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Original Article

## Clinical reasoning in traditional medicine exemplified by the clinical encounter of Korean medicine: a narrative review

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## ABSTRACT

**Background:** Clinical reasoning is generally defined to be a way of thinking for diagnostic or therapeutic decision making in clinical practice. Different cognitive models have been proposed for the clinical reasoning which takes place during the clinical encounter with a patient. This may have similarities with similar approaches used in Traditional Korean Medicine (TKM). *Jinchal*, the clinical encounter, has specific features in TKM and different *Jinchal* processes are closely related to several underlying cognitive models in clinical reasoning. It is a necessary process to see the patient, but in TKM, the method has a characteristic aspect and emphasis is placed on importance.

**Methods:** Experts consensus were reached through panel discussion. Narrative description on the concept of clinical reasoning and explanation on *Jinchal* process in TKM were suggested.

**Results:** This article analyses the *Jinchal* process using theoretical concepts from four authentic KM schools of clinical reasoning which are currently used in contemporary practice.

**Conclusion:** Future research should focus on the similarities and differences in understanding clinical reasoning in KM as well as the broader field of traditional East Asian Medicine.

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## 1. Introduction

Clinical reasoning is an important aspect of clinical practice and underlies all medical and therapeutic practices.<sup>1</sup> It has been defined as “a context-dependent way of thinking and decision making in professional practice to guide practice actions”.<sup>2</sup> The process requires a robust knowledge base, the ability to think critically and reason reflectively, and a sense of metacognition (reflective self-awareness). The current healthcare setting is complex, and the disease conditions presented to clinicians are often ill-structured,

ambiguous, and frequently incomplete. Additionally, decision making may change over time as new information emerges and conditions change. In stark contrast to the development of clinical reasoning models has been the recent development of clinical practice guidelines.<sup>3</sup> While clinical reasoning acknowledges the individually developed cognitive models that underlie the reality of clinical practice, clinical practice guidelines are aligned with the perspective that a prescriptive and managed approach based on research evidence should take precedence. In reality, a measured balance between these two approaches warrants consideration. This article will outline some of the current theories about what constitutes clinical reasoning and will use as an example the prac-

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tice of contemporary Korean Medicine (KM) and the concept of *Jinchal*.

## 2. Methods

This article is a narrative review about clinical reasoning in KM. Clinical reasoning is not a familiar concept in traditional medicine, so we tried to introduce basic concept of clinical reasoning using *Jinchal* process in KM as an example case. For better understanding, we suggested several diagnostic schools in KM. The basic concept around clinical reasoning in traditional medicine was adopted from the structure of Farquhar's book, "Knowing Practice".<sup>4</sup> Specific type of clinical reasoning in different diagnostic procedures were defined through the discussion between the authors of this study.

### 2.1. Clinical reasoning in biomedicine and different aspects compared with traditional medicine

Several theories have been proposed that attempt to explain the clinical reasoning in conventional medicine that occurs at the various levels of clinical experience development.<sup>5</sup> One of the first proposals to emerge was that of hypothetico-deductive reasoning (HDR).<sup>6,7</sup> This model involves the generation of multiple clinical hypotheses based on clinical data and knowledge that are tested in an iterative manner. Diagnostic hypotheses are either refuted or confirmed until one or more hypotheses remain. This type of reasoning is commonly used by novice or expert clinicians in a problematic or uncommon situation. An important cognitive process underlying this type of reasoning is "chunking" whereby successive exposure to individual "bits of knowledge" are integrated into a larger cognitive network allowing increasingly larger amounts of knowledge to be utilized in a more efficient manner during the reasoning process. The chunking process reduces the demand on the working memory, which has limited ability, to process many pieces of unrelated and disparate data.<sup>8</sup> Until the clinician has chunked (networked individual aspects of knowledge) vast amounts of clinical data in a meaningful way, the HDR process tends to be slow and detailed and requires considerable effort by the clinician. Fig. 1 shows an example of how HDR may be considered when diagnosing a case of the common cold. Notably, at all times during the initial formation of the hypothesis and the iterative confirmation and refutation process that occurs with feedback and forward cycles, the physician is continuously utilizing their knowledge base in both an inductive (arising from the initial data collection and the generation of hypotheses) and a deductive (using a type of reasoning that leads to a conclusion) clinical reasoning manner. As subsequently described, KM also utilizes such HDR processes in a contextual and identifiable manner.

The second clinical reasoning process is often termed pattern recognition. This type of clinical reasoning usually emerges from experienced clinicians in non-problematic clinical situations<sup>9</sup> and appears intuitive, whereby clinical information is rapidly retrieved from a well-structured cognitive knowledge base. A new clinical case is quickly categorized according to signs, symptoms, outcomes, treatment, and context and compared to previous cases. The closer the fit and similarities to the previous case, the more rapid and efficient the process appears.<sup>10</sup> As subsequently proposed, the Decoction-Pattern matching method used in KM is an example of this approach.

The third approach uses a systematic review of the body systems and is termed systematic scanning. It involves identifying the central features of a clinical situation and is considered the initial phase of the clinical reasoning process. Information is collected using an established protocol that attempts to survey all aspects of a clinical encounter. One of the best examples comes from Traditional

Chinese Medicine (TCM). The traditional 10 questions were first formulated by Zhang Jingyue in the Ming Dynasty (1368–1644), known as the Ten Rhythmical Questions: "First, ask hot and cold, second ask sweat, third ask head and body, fourth ask stools and urine, fifth ask food and drink, sixth ask chest, seventh ask hearing, eighth ask thirst, ninth ask old diseases, tenth ask cause. When taking medicinals, what changes appear? (For) women inquire particularly about the time of menses, (whether they are) slow, fast, blocked or flooding. For children, add experience with measles and chicken pox".<sup>11</sup>

Recently, a new perspective on clinical reasoning has also been emerging. This interpretation views the clinical reasoning process as interactive and may be characterized as narrative, collaborative, multidisciplinary and ethical in nature. This perspective is best reflected in the emerging patient-centered clinical model whereby clinical encounters and the development of clinical stories are acknowledged as a human construct and as socially and historically situated.<sup>12</sup> The key features of a patient-centered approach include collaboration, a high level of communication, cultural competence, shared decision making, and ethical practice.<sup>2</sup>

Finally, a variety of diverse and sometimes similar models notably exist to represent the clinical reasoning process. Indeed, Norman<sup>5</sup> has suggested that no one single model or representation of clinical reasoning may exist to solve a clinical problem and that the expert clinician utilizes "multidimensional components of knowledge and skill." Furthermore, the clinician must possess procedural adaptability in order to achieve the goal of effective patient care.

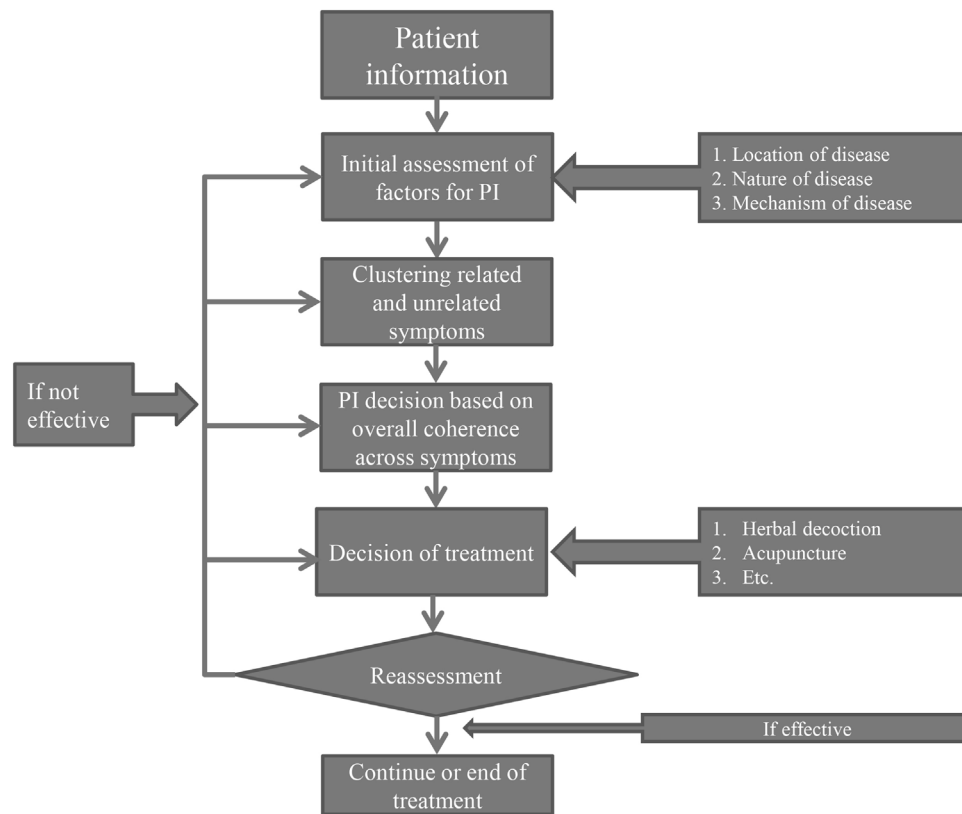
### 2.2. *Jinchal*—the Korean clinical gaze

*Jinchal* is the Korean term for the Chinese *Kanbing*, which in TCM means "examining and investigating disease" or "clinical gaze." It is an important step in understanding specific characteristics of traditional East Asian medicine. *Jinchal* is a necessary process to assess the patient in both western medicine and TKM; however, in TKM, the method has a characteristic focus and emphasis is placed on its importance.

*Jinchal* is a process for inquiring into a patient's condition through a collaborative interaction between the physician and patient. As in TCM, the four examination methods of inspection, listening and smelling, inquiry, and palpation are also the initial steps of *Jinchal*, which are aimed at identifying the most appropriate type of diagnostic pattern that might explain the patient's status and support a clinical decision for the further development of a therapeutic principle and subsequent treatment.

In TCM, physicians analyze a patient's subjective and objective symptoms using the four examination methods based on the existing cognitive frameworks that have been developed from standardized diagnostic guidelines (clinical guidelines) and personal experience gained from training with senior physician mentors or from their own experiential practice. This clinical information is then used to identify diagnostic patterns according to the current clinical diagnostic systems, including Eight Principles Pattern Identification (PI), Disease Cause PI, Visceral PI, Defense, Qi, Nutrient and Blood PI, and Six-Meridian PI, which are the most frequently used PI systems in TCM. Thus, a crucial feature of the clinical encounter in TCM is a series of cognitive procedures to collect patient information and identify patterns.<sup>4,13,14</sup>

KM, one of several East Asian medicines, originated as an indigenous medicine of Korea. Korean Medicine (KM) physicians adopt a PI system of practice similar to that of TCM physicians. However, different diagnostic systems based on the particular historical development and medicine-traditional context, for example the *Dongueuibogam* and *Sasang* constitution diagnostic models, were developed and reflect the unique perspective of KM. The practice



**Fig. 1.** An example of hypothetico-deductive reasoning process when diagnosing common cold in traditional Chinese medicine.

This is an example case of hypothetico-deductive reasoning process which can be observed during the diagnosis of common cold in traditional Chinese medicine.

of using these KM diagnostic systems has resulted in modification of the *Jinchal* process in KM. The *Jinchal* process is an observable phenomenon in medical practice; therefore, cognitive aspects underlying the clinical reasoning may be identified through analysis of the *Jinchal* process. The aim of this review is to describe the *Jinchal* processes of several KM schools that are routinely used by KM physicians in contemporary practice.

### 2.3. The *Jinchal* process and the Pattern Identification system

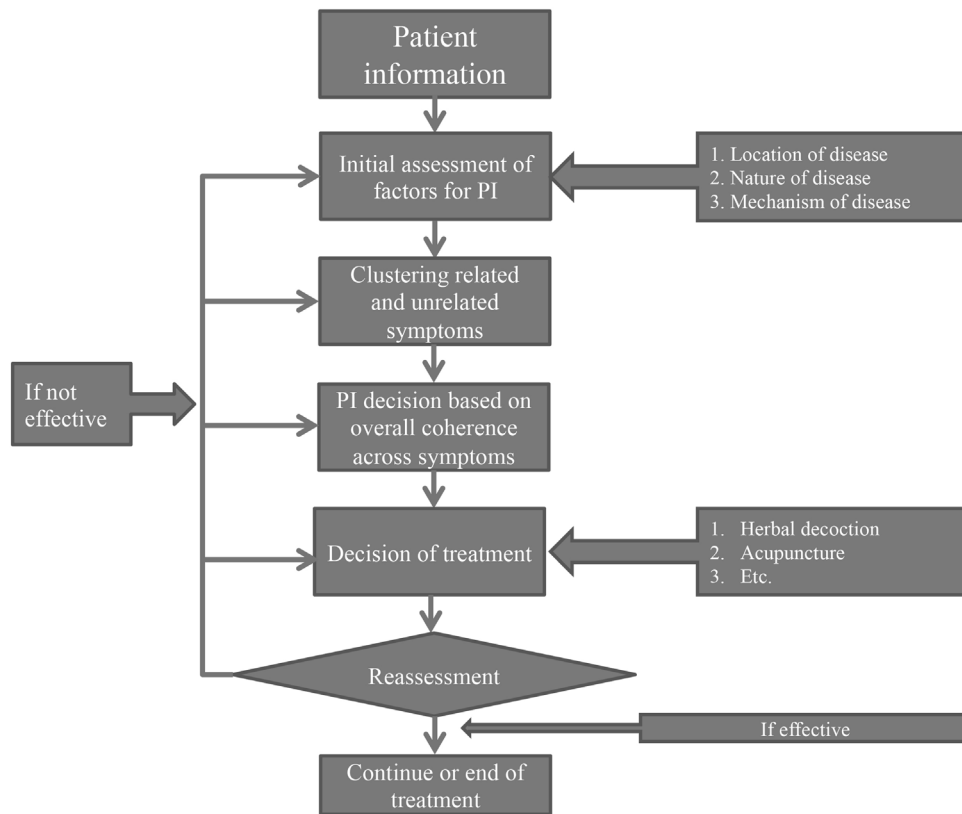
PI is one of the most frequently used diagnostic approaches in TCM and is generally used in many other counties where traditional East Asian medicine is practiced.<sup>15</sup> It resembles the process of HDR. The conceptual basis of PI is that when pathologic factors that originated from the outside (exterior causes) or the inside (interior causes) of the human body affect a healthy person, various signs and symptoms occur, which may be summarized and classified into specific types of symptom clusters or patterns.<sup>15</sup> The purpose of PI may be understood from the TCM statement, “*Bianzheng Lunzhi*,” or “Treatment follows the pattern”, whereby the pattern is principally a means to determine the treatment. PI also has the potential to determine patterns of symptoms that explain the underlying mechanism of the disordered or unhealthy illness state. When selecting the possible symptom clusters or patterns, in *Jinchal*, physicians examine patients interactively and confirm or refute diagnostic possibilities or hypotheses associated with the pattern-specific conditions, of which the patient may not be conscious. During this stage, physicians determine a possible list of patterns in terms of disease location (channels and viscera), nature (three causes), and strength of disease (replete or vacuous), which may collectively explain the patient’s condition when summarized. To generate this list, six to ten classification systems are generally used.<sup>16</sup> After the initial disease patterns and treatment

strategy are confirmed, physicians further consider modifications after analyzing the patient’s response to the several sessions of pattern-specific treatment. Although the chief complaint may not be resolved completely, expected changes in a patient’s condition may indicate a correct PI diagnosis (Fig. 2).

The specific aim of PI in the *Jinchal* process is to identify specific clustering of information gathered from the patient’s responses and through observation of the patient. According to the level of the physician’s experience, the patient’s signs and symptoms are collected systematically without attempting to interpret or deductively prove the initial hypothesized patterns.<sup>17</sup> At this stage, symptoms are sorted based on whether they might be classified into cold or heat, replete or vacuous, exterior or interior, and yin or yang. Robust coherence across the subjective and objective conditions, symptoms, and signs suggests a greater possibility of a clear and definite PI diagnosis. The core of the *Jinchal* process in the PI system is to cluster related and other symptoms around the chief complaint and to identify the most appropriate pattern reflecting the current patient’s condition. Additionally, the definition of patterns is considered an active process, which may result in changes of the PIs during the course of a disease’s history. Various signs, including pulse and tongue body and coat, provide critical information for the determination of PI when the patient’s signs and symptoms do not readily conform to a uniform pattern presentation

### 2.4. The *Jinchal* process and the Decoction-Pattern system

The Decoction-Pattern system is generally used by physicians who follow treatment principles from the classical Chinese medical text, “*Shanghanlun*,” or “Treatise on Cold Diseases”. Physicians who utilize this diagnostic approach are representative of the Japanese *Kohu*, or “Antiquity” school.<sup>15</sup> This system has similar aspects to the diagnostic methods applied in the Japanese system



**Fig. 2.** *Jinchal* process in the Pattern Identification system.

*Jinchal* process in the Pattern Identification system is considered to be the most basic procedure of the diagnosis in Korean Medicine. The circled portion of the figure is the specific point of this clinical reasoning system.

of Kampo medicine, which pursues diagnostic information from abdominal palpation and uses a coupled formula-pattern diagnosis and treatment system. Kampo medicine was introduced to the Korean medical system by physicians who had studied the Japanese medical literature.<sup>18</sup> However, it further evolved, resulting in a specific Korean context. In one of the *Kohu* schools, physicians additionally included palpation of the trapezius muscle, biceps and triceps brachii, and spinal muscles, concurrently retaining abdominal palpation, as diagnostic methods. This development led to new interpretations (and prescriptions) of individual herbs and formulas of the *Shanghanlun*.<sup>19</sup>

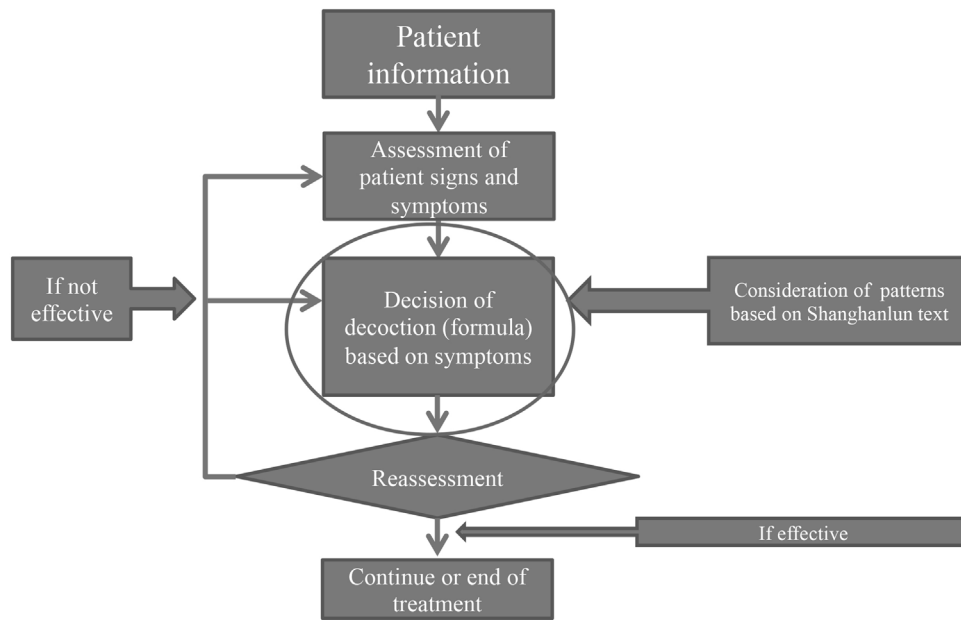
In the Decoction-Pattern system, the *Jinchal* process aims to identify the most appropriate patterns for the patient's presenting condition, which are closely related to a specific herbal decoction (Fig. 3). Compared with other PI systems, the Decoction-Pattern system shows a direct relationship between the featured symptoms and the herbal formulas found in the *Shanghanlun*, without a conceptualized clinical reasoning process.<sup>20</sup> This process is very similar to the clinical reasoning concept of pattern recognition. Therefore, when a patient presents with any chief complaints, the physician, who has a comprehensive knowledge of the pathologic patterns and specific herbal formulas, attempts to identify any validation for whether a decoction might be prescribed based on the *Shang han lun* text. Individual herbs are also considered related to specific symptoms and may thus be added to or subtracted from the formula according to the patient's symptoms. Correspondingly, physicians focus on locating specific symptoms rather than scanning the body systematically through the four examinations in the *Jinchal* process. Because abdominal palpation is particularly accepted as an objective indicator when deciding any Decoction-Pattern system, it has core diagnostic value in this system.<sup>21</sup>

## 2.5. The *Jinchal* process and the Condition-Decoction system

The Condition-Decoction system is the treatment school currently followed by most KM doctors. It is based on the Korean medical classic, the "*Dongeuibogam*," or "Principles and Practice of Eastern Medicine", which was written by Heo Jun in 1610.<sup>22</sup> The UNESCO included the book in the Memory of the Word register in 2009 because of its special value in KM practice, which has withstood the test of time.

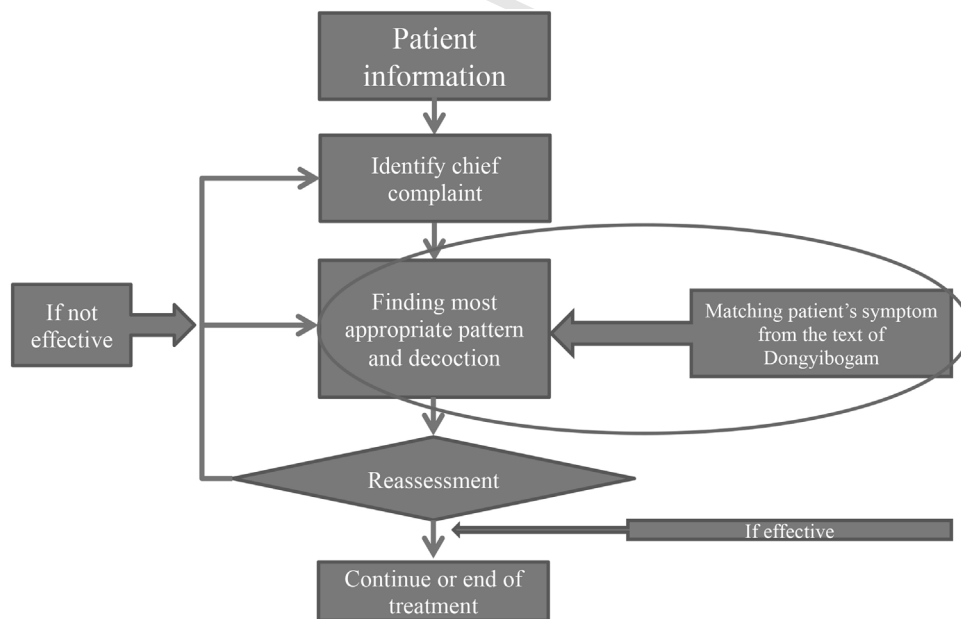
The conceptual value of the Condition-Decoction system is drawn from the text of this historical KM classic. The *Dongeuibogam* consists of five chapters, including *Naegyeong* (inner body), *Oehyeong* (external body), *Japbyeong* (various diseases), *Tang-aek* (herbal medication) and acupuncture. The *Naegyeong* chapter includes four major body constituents, *Jeong* (essence), *Qi* (qi), *Shin* (spirit) and *Hyeol* (blood), along with the five viscera and six bowels. The *Oehyeong* chapter describes the external parts of body from head to foot. In the *Japbyeong* chapter, various diseases and symptoms are assigned. The chapters on *Tang-aek* and acupuncture describe herbal decoction prescriptions and acupuncture. In the *Dongeuibogam*, different patterns are assigned to the relevant body constituents and body parts and are classified according to the representative patient symptoms.

In the Condition-Decoction system, the *Jinchal* process focuses on identifying key symptoms considered easily discerned. When a doctor diagnoses diseases or specific symptoms using the *Dongeuibogam*, appropriate sections (or key points) are listed in the related chapter. These key points are usually important symptoms that reflect the body constituents or parts. Once the key symptom is identified, the most suitable decoction must be selected based on other accompanying symptoms and signs, which are distinguishing



**Fig. 3.** *Jinchal* process in the Decoction-Pattern system.

Specific features of clinical reasoning in Decoction-Pattern system is decided by the decision procedure of decoction based on the Shanghanlun text. The circled portion of the figure is the specific point of this clinical reasoning system.



**Fig. 4.** *Jinchal* process in the Condition-Decoction system.

Specific features of clinical reasoning in Condition-Decoction system is to find most appropriate pattern and decoction based on the patient's chief complaint. The circled portion of the figure is the specific point of this clinical reasoning system.

features of patterns associated with the key symptom. For example, if a patient complains of headache, the physician reviews the “head” section of the *Oehyeong* chapter, identifies the most appropriate patterns based on other symptoms, and subsequently decides on the therapeutic approach (Fig. 4). Compared with the Decoction-Pattern system that requires well-trained experts with profound knowledge of *Shang han lun*, this system is easier for inexperienced practitioners and lay persons to use.

## 2.6. *Jinchal* process and the Sasang constitutional medicine system

For a *Sasang* physician, identifying the specific constitutional type of the patient is the primary step. In the *Sasang* constitutional system, every individual is assumed to have one unique constitution, that is, *Taeyang*, *Taeum*, *Soyang* or *Soeum*, which persists lifelong.<sup>23</sup> According to “*Dongeuiseobowon*,” or “Longevity and

Life Preservation in Oriental Medicine” by Lee Jae-ma, which is the main *Sasang* medicine textbook, each individual has a different physiology and pathology based on their own constitution; therefore, the treatment strategy is additionally determined by their specific type of constitution.<sup>24</sup> Physicians focus on the patient’s constitution in the first clinical encounter and continue to assess whether their initial constitutional decision was correct during successive visits.

A person’s constitution type is determined by several factors. These factors include external appearance, including characteristics of the face, body shape and voice; covert behavior, including temperament and personality type; symptoms in both healthy or diseased states; and response to the constitution-specific treatments.<sup>24</sup> Several current constitutional diagnostic methods were developed based on the principal theory of *Sasang* constitutional medicine. Examples include measuring the circumference of the trunk segments for the evaluation of body shape<sup>25</sup>; using survey or questionnaire measurements, including the Short Form *Sasang* Classification Questionnaire (SF-SSCQ)<sup>26</sup>; and gathering auditory information through voice analysis using recently developed technology.<sup>27</sup> These methods have been updated and revised through the accumulated clinical experiences among the individual expert physicians and schools.

Once the patient’s constitution is identified, the pathological symptoms are analyzed in detail within the boundary of the specific constitution to select the most appropriate treatment strategy. Physicians apply constitution-specific herbal formulas, acupuncture treatment and lifestyle modifications, which aim to address the patient’s hypothesized constitution. At this stage, because the patient’s constitution is not confirmed, the physician prescribes only a few days of treatment to observe the therapeutic response. Generally, experienced physicians may diagnose a constitution more precisely and rapidly than inexperienced practitioners. After several sessions of trial and error, the physician may finally confirm the constitution. Should the patient not show any expected response or adverse events after treatment, the physician might consider other possibilities and address any mistakes in the selection of treatment and in the differentiation of constitution.

*Sasang* medicine reflects specific features during a clinical encounter (Fig. 5). In contrast with the other systems where present symptoms are more critical for the purpose of diagnosis of current patterns, diseases or syndromes, *Sasang* medicine regards consistent factors as more important to determine the patient’s constitution in the clinical practice. This concept may have originated from the specific perception of pathology compared with other traditional Eastern Asian medicine schools which hold the view that diseases occur when external or internal pathogenic factor affect the channel or organ system. In *Sasang* medicine, internal imbalances among organs, which are affected by constitutional factors, are perceived to be the main pathologic factors, and external factors are viewed as additional components of a disease.<sup>28,29</sup> From this perspective, factors such as personality and symptoms in a healthy individual are considered more importantly than changing bio-information such as pulse or tongue features. In the *Sasang* approach, gathering information through inquiry has priority over the other three examinations, including inspection, the listening and smelling examination, and palpation. When evaluating the clinical outcome of the constitution-specific treatments, symptoms related to the constitution, such as sweating, urine and stool status, and digestive function, comprise key information that is as important as the chief complaints. Additionally, the constitution is considered to persist over an individual’s lifetime. If an individual’s constitution is confirmed, the treatment strategy is minimally changed during that person’s life, although herbal formulas might be changed within the constitution-specific drug list.

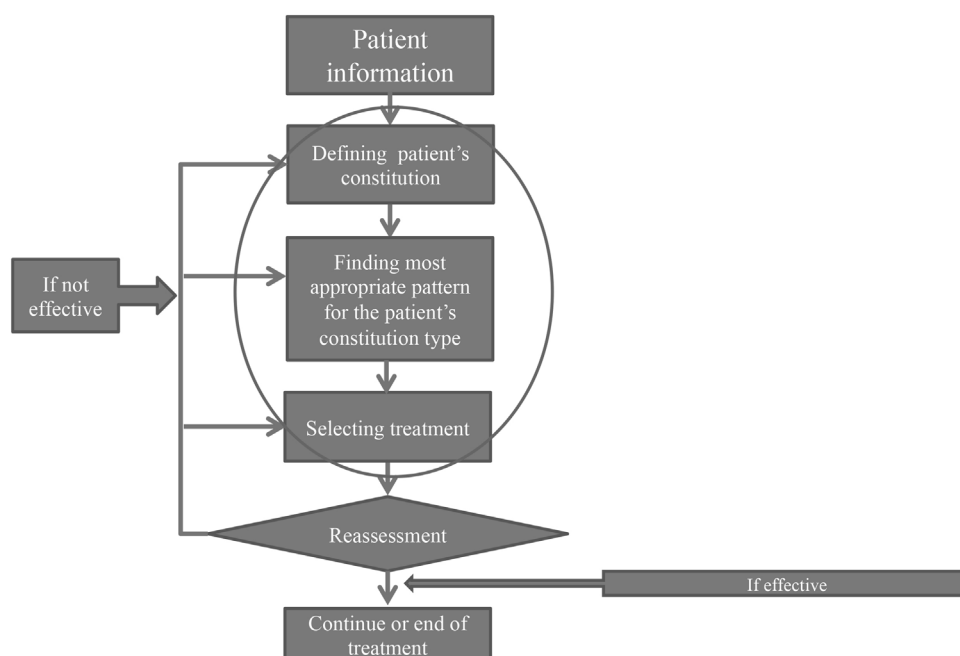
## 2.7. Specific cognitive models of clinical reasoning in different KM schools

*Jinchal* is closely related to the clinical reasoning process. In TCM, three types of cognitive models were generally suggested, including hypothetic-deductive reasoning, systematic scanning, and pattern recognition models, based on their reasoning processes.<sup>30</sup> In KM, although these three models are used interactively in practice, diagnostic schools provide specific cognitive models for clinical reasoning at a novice level. The PI school and *Sasang* constitution school use the HDR strategy; they commonly recognize a gross label for patterns or constitution types early in the diagnosis and refine the diagnosis through deductive reasoning. A discriminating difference between these two systems is whether the diagnostic focus is on the characteristics of the disease or the constitution of the person. In PI, the alignment of symptoms to patterns is important; thus, differentiating symptoms across different competing categories is a key process in *Jinchal*. Consequently, physicians typically actively seek to identify symptoms and physical signs related to a disease-specific pattern during the diagnostic process.<sup>30</sup> However, with *Sasang*, deciding the personal constitution type is the initial stage in *Jinchal*. To identify the individual constitution type, personal characteristics, including external appearance and voice, the physical conditions during healthy and ill states, personality traits, including introversion-extroversion, and responses to certain herbal drugs are closely observed as a whole before investigating the chief complaint or illness.<sup>29</sup> Subsequently, all the patient’s complaints are analyzed within the specific constitutional boundary. Because symptoms are classified by the constitution, constitution-specific signs and symptoms are regarded as more important than the chief complaint.

The Condition-Decoction system and the Decoction-Pattern system mainly adopt a systematic scanning model for clinical reasoning. In these systems, diagnostic information is collected and clinical reasoning occurs following the structure of the medical textbooks without generation of a hypothesis of patterns.<sup>30</sup> Because the patient’s condition is matched directly with the symptoms suggested in the textbooks during the diagnostic process, individual interpretation is not primary during the reasoning process. Furthermore, the Condition-Decoction system is easy to use, even for the inexperienced. When a physician identifies a chief complaint, he or she will then refer to the key symptom in the chapter of *Dongeuibogam* and select the most appropriate patterns and treatments from those provided in that section. The Decoction-Pattern system requires a more comprehensive understanding of the structure of the *Shanghanlun* text because patterns are not classified according to the major categories of symptoms. Therefore, physicians must know the diagnostic patterns comprehensively, or the correct decoction, to confidently select an appropriate treatment. From this perspective, the Decoction-Pattern system may involve the pattern recognition model, which uses implicit knowledge intuitively in the clinical reasoning process.<sup>30</sup> When a patient has complex symptoms, physicians identify the most similar patterns and treatments (decoctions) suggested in the *Shang han lun*, similar to solving a jigsaw puzzle, whereby the physician attempts to fit puzzle pieces (symptoms) into the jigsaw puzzle frame (pattern) (Table 1).

## 2.8. Clinical reasoning research

Several different research methods and approaches have been used to investigate the reasoning processes that clinicians use in practice.<sup>30</sup> These methods may be categorized as either qualitative or quantitative and involve both group and individual analyses. Quantitative methods usually revolve around decision-making approaches that use regression models and Bayesian estimate mod-



**Fig. 5.** *Jinchal* process in the Sasang constitutional medicine system.

Specific features of clinical reasoning in Sasang constitutional medicine system is to define a person's constitution first and clinical reasoning proceeds based on the constitution. The circled portion of the figure is the specific point of this clinical reasoning system.

**Table 1**  
Comparisons between different *Jinchal* processes in different system KM schools.

Type of <i>Jinchal</i> process in Traditional Korean Medicine schools	Rationale	Definition	Major clinical reasoning models
Pattern Identification system	" <i>Bianzheng Lunzhi</i> ", "Treatment follows the pattern"	Identifying a specific clustering of information	Hypothetico- deductive reasoning
Decoction-Pattern system	" <i>Shang han lun</i> ", "Treatise on Cold Diseases"	Matching specific symptoms to corresponding herbal formulas	Systematic scanning and pattern recognition
Condition-Decoction system	" <i>Dongeuibogam</i> ", "Principles and Practice of Eastern Medicine"	Identifying specific herbal formulas listed for related symptoms	Systematic scanning
<i>Sasang</i> constitutional medicine system	" <i>Dongeuisoosebowon</i> ", "Longevity and Life Preservation in Oriental Medicine"	Identifying the specific constitutional type	Hypothetico- deductive reasoning

els as the basis for analysis. These models have often been used as a rational approach to decision making, and critics have argued that decision making is frequently not rationale and that this approach cannot be employed as a guide for action. In contrast, qualitative approaches are based on real life or situations that are very closely related to real life and perceived experiences, for example, verbal reports that utilize "think aloud" protocols and retrospective protocols that use verbal data (verbalized thoughts provided by subjects), which attempt to capture "thick" individualized data rather than the "gross averaged measures of many situations".<sup>30</sup> Recently, an interpretative approach to data collection has been used.<sup>31</sup> Often using situated cognitive methods in a naturalistic environment, such as the clinic or hospital, this approach permits not only the collection of verbal data but also that of the actions and tasks performed, which are captured on video and later analyzed. Research approaches such as these lend themselves easily to TKM clinical situations, which to date have not yet been used.

### 3. Conclusion

This study is an exploratory review on the *Jinchal* processes that have evolved in different TKM schools through the four representative TKM schools reviewed. Each school adopts a specific *Jinchal*

process for practice and several *Jinchal* processes were identified that are currently used by contemporary KM physicians.

The *Jinchal* process allows the physician to have a clearer understanding of diagnostic clinical reasoning among the different schools of KM. Additionally, the study of *Jinchal* provides information on the specific models of reasoning used in various indigenous medicines and will be useful for the further education of KM doctors inexperienced in those medicine systems. This study is expected to represent an important first step in understanding the specific features or modes of cognitive reasoning in the diagnostic aspects of traditional East Asian medical systems.

In the future, qualitative research on the perception of KM practitioners should be undertaken to identify additional key features underlying the clinical reasoning processes of KM. Moreover, cross-cultural and interdisciplinary studies are required to gain a better understanding of the clinical reasoning process in traditional East Asian medicine.

### Author contributions

Conceptualization: THK and CZ. Investigation: THK and CZ. Writing – Original Draft: THK and CZ. Writing – Review & Editing: TA, Z-XB, SB, MB, JL, MSL, NR, and CZ.

## Conflict of interest

The authors declare no conflicts of interest.

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## Ethical statement

There is no data which might be related to the ethical issue.

## Data availability

There is no available data as this work used available literature.

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