

The last chain of trauma survival: development of a scale for trauma-rehabilitation linkage in South Korea using a systematic review and expert consensus

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Purpose: There is a high possibility of trauma patients being referred to an unsuitable medical institution for their rehabilitation treatment since the decision is made by them. This study sought to develop a standardized scale to evaluate the need for specialized rehabilitation in patients with multiple traumas and evaluate the effectiveness of the developed scale.

Methods: This study employed a systematic review of existing literature to inform the development of a specialized rehabilitation evaluation scale. An expert panel consisting of trauma surgeons, orthopedic surgeons, and rehabilitation medicine physicians collaborated to create a discharge-planning checklist by assessing the need for specialized rehabilitation. The checklist was validated using retrospective data from trauma patients treated at Seoul National University Hospital.

Results: We identified 12 studies, providing factors influencing the discharge location and rehabilitation needs of trauma patients. The checklist was developed through expert consensus and comprised 3 criteria: discharge feasibility to specialized rehabilitation facilities, diagnostic eligibility for specialized rehabilitation, and functional assessment. Validation of the checklist demonstrated that the percentage agreement, likelihood ratio of a positive test, and Cohen's kappa value were 82.1%, 5.21, and 0.375, respectively when comparing whether the checklist was met and the actual discharge location, indicating its effectiveness.

Conclusion: This study established standardized criteria for assessing the need for specialized rehabilitation in trauma patients, offering a practical tool for clinical use. Implementation of this assessment scale has the potential to improve the trajectory of trauma survivors by facilitating access to appropriate rehabilitation services.

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INTRODUCTION

Care of injured patients is based on appropriate, timely, and accurate interventions through each link in the trauma chain of survival [1]. The trauma chain of survival consists of early first aid to prevent immediate deterioration, early basic/advanced life support to secure vital functions, early advanced therapy to limit or repair injury, and early rehabilitation to restore the quality of life [1].

To date, optimizing resuscitative strategies and training in surgical techniques have been emphasized in the trauma chain of survival, and this is something domestic trauma centers have been working on. Due to these efforts, the trauma survival rate has improved [2]. However, as the number of trauma survivors is increasing in Korea, attention has been paid to appropriate rehabilitation to restore quality of life, which is the last chain of trauma survival.

Until recently, surgeons did not pay much attention to the process of patients recovering their function and returning to society after surgery. Typically, the responsibility of the patient and their family is to determine the appropriate hospital for post-acute treatment upon discharge, with support often provided by referral centers.

Patients with diseases that do not require rehabilitation may decide whether to go home or to another nursing facility, based on their perceived needs. However, for trauma patients, there is a high possibility that they may be referred to an unsuitable medical institution for rehabilitation treatment if they decide where to go on their own because rehabilitation needs cannot be decided subjectively by the patient. Insufficient or delayed rehabilitation can affect the final functional outcomes of patients [3,4]. Therefore, it is reasonable to assert that the role of trauma surgeons includes connecting trauma survivors to the appropriate rehabilitation facilities.

The functional assessment tools for establishing discharge plans after acute treatment are limited to specific diseases. Examples include the National Institutes of Health Stroke Scale [5], Activity Measure for Post-Acute Care (AM-PAC) [6], and Predicting Location after Arthroplasty Nomogram [7]. To the best of our knowledge, there is no standardized evaluation tool for determining the discharge location of patients with polytrauma after acute treatment. It is presumed that in Korea, many patients with multiple traumas are transferred to hospitals that are not appropriate for their rehabilitation needs in the post-acute treatment stage. Moreover, the absence of an objective standard to determine whether a patient has been linked to an appropriate rehabilitation institution makes it difficult to determine their current domestic status. To prevent insufficient rehabilitation treatment, there is an urgent need to develop a scale to evaluate trauma patients who require specialized rehabilitation. Therefore, this study

sought to develop a standardized scale to evaluate the need for specialized rehabilitation in patients with trauma and to evaluate the effectiveness of the developed scale.

METHODS

First, a systematic review of the literature was conducted to develop a scale to evaluate the rehabilitation needs of patients with trauma. A scale to evaluate the need for specialized rehabilitation was developed with reference to the selected literature, and a retrospective medical record survey was conducted to evaluate the effectiveness of the developed scale. This study was approved by the Institutional Review Board of Seoul National University Hospital (No. 2210-008-1364).

Systematic review

Inclusion and exclusion criteria

Among studies targeting adults (≥ 18 years old) hospitalized for multiple traumas, those that analyzed factors predicting discharge location, assessed the need for specialized rehabilitation, or described methods for establishing discharge plans were included. All study types were considered eligible for inclusion. Studies were excluded if they focused on isolated injuries or if the design did not match. Articles that were not written in English or Korean were also excluded.

Search strategy

A literature search was performed using PubMed, Embase, and Cochrane Library. Further search strategies included manual searching of the reference lists of potential articles in Google Scholar and KoreaMed. The search was conducted in May 2022 using a combination of 4 themes: multiple trauma/injury, rehabilitation, discharge/disposition, and prediction/planning. A full description of the key search terms used to identify the potential studies is provided in Supplementary Tables 1–3.

Study selection

After removing duplicates, 2 reviewers (YJJ and YRC) independently screened all titles and abstracts using the inclusion and exclusion criteria. The inclusion criteria and study design of the articles for which the full text was available were reviewed. The reviewers recorded the reasons for the exclusion. The screening was conducted in 2 rounds, and disagreements were discussed with a third reviewer (SAL). The reviewers shortlisted articles that were deemed eligible after reviewing the full text.

Data extraction

Data were extracted by 2 authors (YJJ and YRC) using the

standard pro forma. The information obtained from all included studies included authors, publication year, trauma type, sample size, data source, discharge location, and predictive factors for discharge location.

Discharge checklist development

To develop the scale, an expert group consisting of 3 trauma surgeons, 3 orthopedic surgeons, and 3 rehabilitation medicine physicians was formed (Supplementary Table 4). A group of experts systematically reviewed the content extracted from the selected studies. A discussion was held regarding the classification of discharge locations, timing, methods, and criteria for assessing rehabilitation needs. A consensus was reached to create new standards suitable for Korea using the nominal group technique [8].

Validation of the checklist

The study subjects were patients who visited Seoul National University Hospital between September 2021 and August 2022. Patients who died after acute treatment, were discharged from the emergency room without being hospitalized, or were under 18 years of age were excluded from data collection. Data on the study subjects' demographics, injury severity score (ISS), diagnosis and operation, admission to the intensive care unit (ICU), length of hospitalization, discharge location, reason for disposition, and all items in the checklist were collected.

Discharge locations were classified into 5 categories: specialized rehabilitation facilities (SRF); rehabilitation facilities other than SRF; tertiary referral hospitals; secondary, primary,

and nursing hospitals; and homes. An SRF was defined as a hospital designated by the Ministry of Health and Welfare that meets specific standards for facilities, equipment, and medical personnel.

To evaluate the effectiveness of the checklist, the sensitivity, specificity, negative predictive value, positive predictive value, percent agreement, likelihood ratio of the positive test, and Cohen's kappa value were evaluated by comparing whether the checklist met the actual discharge location. If the checklist results and the actual location after discharge did not match, the reason was collected. IBM SPSS Statistics ver. 24.0 (IBM Corp.) was used for the statistical analysis.

RESULTS

Systematic review

The search identified 957 titles: 333 from PubMed, 572 from Embase, 14 from Cochrane Library, 28 from Google Scholar, and 10 from KoreaMed. After removing duplicates, 827 articles were screened for assessment. Reviewers excluded 712 abstracts after 2 rounds of screening. Through a full-text review, 12 studies fulfilled the inclusion criteria for a total of 26 articles. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram is shown in Fig. 1.

Characteristics of included studies

Previous studies (Table 1 [9–20]) have mainly used existing trauma registries or medical records as data sources. Discharge location was often divided into home and nonhome, and

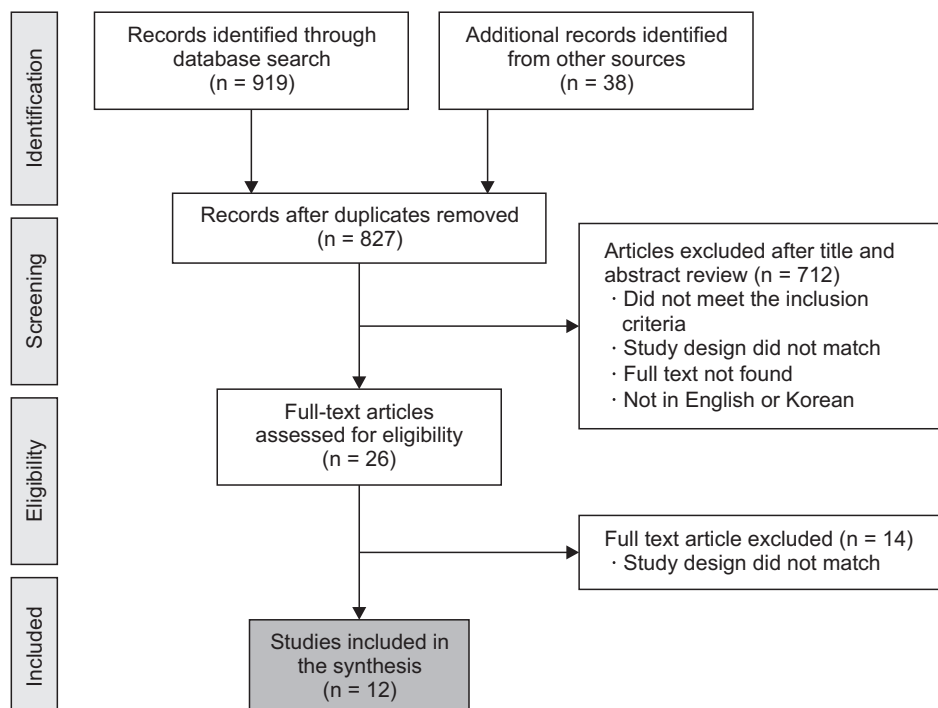


Fig. 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram showing the selection of articles for review.

Table 1. Characteristics of included studies

Study	Year	Study population	Data source	Discharge location	Predictive factors for discharge location
Beaulieu et al. [9]	2014	Trauma patients of level I trauma center (n = 2,836)	Institutional Trauma Registry	Home vs. nonhome vs. rehabilitation	Age, sex, ICU LOS, hospital LOS, and comorbidities
Cheung et al. [10]	2017	Trauma patients aged ≥65 years of level I trauma center (n = 266)	Institutional Trauma Registry	Home vs. nonhome	Pre-admission Clinical Frailty Scale
Debus et al. [11]	2016	ISS≥9 who were taken to the ICU (n = 24,208)	TraumaRegister DGU	Home vs. rehabilitation hospital	Age, AIS pelvis, AIS legs, AIS spine, AIS head, and ICU LOS
Emhoff et al. [12]	1991	Trauma patients of level I trauma center (n = 109)	Medical records	Home vs. rehabilitation facility	Functional Independence Measure score
Gazzotti et al. [13]	2020	Trauma patients aged ≥70 years receiving acute care rehabilitation in the geriatric ward (n = 69)	Medical records	Home vs. nonhome	Short Physical Performance Battery and De Morton Mobility Index
Citajin et al. [14]	2020	Lower extremity trauma patients (n = 2,365)	Medical records	Home vs. inpatient rehabilitation facility	Age, sex, unmarried, insured, body mass index, history of severe alcohol abuse, Gustilo type IIIB or IIC open injuries, bilateral, spine and upper extremity injuries, ISS, and ICU stay
Graham et al. [15]	2020	Trauma patients (n = 614,625)	National Trauma Data Bank	Home vs. nonhome	Age, sex, ISS, comorbidities, and payment method
Hetherington et al. [16]	1995	Trauma patients (n = 93)	Medical chart, Interview	Home vs. nonhome	Functional Independence Measure score
James et al. [17]	2018	Trauma patients of level I trauma center (faller, n = 1,121)	Institutional Trauma Registry Database	Home vs. inpatient rehabilitation / skilled nursing facility	Age, ICU LOS, ISS, number of comorbidities, any fracture, insurance, and ambulation status
Khorgami et al. [18]	2019	Trauma patients (n = 101,656)	Oklahoma Trauma Registry	Home vs. facility	Age, types of injury, ISS, and comorbidities
Rouleau et al. [19]	2015	Lower limb injury patients (n = 160)	Medical chart, questionnaire	Home vs. inpatient rehabilitation center	Preinjury physical health status, concomitant injury of the upper limbs, bilateral lower limb injury, the use of a walking aid before injury, head injury and femur or pelvic fractures
Stocker et al. [20]	2021	Trauma and emergency general surgery patients (n = 200)	Service team member survey	Home vs. nonhome	Age, trauma admission, ISS, LOS, frailty, ICU admission, and APACHE II scores

ICU, intensive care unit; LOS, length of stay; DGU, Deutsche Gesellschaft für Unfallchirurgie; AIS, abbreviated injury score; ISS, injury severity score; APACHE, Acute Physiology and Chronic Health Evaluation.

Checklist regarding the need for specialized rehabilitation for trauma patients		
If all three criteria are met, referral to specialized rehabilitation facility	Yes	No
1. Patient condition assessment criteria	All 'Yes' of 5 criteria	
① Major surgery completed during hospitalization*	<input type="checkbox"/>	
② Able to be accommodated in general ward	<input type="checkbox"/>	
③ Stabilization of vital signs	<input type="checkbox"/>	
④ Capable of oral/enteral feeding	<input type="checkbox"/>	
⑤ GCS score: Eye 4 (continuous eye opening)	<input type="checkbox"/>	
2. Diagnostic criteria eligible for specialized rehabilitation	Met one or more criteria	
2-1. All patients regardless of the insurance type	<input type="checkbox"/>	
① Traumatic brain injury		
② Spinal cord injury		
③ Amputation		
2-2. Patients with health insurance	<input type="checkbox"/>	
① Pelvis or femur fracture		
② Disuse syndrome (cardiovascular, respiratory disease)		
2-3. Patients with automobile insurance/sorker's compensation insurance	<input type="checkbox"/>	
① Upper limb and shoulder injury		
② Hand injury		
③ Back injury		
④ Lower limb injury		
3. Functional assessment criteria	Met one or more criteria	
① FAC score ≤3	<input type="checkbox"/>	
② Dysphasia	<input type="checkbox"/>	
③ Dysphagia	<input type="checkbox"/>	
Referral limitations (If relevant for limitations, confirmation required with the relevant facility)		
① Use of home ventilator		<input type="checkbox"/>
② Hemodialysis		<input type="checkbox"/>
③ Contact-precaution communicable disease (VRE, CRE etc.)		<input type="checkbox"/>

Fig. 2. Checklist regarding the need for specialized rehabilitation for trauma patients. GCS, Glasgow Coma Scale; FAC, functional assessment criteria; VRE, vancomycin-resistant *Enterococcus*; CRE, carbapenem-resistant Enterobacteriaceae.

nonhome was often subdivided into nursing and advanced rehabilitation facilities. Of the 12 references, 7 studies [9,10,13,15,17-19] developed a scale to predict discharge location by analyzing registries or databases using statistical techniques.

Therapeutic factors predicting discharge location included injury severity, type of injury, post-injury functional status, length of hospital stay, and comorbidities, whereas nontherapeutic factors included age, sex, marital status, and insurance type.

Checklist regarding the need for specialized rehabilitation for trauma patients

If the output of the scale, specifically the location after discharge from a trauma treatment facility (TTF), is overly detailed, there is a risk that the accuracy of the scale may decrease. Therefore, the intended purpose of using this scale was to screen for the need for specialized rehabilitation. Therefore, the scale was developed in the form of a checklist that could derive the yes/no need for specialized rehabilitation (Fig. 2). "Yes" was defined as transfer to an SRF certified by the Korean Ministry of Health and Welfare.

The checklist consists of the following 3 items: evaluation of

whether discharge from the TTF for SRF is possible, whether there is a diagnosis that can be treated with rehabilitation, and post-trauma functional assessment. If all 3 criteria are met, specialized rehabilitation is required, resulting in the need for transfer to an SRF. However, even if the checklist is satisfied, the actual transfer may not be possible if there is a clinical condition that limits transfer. Therefore, a referral limitation section was added at the bottom of the checklist.

Patient condition assessment criteria

The first scale is a criterion for evaluating whether a patient can be transferred from TTF to SRF. The first scale is met if all 5 of the following are satisfied: whether all major operations have been completed; whether the patient is hospitalized in a general ward (not in the ICU); whether vital signs such as blood pressure and heart rate are stable; whether oral or enteral feeding is possible; and whether continuous eye opening is possible. Wound problems not requiring major operations and interval operations planned after readmission were excluded from the definition of "major operations." The evaluation process was simplified by using only the Glasgow Coma Scale eye score to determine the functional mental status eligible for

rehabilitation treatment.

Diagnostic criteria eligible for specialized rehabilitation

To be admitted to an SRF, the medical need for specialized rehabilitation and the cost of treatment for professional rehabilitation must be reimbursed by insurance. The second criterion of the checklist is the list of diagnoses that can be reimbursed for the treatment of the checklist. As the list of diagnoses that can be reimbursed by national health insurance, car insurance, and industrial accident insurance is slightly different, 'Article 14 of the Notice on Designation and Operation of Rehabilitation Medical Institutions' and 'Industrial Accident Compensation Insurance Nursing Care Benefit Calculation Standards' was adopted as a reference.

In addition to the list of diagnoses that can be reimbursed, disuse syndrome was included in the criteria to prevent patients whose functional status was significantly reduced due to prolonged ICU care or a post-trauma immobilized state from being omitted from rehabilitation treatment. To be reimbursed for disuse syndrome, 2 prerequisites must be met: (1) within 60 days after surgery or disease occurrence; and (2) a Manual Muscle Testing score of less than 48 and a Korean Modified Barthel Index of 80 points or less, or Berg Balance Scale of 40 points or less. If one or more of the diagnostic criteria were met, the second criterion was met.

Table 2. Demographics of the research participants used for validation

Parameter	Data (n = 392)
Injury severity score	9.6 ± 10.0
≥9	177 (45.2)
≥15	69 (17.6)
Patients who underwent surgery	328 (83.7)
Patients who admitted to ICU	78 (19.9)
Length of hospital stay (day)	11.5 ± 12.7
Diagnosis ^{a)}	
Traumatic brain injury	48 (12.2)
Injury of face or neck other than C-spine	41 (10.5)
Injury of chest	36 (9.2)
Injury of abdominal organs	25 (6.4)
Injury of pelvis or femur	91 (23.2)
Injury of knee, ankle, foot	69 (17.6)
Injury of shoulder, clavicle, arm, hand	156 (39.8)
Injury of spine other than spinal cord injury	22 (5.6)
Spinal cord injury	4 (1.0)
Injury of skin	44 (11.2)
Others ^{b)}	15 (3.8)

Values are presented as mean ± standard deviation or number (%).

ICU, intensive care unit.

^{a)}Duplicates allowed. ^{b)}Asphyxia, cerebral concussion, traumatic shock.

Functional assessment criteria

Among the functional evaluation tools collected through systemic review, the expert group decided to use the Functional Ambulation Category (FAC) [21], which is simple and can be easily evaluated even by non-rehabilitation specialists to determine whether specialized rehabilitation is necessary. The FAC scores ranged from 0 to 5, depending on ambulatory function. To select subjects for specialized rehabilitation, the cutoff was set at '3 points or less,' which indicated difficulty in independent walking. Therefore, a score of 3 (ambulator, dependent on supervision), 1–2 points (ambulator, dependent on physical assistance), or 0 points (nonfunctional ambulator) was defined as the target for specialized rehabilitation.

Dysphasia and dysphagia were included in consideration of neurological deficits that required specialized rehabilitation. Isolated upper extremity injuries were not included as a criterion because outpatient rehabilitation is usually performed without hospitalization at the SRF. If one or more items were met, the functional assessment criterion was met.

Referral limitations

Depending on the patient, clinical conditions may exist that make discharge to the SRF impossible. Therefore, we checked whether the following conditions existed: use of a home ventilator, hemodialysis, or diagnosis of a contact precautionary communicable disease. Confirmation from a relevant institution was required if a referral limitation existed.

Validation of the checklist

After excluding 46 of the 438 patients with missing clinical information, the checklist was validated on 392 subjects. The mean ISS was 9.6, and 17.6% scored higher than 15 points, which is the criterion for severe trauma. Of all patients, 83.7% received surgical treatment and 19.9% received ICU care. The mean length of the hospital stay was 11.5 days (Table 2).

Checklist results versus actual location after discharge

As a result of the medical chart review of the checklist items, 95.1% of the 392 subjects met item #1, 36.7% met item #2, and 40.8% met item #3. A total of 98 patients (25.0%) who met all 3 criteria of the checklist were judged to be in need of hospitalization at the SRF.

Among patients' discharge locations, most (73.7%) underwent outpatient rehabilitation after discharge. Among the 98 patients who required hospitalization at SRF, 28.6% went to SRF, and 33.7% were discharged. Among the 294 patients who did not meet the checklist criteria, none were transferred to the SRF (Table 3).

The reasons for discrepancies among the 70 patients who satisfied the checklist but were not transferred to the SRF were

Table 3. Actual location after discharge depending on whether the checklist is met

Location after discharge	Patients who met the checklists (n = 98)	Patients who unmet the checklists (n = 294)
SRF	28 (28.6)	0 (0)
Rehabilitation facility other than SRF	5 (5.1)	1 (0.3)
Tertiary referral hospitals	14 (14.3)	9 (3.1)
Primary, secondary, and nursing hospitals	17 (17.3)	27 (9.2)
Home	33 (33.7)	256 (87.1)
Others	1 (1.0) ^{a)}	1 (0.3) ^{b)}

Values are presented as number (%).

SRF, specialized rehabilitation facility.

^{a)}Oriental hospital. ^{b)}Flight to home country for foreign nationals.

Table 4. Reasons for discrepancies between checklist results and actual location after discharge

Reason	Data (n = 70)
Unknown	39 (55.7)
SRF not recommended	11 (15.7)
Hemodialysis or communicable disease	8 (11.4)
Patient's request to go to a hospital close to his/her hometown	8 (11.4)
Additional treatment needed ^{a)}	4 (5.7)

SRF, specialized rehabilitation facility.

^{a)}Wound care, chemotherapy, coronary intervention.

often difficult to identify owing to the retrospective nature of the study (55.7%). The reasons identified included medical staff not recommending SRF to the patient or family (15.7%), referral limitations preventing admission to SRF (11.4%), or the patient or family preferring to go to a hospital near their hometown (11.4%) (Table 4).

Validation results of the checklist

When comparing whether the checklist was met and the actual discharge location, the percentage agreement was 82.1%, the likelihood ratio of a positive test was 5.21, and Cohen's kappa value was 0.375. Nineteen patients (4.8%) had SRF referral limitations, 9 of whom met the checklist and were eligible for specialized rehabilitation treatment. Of these 9 patients, only one was transferred to SRF. When the 8 patients who did not undergo SRF were excluded, all values, including percent agreement, improved (Table 5).

DISCUSSION

According to the injury fact book published by the Korea Disease Control and Prevention Agency, the number of patients hospitalized for injuries in 2021 was 960,000 [22]. The number

Table 5. Validation results of the checklist

Variable	Patients who met all checklists (n = 98)	Excluding patients who had reasons for not being able to be transferred to SRH (n = 90)
Location after discharge (n)		
SRF	28	28
Others	70	62
Sensitivity (%)	100	100
Specificity (%)	80.8	82.0
PPV (%)	28.6	31.1
NPV (%)	100	100
Percent agreement (%)	82.1	84.2
LR of positive test	5.21	5.88
Cohen's kappa value	0.375	0.410

SRF, specialized rehabilitation facility; PPV, positive predictive value; NPV, negative predictive value; LR, likelihood ratio.

of severe trauma patients by International Classification of Diseases 9th Edition Injury Severity Score [23] criteria in 2022 was 86,159 [24] and the number of patients treated at regional trauma centers was reported to be 35,019 [25]. The socioeconomic cost of injury is estimated to be 5.3 trillion Korean won in 2021 [22].

The treatment of trauma patients does not end when they are discharged from a trauma center, and many require ongoing rehabilitation even after discharge. Timely multidisciplinary rehabilitation improves patient outcomes [3,4]. In a survey conducted in 2021, Korean trauma specialists recognized that multidisciplinary treatment for patients with trauma was necessary. However, the number of regional trauma centers capable of in-hospital transfer to the Department of Rehabilitation Medicine was reported to be very limited [26].

The Korean Ministry of Health and Welfare began a rehabilitation medical institution certification project in 2020, and nationally designated rehabilitation facilities are currently in operation. However, there is still no standard for determining which patients should undergo SRF; therefore, the domestic trauma-rehabilitation linkage system still needs much improvement.

In the United Kingdom, the National Clinical Audit Specialist Rehabilitation following Major Injury (NCASRI) [27] includes the identification of patients' rehabilitation needs while in the major trauma centers. To enable timely assessment and transfer to level 1 and 2 specialist rehabilitation units, a national standard requires that all trauma patients have an ISS score of 9 or higher within 10 days and be transferred within 6 weeks. In addition, standards for evaluating the patients' measurable gains or goal achievement were set to ensure that the patients reached their goals. These standards require that all patients achieve some measurable gain or goal upon discharge, and

discharge destinations are mandatorily recorded. In Australia, the time to rehabilitation from referral and discharge destinations is included as a quality indicator of trauma care [28]. The Korean Trauma Data Bank contains inaccurate information on discharge locations and does not collect information that can be used to determine the rehabilitation linkage process or post-injury functional status.

Most previous studies on disposition planning have used statistical methods to determine the risk factors and predictors of discharge locations. Statistical methods can be applied only under the assumption that the discharge disposition has been made ideally and that the data of the registry are collected correctly. However, in Korea, patients and their families often decide the discharge location independently; therefore, statistical methods were not used. Instead, a group of experts reached a consensus on the criteria for determining the need for specialized rehabilitation by referring to factors investigated in a systematic review and then selected a checklist in a format that was easy to understand at a glance.

In this study, the FAC was selected as an evaluation tool for the necessity of specialized rehabilitation in patients with multiple traumas. Among the existing indicators used to determine discharge location, the AM-PAC [9] was developed as a tool to determine the discharge location after acute treatment by evaluating the patient's condition, functional mobility, and ability to perform daily activities. Existing studies using the abbreviated form of 'AM-PAC 6-Clicks' either targeted all patients who received acute hospital care regardless of the cause [29] or targeted too specific disease groups [30], and only classified the discharge location as home or institution [29,30]. Predicting Location after Arthroplasty Nomogram [7], developed in 2010, is a tool used to predict patient discharge disposition after total joint arthroplasty and can be evaluated preoperatively to make appropriate arrangements and avoid potential delays in patient discharge who require an extended care facility. However, it cannot be applied to patients with multiple traumas. In this study, the FAC was selected because it is sufficiently simple to be used by non-rehabilitation medical staff without the help of rehabilitation physicians.

This study had limitations in that the number of expert groups was small, and there may be issues that require supplementation in clinical practice. In addition, although the term "validation" was used to assess the effectiveness of the checklist, it is more accurate to say that the checklist developed in this study was used to evaluate how an institution's trauma-rehabilitation linkage is being carried out. A domestic multicenter follow-up study is being conducted.

Nevertheless, the significance of this study is that it was the first in Korea to establish standards for evaluating the need for specialized rehabilitation and present standards as a starting point for identifying the unmet need for rehabilitation,

identifying its causes, and suggesting solutions. As of 2023, interhospital transfer departments of several domestic institutions began using the checklist developed in this study. The scale developed in this study has the advantage of preventing patients in need of specialized rehabilitation from being excluded. In addition, it is expected to contribute to improving the domestic trauma-rehabilitation linkage system for the last chain of trauma survival by making it possible to prospectively collect the proportion and reasons for not being transferred to a specialized rehabilitation medical institution among those eligible for specialized rehabilitation.

In conclusion, this study established standards for assessing the need for specialized rehabilitation in patients with polytrauma and validated that this simple scale is effective for clinical use. This scale is expected to contribute to early rehabilitation to restore the quality of life and the last chain of the trauma chain of survival. In the next stage of research, the authors will be conducting a domestic multicenter study using this checklist.

SUPPLEMENTARY MATERIALS

Supplementary Tables 1–4 can be found via <https://doi.org/10.4174/ast.2024.1075.274>.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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