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Establishing a critical pathway for Korean medical management of lumbar disc herniation

A modified Delphi consensus process

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Abstract

A modified Delphi method was used to establish a consensus. Stakeholders and experts were invited to participate in the expert panel. Best practice statements and decision-making questionnaires were distributed to the panel. Panel members were asked to mark "Strongly disagree" to "Strongly agree" after a series of statements over several rounds until either a consensus was reached or the decision-making method was deemed unsuitable for reaching a consensus.

The most common cause of lumbar pain is intervertebral degeneration, which leads to degenerative disc disease and lumbar disc herniation. There is a lack of unanimity regarding appropriate patient protocols and rehabilitation expectations for Korean medical care. The long-term viability of Korean medical treatment, further adoption in the institutional setting, and specific patient outcomes are contingent on the existence of appropriate Korean medical programs.

A Korean medical expert panel of 17 practitioners employed a modified Delphi method to achieve consensus on Korean medical care for lumbar disc herniation. The panel first reviewed the literature and guidelines relevant to Korean medical treatment for lumbar disc herniation. The panel members considered questionnaires intended to determine "standardized" Korean medical care recommendations for patients with a wide range of symptoms of lumbar disc herniation. Each panel member participated in a round of voting, which was followed by an opinion-collecting session online. Consensus was defined as a ≥75% agreement among the respondents.

In the first round, 144 questionnaires across 5 domains were administered to the expert panels. After reviewing the responses and open-ended comments collected in the first round, the authors modified the questionnaires to 53 items and proceeded. In round 2, consensus was achieved in all 53 survey questions. The final treatment pathway comprised a standardized and comprehensive care approach for lumbar disc herniations in 4 types of medical institutions.

This study identified a core set of evidence- and consensus-based principles that are essential to a comprehensive model of care, incorporating identification, referral, and management of patients with lumbar disc herniation.

Abbreviations: IRB = Institutional Review Board, N/A = Not applicable, R&D = Research and development, SD = Standard deviation.

Keywords: clinical practice guideline, critical pathway, Delphi, Korean medical management, lumbar disc herniation

1. Introduction

Lumbar disc herniation is a condition that manifests symptoms by pressuring the nerve root or the dura mater with either parts of the nucleus pulposus or the entire nucleus pulposus, which may have herniated from a ruptured fibrous ring due to degenerative changes of the intervertebral disc or damage from injury, vibration, or continuous microstimulation.[1,2]

As conventional medical approaches, which rely on painkillers, steroids, and surgical intervention, have been pushed to the limit, Korean medical therapy has been considered in various clinical domains.[3,4] Additionally, the safety of Korean medical interventions has been verified in several previous studies.[5–7] Hence, in recent years, these procedures have become widely accepted by both patients and providers as safe and effective

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treatment options for lumbar disc herniation in the Republic of Korea.

Although patient selection, various interventions, and long-term clinical outcomes are well accepted, there is less unanimity in Korean medical care for lumbar disc herniation. Korean medical care protocols can vary based on practitioner preference, but the common practices include the use of painkillers, steroid injection, and some form of physical therapy. Although there are similarities between Korean medical practices, there is a paucity of formalized clinical research on Korean medical care for lumbar disc herniation. Therefore, there are very few adequately developed clinical practice guidelines despite their importance in terms of favorable outcomes.

Clinical practice guidelines are a landmark to assist in determining appropriate treatment behaviors in a particular clinical situation. Guidelines are based on clinical studies with clear scientific evidence during the development process. Clinical practice guideline mainly addresses decision-making issues regarding the appropriateness of medical practice and is mainly recommended for treatment direction with rationale.[8,9] Most existing Korean medical care studies have focused on clinical evidence or reimbursement recommendations. However, there is a lack of suggestions for systematic medical care and references to the process of updating them. The most comprehensive guideline for the management of lumbar disc herniation is the official document from the Republic of Korea, the Korean Medical Clinical Practice Guideline for Lumbar Herniated Intervertebral Disc.[10] The guidelines published in 2017 provided 15 recommendations for key interventions in Korean medicine, including acupuncture, moxibustion, herbal decoction, acupoint injection, Chuna manual therapy, thread embedding, and cupping, which together help health professionals to make decisions on clinical sites.

However, to more widely use the clinical practice guidelines, it is necessary to have a clear presented process of key interventions that are to be selected by the medical institution among the various treatment alternatives presented by the guidelines. For this purpose, critical pathways are developed based on clinical practice guidelines, which refer to standardized care processes that have a predetermined order of care and time of treatment for a particular disease. Unlike clinical practice guidelines, critical pathways have a concept of time and focus on presenting point-of-care practices. Although standard clinical guidelines for lumbar disc herniation with regard to Korean medicine updated in 2019[11] are being utilized in the clinical practice, critical pathways focusing on individual hospital environments have not been developed.

The aim of this study was to assess how closely these clinical practice guidelines mimic current practice in the Republic of Korea and better understand their relevance as a resource for Korean medical practitioners. To evaluate the adequacy of recommendations for critical pathway development, a modified Delphi process was used among a group of 17 practitioners; its purpose was to drive consensus regarding Korean medical care for lumbar disc herniation.

2. Methods

2.1. Participants

As part of the association of Korean medicine, which includes an expert panel of 17 Korean medical doctors, a modified Delphi method was used to drive consensus on a positioning statement regarding Korean medical care for lumbar disc herniation. We conducted a study involving clinicians who treat patients with lumbar disc herniation. Medical institutions were largely divided into integrative medical hospitals, Korean medical hospitals, primary Korean medical clinics, health care institutions, and nursing hospitals. Health professionals for Korean medicine were eligible for the study if they were clinically active and were working primarily in Korean medicine in the Republic of Korea.

2.2. Design

An initial draft pathway was developed, guided by the existing literature, including reviews and relevant clinical guidelines. Initial version of pathway was refined after extensive feedback from semi-structured surveys conducted by 17 Korean medical experts. This process identified some uncertainty regarding the key recommendations made by these pathways. The key components fell into the following 5 domains: diagnosis, assessment, Korean medical patternization, treatment, and consulting with conventional medicine.

A multidisciplinary advisory committee developed 144 statements comprising areas of uncertainty for each of the domains (see Tables 2–4). Each statement was framed to elicit an agree or disagree response from the participants, with accompanying free text to encourage survey participants to comment on the underlying reasons for their responses.

Potential participants were invited to participate via an e-mail that provided a link to the password-protected online survey (Google Forms; Online Survey). Participants provided online consent prior to completing the 25-minute survey. In each round of feedback, participants indicated their agreement with each item on a 9-point Likert scale, ranging from strongly disagree to strongly agree.

Participants were also able to provide comments for each individual item. According to a form of a modified Delphi study, we collected the comments attached to each statement, grouped similar opinions, and finally revised the statement through the agreement of the bibliography and 2 independent researchers.

Consensus was defined as a $\geq$75% agreement among the respondents.[12] Participants were asked to re-rate items that failed to reach consensus in light of group responses in subsequent rounds until sufficient feedback had been received. Non-responders were e-mailed up to 3 reminders over 3 weeks for each round.[13]

2.3. Ethics approval

The design of the critical pathway was the last stage of implementation with clinical practice guidelines for lumbar disc herniation in Korean medicine. The study was approved by the Institutional Review Board of Kyung Hee University Hospital, Gangdong (Institutional Review Board number: KHNMCOH 2020-09-002). However, the design of the pathway stage was specifically identified as a service improvement project, and thus, did not require individual ethical approval.

2.4. Data analysis

The results were analyzed in total and per discipline. Descriptive statistics were used to determine the level of consensus. A two-tailed

Kruskal–Wallis exact test ($P < .05$ was considered statistically significant) was used to assess inter-discipline differences for items that failed to reach consensus. Data were analyzed using SPSS Statistics 20 (IBM, Armonk, NY). The content of free text comments for individual items was analyzed to further explore the participant responses. After collecting free text comments and grouping similar opinions, the items deemed necessary to be modified were corrected through discussion, and the value of kappa was calculated.

3. Results

3.1. Results of the Delphi consensus process

Figure 1 presents an overview of the consensus process. A total of 4 items were presented in round 1, and 53 items were presented in round 2. None of the items remained unresolved at the end of round 2. The research team reviewed responses to these items together with qualitative responses. In the diagnosis section of the first round of the survey, 50 of the 51 questions were agreed at a ≥75% agreement rate, 12 of which were corrected by the review of the descriptive comments and 4 were deleted. The 12 questions that were revised by the review of the descriptive comments were reviewed for the consensus rate in the second round, achieving a high consensus rate beyond a certain consensus level. In the assessment section of the first round of the survey, 26 of the 28 questions reached a high consensus level, exceeding a 75% agreement rate, 6 of which were corrected by the review of the descriptive comments and 20 were deleted. The second round of the survey included the 6 questions, achieving a high level of agreement. The questionnaires dealing with Korean medical

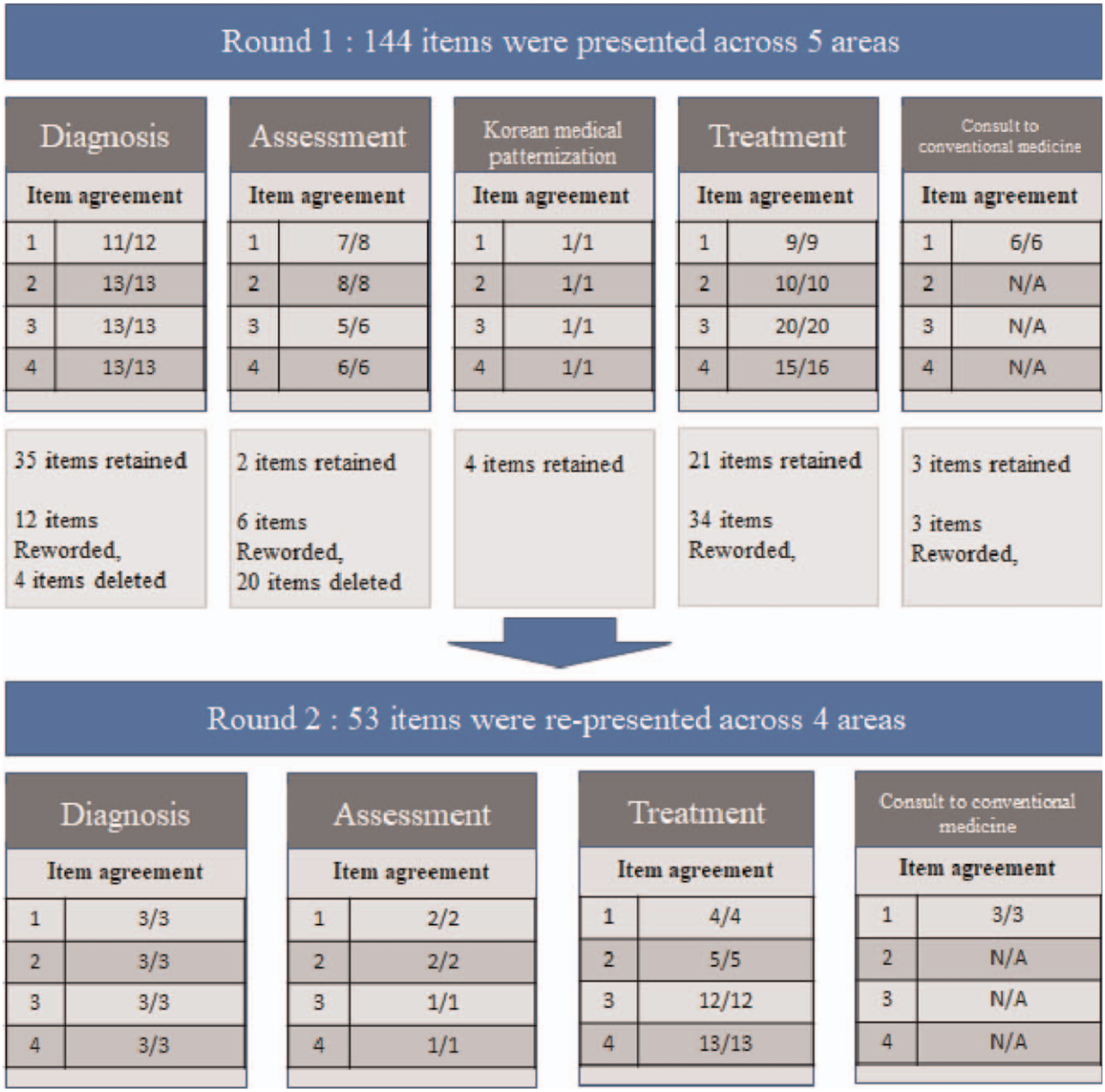

Figure 1. Delphi consensus process.

patternization were not re-surveyed because all items reached the agreed level in the first round. Hence, it was judged that there was no need to determine the agreement level again, although the descriptive opinion was reviewed. In the treatment section, 54 of the 55 questions reached a high consensus level, exceeding a 75% agreement rate, 34 of which were corrected by the review of the descriptive comments. In the second round, a high level of consensus was achieved. In the consulting with conventional medicine section, all 6 questions reached a high consensus level in the first round, but instead of keeping the 3 original items intact, it was necessary to gather descriptive opinions and correct the 3 questions. A high level of agreement was reached after the second round including the 3 revised questions.

3.2. Collecting responses to items specific to 4 different medical institutions

Tables 1 to 4 present individual items grouped by domain and the level of consensus for each item in descending order. Each set of items is discussed below. The questionnaires were delivered differently depending on the nature of each medical institution, and the critical pathways are distributed in Tables 1 to 4.

Table 1

Overall level of consensus for each item presented for integrative medical hospital.

Response category • Individual items	Level of consensus (%)	Median rating*	SD	Consensus round
Diagnosis				
Lumbar disc herniation is diagnosed through a history taking, differential diagnosis, double-checking of diagnosis, and physical examination	94.12	9	1.49	1
Items collected when history has been taken	100	9	0.87	1
When needed, consult further examination or operative approaches	100	9	0.61	1
Red signs of back pain identify fractures, cancer, infections, cauda equinae syndrome, and abdominal aneurysm	88.24	9	1.81	1
Red signs for diagnosis of fractures	88.24	8	1.09	2
Red signs for the diagnosis of cancer	94.12	8	0.93	2
Red signs for the diagnosis of infection	88.24	9	1.85	1
Red signs for the diagnosis of cauda equinae syndrome	100	9	0.71	1
Red signs for the identification of abdominal aneurysms	94.12	8	1.73	1
Diagnosed as an intervertebral disc disease only if it is confirmed through a diagnostic test	94.12	8	1.48	2
A type of physical examination used	94.12	8	1.70	1
Diagnosis if a physical examination shows positiveness without clear evidence of a diagnostic examination	70.59	7	1.67	N/A
Assessment				
The scale used for the severity assessment	88.24	8	2.15	2
Severity of the symptoms is classified by mild, moderate, and severe	94.12	8	1.09	N/A
Severity classification based on imaging assessment	70.59	7	2.34	N/A
Severity classification based on NRS test results	88.24	8	2.09	N/A
Severity classification based on motor/sensitivity test results	88.24	8	1.58	N/A
Severity classification based on ODI test results	88.24	8	1.54	N/A
Criteria for determining the continuation of hospitalization or discharge	94.12	8	0.99	1
Frequency of each examination when hospitalized	88.24	8	2.14	2
Korean medical patternization				
Items on Korean medical patternization	76.47	7	2.01	1
Treatment				
A treatment plan is established for patients diagnosed with lumbar disc herniation through severity assessment and Korean medical patternization	100	9	0.72	2
Length of hospitalization for inpatient treatment	82.35	8	1.66	1
Restriction of patient activity during inpatient treatment	100	8	0.79	2
Korean medical interventions used for inpatient treatment	100	8	0.77	2
Patient education for inpatient treatment	94.12	9	0.87	1
Determination of conversion to outpatient care and the end of treatment	100	8	0.75	1
Korean medical interventions for mild outpatient	100	8	0.83	2
Korean medical interventions for moderate or severe outpatient	88.24	9	2.16	1
Contents of patient education to be delivered to patients during outpatient care	100	9	0.70	1
Consult to conventional medicine				
Necessity of medical cooperation during examination for diagnosis	100	9	0.62	2
Basic examination requests for inpatient treatment	100	8	0.69	2
Follow-up and discharge check-up after basic examination for inpatient treatment	94.12	8	0.83	2
Medical cooperation treatment at the time of hospitalization	100	9	0.79	1
Requesting medical cooperation in case of sudden neurological symptoms during hospitalization	94.12	9	1.06	1
Cooperative medical treatment in the case of a moderate/serious patient's outpatient treatment.	100	9	0.86	1

N/A = not available, SD = standard deviation.

* Ratings were from 1 (strongly disagree) to 9 (strongly agree).

Table 2

Overall level of consensus for each item presented for Korean medical hospital.

Response category • Individual items	Level of consensus (%)	Median rating*	SD	Consensus round
Diagnosis				
Lumbar disc herniation is diagnosed through a history taking, differential diagnosis, double-checking of diagnosis, and physical examination	94.12	9	1.46	1
Items collected when history has been taken	100	9	0.80	1
Transfer to a higher level hospital if red signs of back pain are identified	94.12	8	0.95	2
Red signs of back pain identify fractures, cancer, infections, cauda equinae syndrome, and abdominal aneurysm	88.24	8	1.79	1
Red signs for diagnosis of fractures	94.12	8	1.00	2
Red signs for the diagnosis of cancer	100	8	0.70	2
Red signs for the diagnosis of infection	94.12	9	1.69	1
Red signs for the diagnosis of cauda equinae syndrome	100	9	0.70	1
Red signs for the identification of abdominal aneurysms	94.12	9	1.76	1
Ensuring that the patient has ever had a diagnostic examination	100	9	0.47	1
A type of physical examination used	88.24	9	1.98	1
Diagnosed as an intervertebral disc disease only if it is confirmed through a diagnostic test	100	9	0.71	1
Diagnosis if a physical examination shows positiveness without clear evidence of a diagnostic examination	82.35	8	1.20	N/A
Assessment				
The scale used for the severity assessment	88.24	8	2.15	2
Severity of the symptoms is classified by mild, moderate, and severe	88.24	8	1.13	N/A
Severity classification based on NRS test results	94.12	9	1.73	N/A
Severity classification based on motor/sensitivity test results	94.12	9	1.07	N/A
Severity classification based on ODI test results	94.12	9	1.05	N/A
Severity classification based on imaging assessment	76.47	8	2.25	N/A
Criteria for determining the continuation of hospitalization or discharge	88.24	8	1.61	1
Frequency of each examination when hospitalized	88.24	8	2.24	2
Korean medical patternization				
Items on Korean medical patternization	82.35	8	2.08	1
Treatment				
A treatment plan is established for patients diagnosed with lumbar disc herniation through severity assessment and Korean medical patternization	100	8	0.77	2
Length of hospitalization for inpatient treatment	88.24	8	1.77	1
Initial care for inpatient treatment of severe patients	100	8	0.86	2
Korean medical interventions used for inpatient treatment	100	9	0.90	2
Patient education for inpatient treatment	100	9	0.33	1
Requesting medical cooperation in case of sudden neurological symptoms during hospitalization	100	8	0.77	2
Determination of conversion to outpatient care and the end of treatment	94.12	8	0.90	1
Korean medical interventions for mild outpatient	100	8	0.83	2
Korean medical interventions for moderate or severe outpatient	88.24	9	1.80	1
Contents of patient education to be delivered to patients during outpatient care	100	9	0.59	1

N/A = not available, SD = standard deviation.
* Ratings were from 1 (strongly disagree) to 9 (strongly agree).

In the diagnosis section, topics such as methods of diagnosis, items considered when taking history, red signals, and utilization of imaging and laboratory test results were commonly asked.

In the assessment section, opinions were collected on the types of test items that determine outpatient treatment and the types of test items used for hospitalization. In the case of primary Korean medical clinics or health care institutions, information on the items was excluded.

In the Korean medical patternization section, opinions were collected to determine the key items for patternization in Korean medicine.

In the treatment section, opinions were asked about interventions, education, and activity instructions applied to hospitalized patients and the most appropriate time to finish hospital treatment. In addition, items were excluded from the primary Korean medical clinics or health care institutions in cases where inpatient treatment was unavailable. In addition, this section provided information on interventions, education, and life management that should be considered during outpatient treatment.

Table 1 shows the responses to questions regarding consulting with conventional medicine. The questions in the section included the need for diagnostic tests, items of routine tests to be performed during hospitalization, and details of the medical treatment that must be performed during hospitalization.

3.3. Grouping of collected opinions and revising questions through agreement

Common opinions were collated by the authors, and open-ended comments were collected from the following 3 categories: diagnosis, evaluation, and treatment (Table 5). Of the 72 open comments collected, 62 reported that words or propositions

Table 3

Overall level of consensus for each item presented for primary Korean medical clinic.

Response category • Individual items	Level of consensus (%)	Median rating*	SD	Consensus round
Diagnosis				
Lumbar disc herniation is diagnosed through a history taking, differential diagnosis, double-checking of diagnosis, and physical examination	100	9	0.80	1
Items collected when history has been taken	100	9	0.80	1
Transfer to a higher level hospital if red signs of back pain are identified	100	9	0.33	1
Red signs of back pain identify fractures, cancer, infections, cauda equinae syndrome, and abdominal aneurysm	88.24	9	1.60	1
Red signs for diagnosis of fractures	100	8	0.81	2
Red signs for the diagnosis of cancer	94.12	9	0.80	2
Red signs for the diagnosis of infection	88.24	9	2.01	1
Red signs for the diagnosis of cauda equinae syndrome	94.12	9	0.94	1
Red signs for the identification of abdominal aneurysms	82.35	8	1.90	1
Ensuring that the patient has ever had a diagnostic examination	88.24	9	1.60	1
A type of physical examination used	88.24	9	1.83	1
Diagnosed as an intervertebral disc disease only if it is confirmed through a diagnostic test	94.12	8	0.85	2
Diagnosis if a physical examination shows positiveness without clear evidence of a diagnostic examination	76.47	8	1.46	N/A
Assessment				
The scale used for the severity assessment	82.35	8	2.16	2
Severity of the symptoms is classified by mild, moderate, and severe	100	8	0.90	N/A
Severity classification based on NRS test results	88.24	9	2.02	N/A
Severity classification based on motor/sensitivity test results	94.12	9	1.54	N/A
Severity classification based on ODI test results	88.24	8	1.22	N/A
Severity classification based on imaging assessment	70.59	7	2.24	N/A
Korean medical patternization				
Items on Korean medical patternization	88.24	8	1.94	1
Treatment				
Establishing a treatment plan through severity assessment and Korean medical patternization	100	9	0.80	1
Determination of intensity of Korean medical care in primary Korean medical clinic and the end of treatment	100	8	0.62	2
Patient education used in primary Korean medical clinic	100	9	0.59	1
Direction of treatment for mild patients	94.12	8	0.99	2
Direction of treatment for severe patients	100	9	0.62	1
Recommendations when applying acupuncture treatment alone	94.12	8	0.88	2
Recommendations when applying Chuna manual therapy treatment alone	100	9	0.80	1
Recommendations when applying herbal decoction alone	94.12	9	0.80	2
Recommendations when applying thread embedding treatment alone	100	8	0.97	1
Recommendations for both acupuncture and other treatments	94.12	8	0.93	2
Recommendations for both moxibustion and other treatments	88.24	8	0.95	2
Recommendations for both herbal decoction and other treatments	94.12	8	0.81	2
Recommendations for both acupoint injection and other treatments	100	9	0.87	1
Recommendations for both Chuna manual therapy and other treatments	94.12	8	0.97	2
Recommendations for both thread embedding and other treatments	100	9	0.85	2
Recommendations for both cupping and other treatments	100	8	0.70	2
Selection of locations for acupuncture and thread embedding treatment	100	8	0.75	2
Considerations for deep approach of acupuncture	94.12	8	0.95	2
Selection of locations for moxibustion treatment	94.12	8	1.03	1
Selection of locations acupoint injection treatment	100	9	0.79	1

N/A = not available, SD = standard deviation.
* Ratings were from 1 (strongly disagree) to 9 (strongly agree).

should be modified to convey meaning more accurately in the context. Of the 62 opinions, 48 were reviewed, excluding duplicates, and 2 independent authors revised the context of the questions through agreement ($\kappa = 0.73$). However, 6 of 10 responses, excluding duplicates, reported that the content needs to be modified, not just context corrections. The authors could not reflect the collected responses in the modification of the question without any retrieval. Consequently, the existing literature was reviewed prior to the consensus process, and the comments raised through the agreement were double checked. As a result, the content related to the 6 opinions was reflected in the revised questions through agreement ($\kappa = 0.82$).

4. Discussion

This paper reports on the consensus reached by Korean medical professionals concerning components of a critical pathway for the identification and management of lumbar disc herniation in Korean medical services. Our results confirmed the efficacy of multicenter focused support for screening of lumbar disc

Table 4

Overall level of consensus for each item presented for health care institution.

Response category • Individual items	Level of consensus (%)	Median rating*	SD	Consensus round
Diagnosis				
Lumbar disc herniation is diagnosed through a history taking, differential diagnosis, double-checking of diagnosis, and physical examination	100	9	0.44	1
Items collected when history has been taken	100	9	0.62	1
Transfer to a higher level hospital if red signs of back pain are identified	100	9	0.59	1
Red signs of back pain identify fractures, cancer, infections, cauda equinae syndrome, and abdominal aneurysm	94.12	9	1.47	1
Red signs for diagnosis of fractures	88.24	8	1.12	2
Red signs for the diagnosis of cancer	94.12	8	0.83	2
Red signs for the diagnosis of infection	94.12	9	1.73	1
Red signs for the diagnosis of cauda equinae syndrome	100	9	0.62	1
Red signs for the identification of abdominal aneurysms	94.12	9	1.69	1
Ensuring that the patient has ever had a diagnostic examination	94.12	9	1.01	1
A type of physical examination used	94.12	9	1.98	1
Diagnosed as an intervertebral disc disease only if it is confirmed through a diagnostic test	100	8	0.70	2
Diagnosis if a physical examination shows positiveness without clear evidence of a diagnostic examination	94.12	8	1.14	N/A
Assessment				
The scale used for the severity assessment	88.24	8	2.14	2
Severity of the symptoms is classified by mild, moderate, and severe	100	9	0.79	N/A
Severity classification based on NRS test results	94.12	9	1.98	N/A
Severity classification based on motor/sensitivity test results	100	9	0.80	N/A
Severity classification based on ODI test results	100	9	0.86	N/A
Severity classification based on imaging assessment	82.35	8	2.28	N/A
Korean medical patternization				
Items on Korean medical patternization	88.24	8	1.97	1
Treatment				
Establishing a treatment plan through severity assessment and Korean medical patternization	100	9	0.93	1
Determination of intensity of Korean medical care in public healthcare institution and the end of treatment	100	9	0.80	1
Patient education used in public healthcare institution	100	9	0.71	1
Direction of treatment for mild patients	94.12	8	1.12	2
Direction of treatment for severe patients	100	9	0.72	2
Recommendations when applying acupuncture treatment alone	100	8	0.83	2
Recommendations when applying herbal decoction alone	100	8	0.77	2
Recommendations when applying Chuna manual therapy alone	100	9	0.87	1
Recommendations for both acupuncture and other treatments	100	8	0.73	2
Recommendations for both cupping and other treatments	94.12	8	0.77	2
Recommendations for both herbal decoction and other treatments	100	8	0.73	2
Recommendations for both moxibustion and other treatments	100	8	0.51	2
Recommendations for both Chuna manual therapy and other treatments	100	9	0.71	2
Selection of locations for acupuncture treatment	100	8	0.62	2
Considerations for deep approach of acupuncture	100	8	0.81	2
Selection of locations for moxibustion treatment	94.12	8	0.90	1

N/A = not available, SD = standard deviation.

* Ratings were from 1 (strongly disagree) to 9 (strongly agree).

herniation in Korean medical care and that of an integrative medical model for treatment and review.

Consistent with previous literature,[14–16] participants agreed that key members of each treatment team need to tailor the pathways for their clinical setting, according to available resources, expertise, and patient needs.

Customized items to establish a critical pathway specific to each medical institution are key aspects of the present study. Critical pathways comprising consensus made in present study reflect the characteristics of each institution. The differences and characteristics of each medical institution are as follows: integrative medical hospitals refer to the form in which Korean medicine and conventional medicine communicate with each other within an institution for better decision making. In integrative medical hospitals, hospitalization and outpatient treatment are possible.[17] Korean medical hospitals only provide Korean medical services, but both outpatient and inpatient treatments are possible.[18] Primary Korean medical clinics offer only Korean medical services, and inpatient treatment is either not possible or only possible on a small scale. Outpatient treatment is also available in primary Korean medical clinics.[19] Health care institutions are established to enhance access to health care in the public sector. These institutions can provide both Korean medical and conventional care, but hospitalization is unavailable in most health care institutions.[20]

As the questions are organized specifically for the aforementioned purposes, the content on the adequacy of individual treatments may be insufficient in the critical pathway developed

Table 5

Modified questionnaire and following reason.

Response category	Prior questionnaire	Modified questionnaire	Reason
Diagnosis	Check trauma and osteoporotic past history for differential diagnosis of fractures	Check trauma, long-term usage of steroids, and osteoporotic past history for differential diagnosis of fractures	Long-term usage of steroids added
Diagnosis	Check weight loss, past history of cancer, resting pain, and night pain for differential diagnosis of cancer	Check weight loss, past history of cancer, resting pain, night pain, and pain that does not respond to existing treatments for differential diagnosis of cancer	Pain that does not respond to existing treatments added
Diagnosis	If confirmed by imaging, lumbar disc herniation is diagnosed	If there is an image finding consistent with symptoms, lumbar disc herniation is diagnosed	Image finding consistent with symptoms are applied
Assessment	Discharge examination must be carried out when patients are discharged	The request for discharge examination is considered when patients are discharged	Discharge examination is not mandatory
Assessment	NRS assessment is implemented twice a week, ODI and SF-36 are implemented once a week, and EQ-5D is implemented upon admission and discharge.	The implementation of each test is considered to assess the change in symptoms.	The evaluation cycle of the examination is not fixed
Treatment	Restrict activities during inpatient treatment	The activity restriction is controlled according to the patient's condition	Not limited to activity restrictions

based on this study. This is in contrast to the fact that the clinical practice guideline for lumbar disc herniation with regard to Korean medicine contains an evaluation of the adequacy of individual recommendations.[21] Alternatively, health professionals may feel that considering critical pathway is better explored in in-depth interviews outside of the initial screening process.

The first limitation of this study is that the findings are based on a sample of 17 Korean medical professionals. This narrowly focused sample potentially results in a less multidisciplinary sample. However, because the corresponding critical pathway has been developed based on existing clinical practice guidelines, the authors can obtain sufficient feedback and opinions from these expert panels. In addition, we consider that a sample of active clinicians or practitioners, rather than that of researchers or policy makers, reflects the reality of actual Korean medical practice, which represents a strength of the study. Gaining consensus from clinicians has resulted in a pathway that reflects existing services and resources rather than a wish list of unfunded or unsustainable services. Therefore, the model used in this study provides a blueprint for other types of institutions to utilize when developing evidence-based critical pathways, regardless of the level of available medical services.

Another limitation of the methodology utilized is the lack of interaction between participants; this prevented in-depth discussion to gain an understanding of inter-disciplinary differences. Participants delivered their opinions amid the limitations that reflected their current medical environment. However, we provided written feedback to participants on others' comments, and they had the opportunity to comment again in the second round. Thus, we received feedback on interdisciplinary issues.

Despite these limitations, our results confirm that the proposed critical pathway is a useful tool for improving the implementation of screening and evidence-based interventions for Korean medical care for lumbar disc herniation. Reaching a consensus regarding the key features of the critical pathway is only the first step in implementing a critical pathway. Work is ongoing to develop and evaluate an online version of the critical pathway to facilitate easy access in Korean medical centers across the Republic of Korea. This online version will incorporate resources and templates to assist centers in developing and documenting their local pathways. As part of this research program, we will systematically evaluate and address barriers to implementation in future studies.

If successful, this program will integrate effective screening, detection, and management of lumbar disc herniation into Korean medical services in a sustainable and effective manner that empowers patients toward preventive care, upskill all health professionals in effective care, and allow practicing staff to focus on the most serious cases that need their expert input.

5. Conclusion

The present study used a modified Delphi process to reach a consensus on the essential elements for the identification and management of lumbar disc herniation with regard to Korean medicine. Our findings confirm that clinicians are amenable to implementing a critical pathway for lumbar disc herniation with regard to Korean medicine as part of the standard practice in Korean medical care. Based on the collected responses, critical pathways specialized in various medical institutions must be distributed. The critical pathway requires implementation and evaluation.

Author contributions

All the studies were performed by the authors. J.H.K. and B.K.S. were responsible for the study design. J.H.K. and B.G. analyzed and interpreted the data. B.K.S. obtained the rights for corresponding funding. J. H. K. was a major contributor to the writing of the manuscript. All authors read and approved the final manuscript. All authors have read, revised, and approved the final manuscript.

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