP use, and they did not use CPs because they lacked knowledge about their use and benefits for patients. Residents were also more familiar with a set of prescription orders in the EMR system and were satisfied with using it; thus, they were reluctant to use a new CP system. One participant stated that differences in physicians' surgical proficiency or expertise hindered the implementation of standardized CPs, even within a single hospital.

The inconvenience and instability of the CP computer systems were also barriers to CP implementation. When hospitals operated stand-alone computerized CP systems separate from EMR systems, the residents needed to repeat their order confirmations in both the CP and existing CPOE systems. Moreover, some participants explained that computerized CP programs did not include a dosage calculation program for medications, which was especially important for paediatric care. This hindered the use of CPs.

TABLE 2 The themes, categories, and codes of factors affecting the use of CPs

Theme	Category	Code
Facilitators	Availability of clinical evidence	Existence of evidence-based CPG, textbooks, CPG provided by expert groups or academic societies
	Flexibility	Branching out from a generic CP, adapting to patient conditions, allowance of an addition or subtraction to length of stay
	Leadership of top management	Hospital's president, chief executive officer, clinical leaders Strong encouragement of directors in clinical departments
	Physician factor	Recognition on necessity of CPs, enthusiasm, past positive experiences of CP use, relationships between medical professors with different specialties
	Computer system Support	User-friendly layout, pop-ups showing CP eligible patients, integration into EMR system
	Policies and regulations	DRG payment system, Public Hospital Evaluation Program, HAP, JCI accreditation
Barriers	Lack of awareness	Clinicians' lack of awareness, lack of enthusiasm of CPs, indifference to CP uses
	Negative perceptions	Perception that the primary purpose is to maximize profits for hospitals or government through cost reductions in patient-care, rather than benefit patients; feeling of being controlled; concerns about standardized patient care; perceptions of negative impacts on education of resident physicians
	Physician factor	Residents' preference to existing systems for prescription orders; low acceptance of CP uses; incomplete handoffs among residents in rotation; difficulty of standardization due to differences in individual physicians' surgical proficiency or expertise
	Limitations in CP programs	Lack of integration into EMR systems, instability of CP programs, difficulties of using CP programs, inability to calculate medication doses for paediatric patients
	No financial incentives	Less relevant to small- and medium-sized hospitals with lower bed occupancy rates

Abbreviations: CP, clinical pathway; CPG, clinical practice guideline; DRG, diagnosis-related group; EMR, electronic medical record; HAP, Hospital Accreditation Program; JCI, Joint Commission International.

Participants indicated that using CPs was beneficial in tertiary hospitals with long waiting lists for admission; however, there was no financial advantage in small- and medium-sized hospitals with low bed occupancy rates. Executives in smaller hospitals lacked the intention to use CPs. Moreover, due to differences in care environments, CPs developed for larger hospitals were not applicable to clinical practice in smaller hospitals.

> "When the costs and efficiency of DRGs were emphasized to physicians, there was reluctance because they thought the management made them use CPs for those purposes … So, now when we are developing other CPs besides DRG-related CPs, we cannot avoid focusing on efficiency and costs. So, it is challenging to change such perceptions."
>
> (G2, P7)

4 | DISCUSSION

CPs have been adopted in clinical practice with the goal of improving care processes and quality. This is the first study to explore the experiences of using CPs in Korean hospitals. This study found that CPs focusing on surgeries were implemented through concerted efforts between the hospital administration and frontline healthcare professionals. To promote CP use, hospitals arranged staffing for CP management, monitored CP utilization, and linked CP use to performance evaluations and reward systems. The use of CPs resulted in positive outcomes, despite concerns about potential risks to patient safety as a tradeoff for the convenience and rapidity of computerized CPs.

The primary target area of CP development pertained to surgical procedures, which differed from cases in other countries that included medical and surgical conditions and procedures (Campbell et al., 1998; Chawla et al., 2016; Vanhaecht et al., 2009). This may be because care processes for surgical procedures are easier to standardize, or because they are identified as high priority for reducing variations through multidisciplinary collaboration and teamwork to provide efficient and reliable care. Moreover, during the CP development phase, collaborative efforts between the management and frontline healthcare professionals may encourage CP implementation. None of the hospitals involved patients in developing CPs or in making decisions about their use, even though patients were key stakeholders. This may contribute to variations in compliance with CPs. Involving patients in developing and using CPs should be encouraged to improve patient-centered care and to achieve better patient outcomes.

Hospitals used various methods for CP fidelity management. Hospitals structured their departments or staff to support CP development and management. They monitored adherence to CPs using indicators and provided feedback for improvement. Physicians were decision-makers for applying a CP to a patient. Thus, it may reflect that physicians in Korean hospitals have professional authority over clinical decision-making that can override management

authority (Ham, 2003). This may also indicate physician accountability in patient care. Power involves the ownership and control of various healthcare resources (Okpala, 2021). As CPs represent multidisciplinary care, it is vital for team effectiveness that members collaborate and share relevant information. Therefore, team members should participate in CP-related decision making (Okpala, 2021; Saxena et al., 2019). Additionally, CP use was linked to incentives for individual physicians or clinical departments as part of their performance evaluations. These practices and care contexts encourage the use of CPs by increasing the relative advantages, trialability, and observability of CP adoption, which is essential for its diffusion (Rogers, 2010).

Following CP implementation, hospitals experienced increased efficiency in their care processes. This may result from eliminating unnecessary delays in patient care decision-making and reducing the time spent on inter-departmental coordination. This supports the findings of previous studies in which the use of CPs in surgical procedures led to reduced hospital stays (Oh et al., 2014; Smith et al., 2014; Tarin et al., 2014). Interestingly, given the shortage of medical residents, the implementation of automated order generation through a computerized CP system improved the timeliness of patient care provision. However, hospitals did not use team indicators for CP management or evaluation (Vanhaecht & Sermeus, 2003).

Meanwhile, the automatic generation of standardized prescription orders by a computerized CP system resulted in risks to patient safety in unplanned situations. This finding may be linked to the concern that EMR systems can increase the risk of medical errors (Palabindala et al., 2016). In the present study, when a medicine was temporarily and unexpectedly unavailable, efforts were required to contact the medical staff to determine suitable alternatives. Therefore, such problems should be addressed to create safer infrastructure for the use of CPs.

Furthermore, we found several facilitators and barriers to CP use. Most CPs used in hospitals were based on current practices or the consensus of the medical staff. Participants highlighted the importance of clinical evidence as a core component of CP development. This finding indicates that there is a need to actively translate clinical practice guidelines into CPs (Chawla et al., 2016; Vanhaecht et al., 2009).

Flexible CPs that are adaptable to dynamic patient conditions were preferred, and those with various sub-pathways, depending on predefined patient conditions and outcomes, were useful in promoting CP implementation. Flexible CPs can also contribute to addressing concerns about reducing physicians' autonomy in using medical judgements and eliminating negative perceptions of the standardization of care in favour of financial benefits for management without considering patients' characteristics. Thus, the flexibility of a CP must be considered regarding the process for which the CP is designed, implemented, and evaluated.

Clinical leadership and physicians' perceptions of CPs were also important in promoting their implementation. This is consistent with the findings of previous studies (Chawla et al., 2016; Evans-Lacko et al., 2010). It highlights the importance of improving physicians' awareness of CPs, since physicians are the primary users.

Another important factor in promoting CP use was the computerized CP system being integrated with the hospital's EMR systems. Several hospitals have reported improved clinical suitability and timeliness after computerization of CPs. Additionally, ongoing revisions of CPs must be supported to reflect the highly dynamic clinical context, as well as emerging evidence.

External healthcare policies and regulations have contributed to the implementation of CPs. This finding implies that accreditation standards for CPs play an important role in developing and maintaining high-quality integrated CPs across healthcare delivery systems beyond individual hospitals. Tertiary hospitals developed more advanced CPs than other hospitals. They regarded their CPs as intellectual property, as they invested considerable time and effort to produce high-quality CPs. However, smaller hospitals did not have any incentive to adopt CPs. Even when smaller hospitals decided to initiate CP use, they found it difficult to dedicate a department or staff to CP development. This finding indicates the need for support in the development of CPs. For example, a web-based system for sharing CPs at the national level can facilitate their use in a wider range of hospitals (Chawla et al., 2016).

This study had several limitations. First, the participants were healthcare professionals with managerial positions in acute-care general hospitals. Therefore, the generalizability of our results is limited. Second, all the CPs in this study were applied to patient care within hospitals. Hospitals did not have integrated CPs, including community resources or primary care referrals outside the hospital (Campbell et al., 1998). Third, we explored the outcomes after CP implementation using only interviews. Therefore, we suggest future studies regarding various healthcare professionals' experiences of using CPs with multiple data based on a multifaceted framework that includes clinical, service, and team components (Vanhaecht & Sermeus, 2003).

5 | CONCLUSION

Hospitals experienced positive outcomes following CP implementation. The findings of this study support the importance of evidence, facilitation, recipients (i.e., people involved in CP implementation), and context for the successful implementation of CPs (Harvey & Kitson, 2015; Kitson et al., 2008). Specifically, finding evidence-based key interventions and translating them into CPs is crucial for CP implementation through collaborative efforts between management and healthcare professionals. The role of facilitation departments or staff is critical to support CP development, implementation, and evaluation in busy care environments. Healthcare professionals' awareness and perceptions of CPs should be improved by such efforts as providing education and sharing the outcomes of CP use. The importance of care contexts, such as leadership, multidisciplinary collaboration, teamwork, and computerized support systems is also highlighted for effective CP

use. These findings provide a better understanding of the factors that promote CP implementation.

AUTHORS CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria [recommended bythe ICMJE (http://www.icmje.org/recommendations/)]:

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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ETHICAL APPROVAL

This study was approved by the Institutional Review Board at National Evidence-based Healthcarecollaborating with the number: NECAIRB 16-014. All participants received explanation of study process and signed to informed consent before the study. Data was confidentially kept and anonymously managed according to the Personal Information Protection Act of Korea.

CONFLICT OF INTEREST

All authors have no conflict of interest.

DATA AVAILABILITY STATEMENT

Data available on request due to privacy/ethical restrictions

ORCID

Soojin Chung https://orcid.org/0000-0002-4066-8377
Miyoung Choi https://orcid.org/0000-0002-2424-9965

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APPENDIX A

Consolidated criteria for reporting qualitative research (COREQ) Checklist

	Item	Guide questions/description	Reported on page no.
Domain 1: Research team and reflexivity			
Personal characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	4
2.	Credentials	What were the researcher's credentials? e.g. PhD, MD	Title page
3.	Occupation	What was their occupation at the time of the study?	Title page
4.	Gender	Was the researcher male or female?	All female
5.	Experience and training	What experience or training did the researcher have?	4
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	3–4
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	4
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	4
Domain 2: study design			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	4
Participant selection			
10.	Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	4
11.	Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	4
12.	Sample size	How many participants were in the study?	4
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	4
Setting			
14.	Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	4
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	4
16.	Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	5
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	4
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	No
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	4
20.	Field notes	Were field notes made during and/or after the interview or focus group?	4
21.	Duration	What was the duration of the interviews or focus group?	4
22.	Data saturation	Was data saturation discussed?	4
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No

	Item	Guide questions/description	Reported on page no.
Domain 3: analysis and findings			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	5
25.	Description of the coding tree	Did authors provide a description of the coding tree?	Table 1, Table 2
26.	Derivation of themes	Were themes identified in advance or derived from the data?	5
27.	Software	What software, if applicable, was used to manage the data?	N/A
28.	Participant checking	Did participants provide feedback on the findings?	No
Reporting			
29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. participant number	6–11
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	6–11
31.	Clarity of major themes	Were major themes clearly presented in the findings?	6–11
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	6–14

Note: Developed from: (Tong et al., 2007).