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▲ Development of Content-Valid Technical Skill Assessment Instruments for Athletic Taping Skills

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Background and Purpose: The content validity of technical skill assessment instruments (TSAI) for the skills of athletic taping has not been reported. The purpose of this paper is to outline and present the process of content validation for nine TSAIs for athletic taping. Local and national validators were selected from Canadian Athletic Therapists' Association (CATA)-accredited athletic therapy (AT) programs to serve as content validators.

Methods: The process of content validation began with the creation of a detailed task analysis via mail and simple validation by local validators. Subsequently, the detailed task analysis was committee validated by a group of 10 validators from across Canada. Validators judged the importance and difficulty of each item, and a face-to-face committee-validator meeting established consensus on the majority of checklist items. Through a modified Ebel procedure, frequency distribution was used in the formation of the final TSAIs.

Results: Initial consensus for pre-taping assessment and technical skill performance items was low. Upon committee discussion and lack of agreement, the decision to remove pre-taping assessment items was made. Initial results of importance and difficulty for athletic taping technical skills were low prior to the committee meeting. Results of importance and difficulty improved substantially following the face-to-face committee-validators meeting. Consensus on fail points improved from initial to final committee validation.

Conclusion: The process of simple and committee validation can be seen as effective methods to establish the content validity of instruments used for the evaluation of athletic taping. J Allied Health 2006; 35:147–155.

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IN THE FIELD of athletic training or athletic therapy (AT), technical skills such as athletic taping, clinical and field injury assessment, exercise rehabilitation, clinical application of therapeutic modalities, and basic and advanced first aid techniques are performed. The use of valid and reliable technical skill assessment instruments (TSAIs), which evolve from a thorough task analysis for the formative and summative assessment of these technical skills, has not been reported in the field of AT. Only one study has evaluated the athletic taping skills of AT students. Herrmann developed a 10-item checklist based on input from several certified athletic trainers in the United States to evaluate the success of two different educational strategies for teaching novice AT students how to tape.[1] There is no indication in the literature that Herrmann's checklists are recognized as a criterion or standard for assessment of athletic taping skills.

Recently (in the past two decades), medical and paramedical professions have begun to create valid and reliable tools to evaluate technical skills. Investigators[2–7] have shown increasing interest in the effective performance and assessment of technical skills inherent in many medical and paramedical professions. This is particularly important when these technical skills reflect a basic level of competence or professional standards such as minimal performance levels, licensure, and certification examinations in the health professions.[8]

The literature describes several advances in creating valid and reliable evaluation tools. These include an objective structured clinical examination,[4] objective structured assessment of technical skills,[2] global rating scales,[3] and case-specific checklists.[6] Global rating scales evolve from the detailed task analysis. Gorter et al. reviewed the results of 29 articles in an attempt to summarize the methods used to create case-specific checklists assessing physician clinical performance.[6] They advocated complete and accurate publication of methods used to create, and subsequently to validate, such checklists.

This background led us to consider both task analysis and TSAI development as goals for a content-valid athletic taping assessment instrument. Hambelton and Novick stated that the process of task analysis is often ignored or is only conducted in an informal basis,[9] while Ebel and Frisbie emphasized that expert judgment is an essential step in estab-

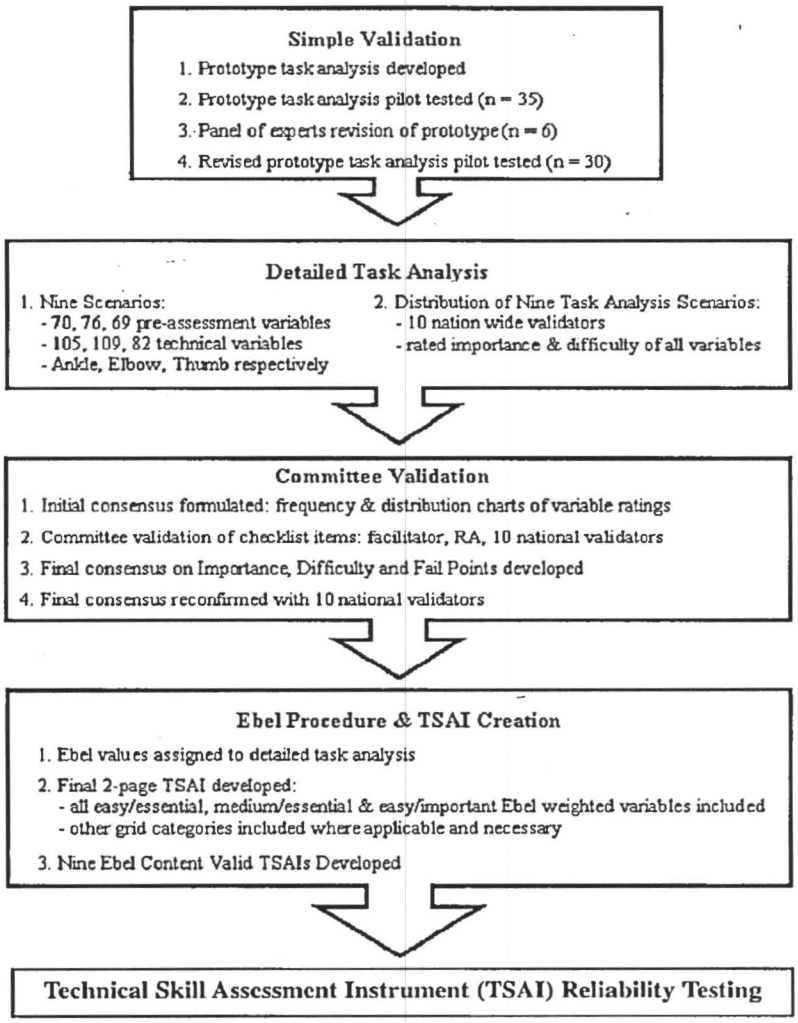

FIGURE 1. Technical skill assessment instrument methodological evolution.

lishing validity.[10] TSAI construction is critical to ensure the validity and ultimately the reliability of the examiner's assessment of the student.[6] Potential benefits include the formative assessment of students,[11] structured and focused feedback on the student's performance,[12] and encouraging the instructor to clearly define parameters of appropriate performance.[5]

Well-structured assessment tools can provide the instructor with information as to what individual and group items need to be reviewed and what tasks are consistently being performed well.[12] They can also help monitor program curriculum success.[13]

The purpose of this study was to use a thorough athletic taping task analysis to develop the content validity of pretaping assessment and athletic taping TSAIs. The task analysis and subsequently the TSAIs were designed for evaluation of student pretaping assessment and athletic taping skills applied to the ankle, thumb, and elbow. This project received ethical approval from the Conjoint Health Research Ethics Board of the Faculties of Medicine, Nursing and Kinesiology at the University of Calgary.

Methods

Instrument Development

The general outline of the process from the creation of a simple TSAI to detailed task analysis content validation and ending with individual content-valid TSAIs is illustrated in Figure 1. Highlights of the process follow.

Simple Validation

Following 30 years of teaching and examining athletic taping skills, the primary investigator developed an assessment tool

TABLE 1. Excerpts of the Task Analysis: Anchors and Stirrups

Item	Difficulty			Importance			Fail Point
	1	2	3	1	2	3	
Anchors							
Amount on skin to prevent tearing	1	2	3	1	2	3	
Tension on middle of tape	1	2	3	1	2	3	
Appropriate angle	1	2	3	1	2	3	
Wrinkle-free	1	2	3	1	2	3	
Anchors overlap by $^1/_2$ width	1	2	3	1	2	3	
Appropriate tension	1	2	3	1	2	3	
No. of anchors	1	2	3	1	2	3	
Direction of anchor application	1	2	3	1	2	3	
Other	1	2	3	1	2	3	
Stirrups limiting inversion							
Placed on calcaneal fat pad	1	2	3	1	2	3	
Stirrups spread at superior anchor	1	2	3	1	2	3	
No. of stirrups applied	1	2	3	1	2	3	
Direction of stirrup application	1	2	3	1	2	3	
Tension	1	2	3	1	2	3	
Wrinkle-free	1	2	3	1	2	3	

Difficulty: 1, hard; 2, medium; 3, easy. Importance: 1, essential; 2, important; 3, marginal.

to assist in the evaluation of student athletic taping skill performance based on the content of a 39-hour athletic taping curriculum. Gradually, a task analysis format was established for five different joints (ankle, knee, elbow, wrist, and thumb), with one format to be used as a template for any other (general) taping skill assessment. These were pilot tested with one cohort of AT program students (n = 35) and revised.

Scenario development identified the complexity of the required taping skills dependent on factors such as onset of injury, type and severity of injury, mechanism of injury, sport or activity at time of injury, initial complaint, physician diagnosis and approval for return to activity, and other physical findings. Nine scenarios were designed to provide a variety of injury and sport-specific challenges for the AT student to address. They were clearly identified to ensure that validators assessing the content validity of each checklist would have no doubt about the scenario-specific athletic taping technical skill requirements.

Panel of Experts

Formal content validation beyond face validity began by the involvement of six certified Canadian Athletic Therapists [CAT(C)] to refine and pilot test the instrument. The panel of experts all taught or supervised taping skill development in Canadian Athletic Therapist Association (CATA)-accredited AT curricula. They assessed and revised the task analysis with the purpose of creating a detailed task analysis. Pretaping physical assessment and athletic taping skills related to a clinically relevant injury were the two main clinical skills to be evaluated. Three tape jobs that were most likely to be encountered in the AT setting (ankle, thumb, and elbow) were selected for final content validation, with three different scenarios for each anatomic location.

An excerpt of the detailed task analysis template for the ankle is presented in Table 1. It was based on guidelines from Blackwell et al. to identify common skills to be assessed and to create a checklist that represented all elements for the appropriate performance of those common skills.[14]

Validation Committee

Following validation by the panel of experts, the detailed task analyses were distributed to validators country-wide. Fifteen CATA-certified athletic therapists were identified and requested to serve as expert validators. Ten agreed to serve. This group was not randomly selected but was representative (former students or faculty) of the only six CATA-accredited academic programs in Canada. All were actively involved in the education and/or assessment of athletic taping skills of students. Table 2 illustrates the expertise of these validators in relation to athletic taping and teaching, examination, national/international team service, and professional team service, as well as other related demographic information.

TABLE 2. Demographics of Validators

	Mean	Range
Age (yr)	42.6	23 (53–30)
Years Certified Athletic Therapist [CAT(C)]	15.9	24 (30–6)
Years teaching academics	14.6	30 (30–0)
Years teaching taping courses	12.8	30 (30–0)
Years examining	19.2	21 (24–3)
No. of students supervised	8.3	15 (15–0)
Years taping professional athletes	5.15	23 (23–0)
Gender	Male: 8/10 (80%)	Female: 2/10 (20%)
Currently Supervisory Athletic Therapist (SAT)?	Yes: 8/10 (80%)	No: 2/10 (20%)
Currently employed in accredited institution?	Yes: 6/10 (60%)	No: 4/10 (40%)
Canadian national teams	12	
Pan American Games	5	
World Track and Field Games	1	
Commonwealth Games	6	
Olympic Games (summer and winter)	9	
Canadian FISU Games	2	
Canada Games	5	
Paralympics Games	1	
World University Games	2	
World Police & Fire Games	2	
Professional football (Canadian Football League)	2	
Professional rodeo	4	

The detailed task analysis instrument was sent to the 10 national validators. Specific instructions were included to enable validators to classify the importance and difficulty of each checklist item for each of the nine scenarios. Importance was rated as essential, important, or marginal; difficulty was classified as hard, medium, or easy. The validators returned the completed documents, and the frequency distributions for all items were tabulated. Subsequently, the validation committee met to discuss items that did not achieve consensus during the initial mail-out validation. Final TSAI content validity was established with the consensus achieved in the face-to-face validator meeting.

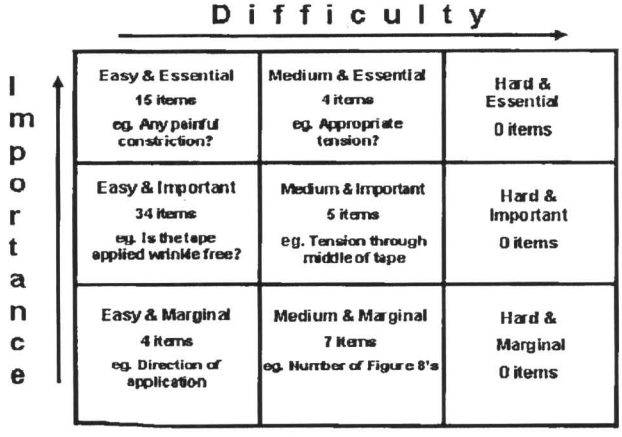

FIGURE 2. Modified Ebel matrix illustrating frequency distribution and examples of task analysis items for the prophylactic ankle-taping scenario.

This consensus building exercise was also applied to a list of "fail points" for each scenario. A fail point was defined as a critical element that could result in the automatic failure of the candidate on that athletic taping trial if the skill performance was unsatisfactory. If a validator was of the opinion that an item was a fail point, he or she was requested to place a checkmark in the "FP" column.

The revised checklists based on the results of the committee meeting were mailed to the validators, and comments or suggestions for change were collected. Results were tabulated from this final committee validation process.

EBEL PROCEDURE

The Ebel procedure was designed to establish a minimum passing score.[8,15,16] We applied an adaptation of Ebel's procedure to a task analysis to establish content validity. In this process, each checklist item was rated on importance (essential, important, or marginal) and difficulty (hard, medium, or easy). The Ebel grid shows a 3 × 3 matrix of importance and difficulty (Figure 2).

The frequency distribution within the Ebel matrix was used to determine the inclusion of each item in the task analysis. Subsequently, the grid allocation of importance and difficulty can be used to determine the minimum performance level for a high-stakes examination.

STATISTICAL ANALYSIS

Data were entered into SPSS version 12.0 (SPSS Inc., Chicago, IL). A frequency distribution for importance and dif-

TABLE 3. Initial and Final Validators Consensus Frequency and Distributions for Importance

	Initial Validators Consensus								Final Validators Consensus							
	10/10	9/10	8/10	7/10	6/10	5/10	Fewer	Percent Consensus	10/10	9/10	8/10	7/10	6/10	5/10	Fewer	Percent Consensus
	Consensus								Consensus							
Ankle 1	0	3	4	19	20	15	14	9	57	8	0	0	0	0	0	100
Ankle 2	3	1	3	15	22	22	2	10	56	8	3	1	0	0	0	99
Ankle 3	2	2	12	11	22	20	8	21	64	12	1	0	0	0	0	100
Elbow 1	1	4	6	18	26	37	10	11	94	8	0	0	0	0	0	100
Elbow 2	2	4	9	16	21	41	7	15	90	12	0	0	0	0	0	100
Elbow 3	0	3	6	11	15	39	29	9	99	4	0	0	0	0	0	100
Thumb 1	1	5	12	5	14	19	16	25	66	5	0	0	1	0	0	99
Thumb 2	1	5	11	6	14	19	16	24	62	8	1	0	0	1	0	99
Thumb 3	1	5	12	5	14	19	16	25	63	8	1	0	0	0	0	100

Consensus = ≥8/10

ficulty was calculated for each task analysis item on every taping scenario. Because greater than 80% agreement was arbitrarily defined as consensus, those items not meeting initial validator consensus were identified for further discussion at the committee meeting of all validators. Items attaining validator committee consensus were subsequently entered into the Ebel grid for analysis and inclusion in the final TSAIs.

The TSAIs were limited to two pages for ease of use and to assure examiner compliance when using the instruments. Initially, each TSAI was formed from three Ebel grid categories (easy and essential, easy and important, and medium and essential). Subsequently, TSAI forms that had space- and scenario-specific reasons were modified to include additional items.

These grid frequency distributions were based on responses that were validated using a committee approach to a task analysis procedure. In this manner, the TSAI forms were created using the Ebel procedure[15] to select the final TSAI-validated content for all nine athletic taping scenarios. See the Appendix for a copy of a basic TSAI that assesses basic ankle prophylactic athletic taping skills.

Results

PRETAPING ASSESSMENT

The frequency and distribution of the initial mail responses from the validators showed that consensus on the importance of pretaping assessment (7.83%) differed from the importance of the technical skill performance (15.2%), yet consensus was lacking for both. Consensus for difficulty was greater for pretaping assessment (36.9%) than for technical skill performance (11.55%).

Postvalidation committee consensus for both importance and difficulty of pretaping assessment items was not established due to the unanimous decision of all validators to remove these checklist items from the detailed task analysis. The technical skills results on the athletic taping detailed task analysis follow.

ATHLETIC TAPING TECHNICAL SKILLS

The results of the frequency distribution of the initial task analysis assessment revealed a low level of consensus on

TABLE 4. Initial and Final Validators Consensus Frequency and Distributions for Difficulty

	Initial Validators Consensus								Final Validators Consensus							
	10/10	9/10	8/10	7/10	6/10	5/10	Fewer	Percent Consensus	10/10	9/10	8/10	7/10	6/10	5/10	Fewer	Percent Consensus
	Consensus								Consensus							
Ankle 1	2	4	6	4	9	25	15	19	64	1	0	0	0	0	0	100
Ankle 2	3	6	4	2	13	20	20	19	64	4	0	0	0	0	0	100
Ankle 3	4	3	4	7	11	25	25	14	73	4	0	0	0	0	0	100
Elbow 1	2	3	7	11	15	38	26	12	102	0	0	0	0	0	0	100
Elbow 2	2	2	12	18	13	39	16	16	102	0	0	0	0	0	0	100
Elbow 3	0	1	2	14	15	33	36	3	101	0	0	0	0	0	0	100
Thumb 1	2	4	4	3	7	30	22	14	70	1	1	0	0	0	0	100
Thumb 2	2	4	4	4	7	29	22	14	71	0	0	0	1	0	0	99
Thumb 3	2	4	4	3	7	30	22	14	71	1	0	0	0	0	0	100

Consensus = ≥8/10

both importance and difficulty for the majority of the checklist items. However, the committee validation process improved the initial task analysis consensus on both importance and difficulty substantially. The distribution of consensus both before and after committee validation is illustrated in Tables 3 and 4. Although consensus was arbitrarily defined as occurring when eight of 10 validators agreed, the tables show that even greater agreement was found, displaying the power of an expert committee validation process.

Fail-Points

There was little initial consensus by the validators regarding fail points, as was the case with the initial assessment of the "importance" of each task. There were a total of 248 fail points recommended by the validators. However, following the group meeting with all 10 validators present, 78 fail points distributed over the nine scenarios were agreed on. Overall, the number of fail points decreased by a mean of 67.24% (range, 55%–78%).

Discussion

Pretaping Assessment

The preassessment taping lack of initial consensus is not surprising. Many athletic therapists in both the CATA and the National Athletic Trainers Association have been witness to pre-examination meetings of examiners at national certification examinations. The intention of such meetings is to achieve consensus, thus validating the examination content. However, the assessment portion of athletic taping stations demonstrates very diverse views regarding the extent of assessment required before the application of technical taping skills. No literature was found to support the common viewpoints for this specific component of athletic taping. Therefore, within this study, a unanimous validator decision reached during the committee meeting was to focus the validation on the task analysis and subsequent TSAIs for taping only and to reserve the evaluation of student clinical assessment skills for validated instruments designed specifically for that purpose. Because the remaining task analysis comprised a majority of the checklist items, a strategy was used to focus on one common structural component at a time for one taping skill (e.g., anchors for the ankle tape job). Later, individual checklist items for the other taping skills were presented (e.g., maintaining tension on the middle of the tape). Using this focus on the technical skills (psychomotor) applied directly to athletic taping techniques, consensus in all nine scenarios for their respective TSAIs was achieved.

Technical Skill Consensus, Content Validity

Face validity in this study is high because the assessment of taping skill performance directly involved the taping of the ankle, thumb, or elbow. Although research can be, and has been, based on the logical validity of the measurement, researchers prefer more objective evidence on the validity of a measurement instrument.[17] This project supports that opinion because initial consensus was low, and despite logical validity it lacked content validity. However, the validation approach established the content validity.

No attempt was made to establish criterion validity, the relationship between these TSAIs and an existing measure, because no gold standard currently exists. Therefore, it is also premature to attempt to establish predictive validity until a gold standard is created. Although construct validity may be established with these TSAIs in the future, we have not assessed the effect of the use of these instruments formatively.

The lack of initial taping technique consensus was somewhat surprising. Despite efforts to design a detailed task analysis, expert panel input, and pilot testing, consensus was only achieved on limited items. There was no existing literature to support the premise that this specific detailed task analysis created for the assessment of technical athletic taping skills was valid. Thus, despite logical validity (using taping skills to assess taping skills), the committee approach did not yield a strong initial consensus of the task analysis. This may be a common reason why pre-examination mock-up meetings with the intent to achieve consensus enjoy limited success. Despite good intentions, the mock-up meetings may fail to provide the detailed task analysis backgrounds, opportunity for reflection, and time necessary for the establishment of consensus on every item, which ultimately calls the examination validity and reliability into question.

While the results from the first validation strategy lacked consensus, the reverse was true for the committee-approach validation strategy. Although this appears to be an unwieldy process, it should be noted that Grantcharov et al. observed that in the development of tools to evaluate surgical skills, "designing objective and structured criteria for different operations is difficult, but it can allow for reliable assessment."[13]

Content validity has been considered to be the most important type of validity for measuring academic achievement.[16] Examinations used to certify competence must be highly valid tests.[15] Content validity was attained (Tables 3 and 4) in the final validator meeting. This validation approach using expert judgment in determining what ought to be measured, and how it ought to be measured, illustrates how the committee review of expert task analysis can lead to the achievement of content validity. Ebel and Frisbie considered expert review to be a critical step in the validation process.[10] This validation process thus addressed a frequent and serious weakness in the development of many professional or technical competence tests.[15] This process was successful in a setting where an examination using the task analysis was not immediately looming.

TSAI Reliability

Instrument development should include testing the reliability of the tool. Thus, the use of these content-valid

TSAIs is being supported by a recently completed interrater reliability study. The intrarater reliability study is currently under way.

Limitations

Selection of validators was based on active involvement in teaching or assessing athletic taping techniques, obvious technical competence such as extensive athletic taping experience in professional sport, representation from all six CATA-accredited academic institutions, and representation from the CATA certification committee. Although validators were selected from across Canada, this process may be considered as a limitation. Table 2 is presented as evidence that despite nonrandom selection of validators, they were an expert group.

Initial inclusion of the pretaping assessment skills in the task analysis, and the subsequent exclusion of these skills in the final TSAIs, may also be considered a limitation. Conversely, because technical skills are primarily in the psychomotor domain, and pretaping assessment skills include cognitive as well as psychomotor performance, the decision to eliminate the preassessment skills in the final TSAIs was made.

The change in consensus noted in this report has been identified as an outcome of the validation committee approach. Although the goal of the validation committee was to clarify nomenclature of the task analysis to facilitate consensus, it must be noted that variables such as group dynamics, intimidation, persuasion, and even fatigue may be limitations to committee validation.

Summary

The process of validation of an athletic taping task analysis and the development of a series of TSAIs has begun. Initially there was low consensus via questionnaire methods among 10 expert validators regarding pretaping assessment and for technical skill performance. Thus, despite logical validity, the initial content validity was low. However, following the committee validation approach, the content validity for the technical skill performance of nine athletic taping scenarios was virtually unanimous by 10 expert validators. The validation process was successful in creating content-valid TSAIs to quantify athletic taping skills. Complete validation of these TSAIs requires follow-up investigations that focus on reliability, predictive, and concurrent validity.

References

1. Hermann TJ: *Teaching Taping Skills to Pre-service Athletic Trainers* [dissertation]. Cincinnati, OH: University of Cincinnati; 1986.
2. Martin JA, Regehr G, Reznick R, et al: Objective structured assessment of technical skill (OSATS) for surgical residents. *Br J Surg* 1997; 84:273–278.
3. Winckel CP, Reznick RK, Cohen R, et al: Reliability and construct validity of a structured technical skills assessment form. *Am J Surg* 1994; 167:423–427.
4. Bartfay WJ, Rombough R, Howse E, et al: The OSCE approach in nursing education. *Can Nurse* 2004; 100:19–23.
5. Reznick R, Regehr G, MacRae H, et al: Testing technical skill via an innovative "bench station" examination. *Am J Surg* 1997;173: 226–230.
6. Gorter S, Rethans JJ, Scherpbier A, et al: Developing case-specific checklists for standardized-patient-based assessments in medicine: a review of the literature. *Acad Med* 2000; 75:1130–1137.
7. Reznick RK: Teaching and testing technical skills. *Am J Surg* 1993; 165:358–361.
8. Violato C, Marini A, Lee C: A validity study of expert judgment procedures for setting cutoff scores on high-stakes credentialing examination using cluster analysis. *Eval Health Prof* 2003; 26:1–14.
9. Hambleton RK, Novick MR: Toward an integration of theory and method for criterion-referenced tests. *J Educ Meas* 1973; 10:159–170.
10. Ebel RL, Frisbie DA: *Essentials of Educational Measurement*. 4th ed. Englewood Cliffs, NJ: Prentice Hall; 1986.
11. Hilliard RI, Tallet SE: The use of an objective structured clinical examination with postgraduate residents in pediatrics. *Arch Pediatr Adolesc Med* 1998; 152:74–78.
12. Norman GR, Van der Vleuten CPM, De Graaff E: Pitfalls in the pursuit of objectivity: issues of validity, efficiency and acceptability. *Med Educ* 1991; 25:119–126.
13. Grantcharov TP, Bardram L, Funch-Jenson P, et al: Assessment of technical surgical skills. *Eur J Surg* 2002;168:139–144. [check volume]
14. Blackwell TA, Petrusa ER, Saydjari CL: Performance in general internal medicine: Comparative study using an objectively scored evaluation system. In: Hart ER, Harden RM, Walton HJ, eds. *Newer Developments in Assessing Clinical Competence*. Quebec, Canada: Can-Heal Publications; 1986:pp 229–237.
15. Cantor JA: A validation of Ebel's method for performance standard setting through its application with comparison approaches to a selected criterion-referenced test. *Educ Psychol Meas* 1989; 49:709–721.
16. Bridge PD, Musial J, Frank R, et al: Measurement practices: methods for developing content-valid student examinations. *Med Teach* 2003; 254:414–421.
17. Thomas JR, Nelson JK: *Research Methods in Physical Activity*. 4th ed. Champaign, IL: Human Kinetics; 2001.

APPENDIX: TECHNICAL SKILLS ASSESSMENT INSTRUMENT: ANKLE 1

Ankle Scenario 1—Prophylactic Basketball TSA1

Injury: Prophylactic tape job	Ebel Value	Pass	N/A	Fail Point	Comments
Start time: Stop time:		1 or 1		FP	
Preparation for taping					
Does the athlete have a tape allergy?	0.9	1	N/A		
Does the athlete have an allergy to tape adherent?	0.9	1	N/A		
Use of materials					
Tape adherent (use as indicated)	0.7	1	N/A		
Pro-wrap (use as indicated)	0.7	1	N/A		
Heel & lace pads	0.7	1	N/A		
Lubricant	0.7	1	N/A		
Zinc oxide (White) tape	0.9	1	N/A		
Starting position					
Neutral or appropriate	0.9	1	N/A	FP	
Maintaining starting position	0.9	1	N/A		
Skin protection					
Use of tape adherent	0.7	1	N/A		
Lubricated heel and lace pads	0.7	1	N/A		
Correct placement of heel and lace pads	0.7	1	N/A		
Tension of Pro-wrap	0.7	1	N/A		
Smoothness of Pro-wrap	0.7	1	N/A		
Anchors					
Amount of tape to prevent skin avulsion (more than 1 strip width)	0.7	1	N/A		
Tape tension (applied evenly through tape)	0.5	1	N/A		
Circumferential tension (appropriate amount)	0.7	1	N/A		
Appropriate angle	0.7	1	N/A		
Wrinkle-free	0.7	1	N/A		
Anchors overlap by 1/2 width of tape	0.9	1	N/A		
Number of anchors (≥3 for longer legs)	0.7	1	N/A		
Anatomical boundaries					
Below muscle-tendon junction (or 5-6" superior to lateral)	0.7	1	N/A		
Base of fifth metatarsal covered evenly by tape	0.7	1	N/A		
Stirrups limiting inversion					
Centered on calcaneal fat pad	0.7	1	N/A		
Strips spread at superior anchor	0.9	1	N/A		
≥3 stirrups (depending on size of model)	0.9	1	N/A		
Wrinkle-free	0.7	1	N/A		
Appropriate direction of application	0.9	1	N/A	FP	
Tension (middle of tape and appropriate amount)	0.7	1	N/A		
Horizontals (horseshoes)					
Inferior strips do not cross dorsum of foot	0.7	1	N/A		
Tension on center of strips along length of Achilles tendon	0.7	1	N/A		
Overlap of horizontals by 1/2 posteriorly	0.7	1	N/A		
Wrinkle-free	0.7	1	N/A		
Attaches to anchor or self	0.7	1	N/A		
Weave					
Basketweave stirrups and horizontals	0.7	1	N/A		

Injury: Prophylactic tape job	Ebel Value	Pass	N/A	Fail Point	Comments
Figure 8					
Appropriate direction of application	0.3	1	N/A		
Number of figure 8's	0.3	1	N/A		
Wrinkle-free	0.3	1	N/A		
Tension (middle of tape and appropriate amount)	0.3	1	N/A		
Base of the fifth metatarsal as anatomical boundary	0.3	1	N/A		
Heel locks					
Basic heel lock	0.7	1	N/A		
LAW for acute inversion	0.5	1	N/A		
Appropriate number of heel locks	0.5	1	N/A		
Wrinkle-free	0.5	1	N/A		
Tape tension (applied evenly through tape)	0.7	1	N/A		
Circumferential tension (appropriate amount)	0.5	1	N/A		
Base of fifth metatarsal as anatomical boundary	0.7	1	N/A		
Close					
Overlap by 1/2 width of tape	0.9	1	N/A		
No windows	0.7	1	N/A		
Wrinkle-free	0.7	1	N/A		
Tape tension (applied evenly through tape)	0.7	1	N/A		
Circumferential tension (appropriate amount)	0.5	1	N/A		
Posttaping circulation assessment (one of the following)					
Capillary refill/visual/color/temperature	0.7	1	N/A		
Design selection					
Restriction of inversion (primary)	0.9	1	N/A	FP	
Functional testing					
Does the tape job restrict inversion?	0.9	1	N/A	FP	
Does the tape job restrict passive inversion?	0.9	1	N/A	FP	
Functional to sport testing					
In the examiner's opinion, will the tape job protect the athlete for participation?	0.7	1	N/A		
In the examiner's opinion, will the tape job protect the athlete for participation in this sport?	0.7	1	N/A	FP	
Perform a sport specific test (e.g., jump to get a rebound)	0.7	1	N/A		
Model's comfort					
Comfort	0.9	1	N/A	FP	
Absence of painful constriction?	0.9	1	N/A	FP	
Does the model think he/she could participate with this tape job?	0.9	1	N/A	FP	
Speed to complete tape job					
≤4 minutes	0.7	1			
Total cumulative points and fail points		63		8	
Accumulated errors					
Score					
Minimum performance level with Ebel procedure				0	
Pass or fail		Pass		Fail	