Developing an objective framework for scrub nurse training: A Japanese pilot study

Supplement 1: The behavioral anchoring criteria established for the four technical skill items in SCOPE.

Domain: Instrument handling

Item 1: Accurate instrument identification and handling?

4 points	Understands the names, purposes and handling of all instruments used in surgery.
3 points	Understands the names, purposes and handling of general surgical instruments.
2 points	Understands the names, purposes and handling of general surgical instruments but requires occasional guidance.
1 point	Does not understand the names, purposes or handling of general surgical instruments and requires constant guidance.

Item 2: Smooth instrument passing to the surgeon?

4 points	Anticipates the needs of the surgeon and prepares instruments accordingly. Hands over instruments before being asked.
3 points	Hands over instruments immediately after the surgeon's instruction without breaking their line of sight from the surgical field.
2 points	Takes a slight delay in handing over instruments after receiving the surgeon's instruction.
1 point	Takes significant time to hand over instruments, causing a noticeable delay in surgery.

Domain: Safety management

Item 3: Safe scalpel/needle passing?

4 points	Can safely hand over scalpels/needles even at unexpected timing. Always keeps them in their visual field and handles them with caution. (Note: If no unexpected handovers occur, score as '3 points'.)
3 points	Can safely hand over scalpels/needles at the expected timing. Always keeps them in their visual field and handles them with caution.
2 points	Sometimes takes eyes off the surgical field when handling scalpels/needles. Fails to promptly retrieve unnecessary items.
1 point	Does not understand how to handle scalpels/needles properly. Creates hazardous situations. (The surgeon feels at risk when receiving instruments.)

Item 4: Operative field and table free of clutter?

4 points	The surgical field and instrument table are always free of unnecessary instruments/materials. Cables and other items are neatly arranged, ensuring a safe working environment.
3 points	The surgical field and instrument table are organised, with only the necessary instruments available.
2 points	Some unnecessary instruments/materials are left on the table or in the surgical field.
1 point	The instrument table contains unnecessary instruments/materials, leading to clutter. (Lack of organisation requires assistance from the supervisor.)

Developing an objective framework for scrub nurse training: A Japanese pilot study

Supplement 2: SQUIRE-EDU (Standards for QUality Improvement Reporting Excellence in Education) checklist

SQUIRE-EDU item		Manuscript location and content
EDU 1	Indicate that the manuscript concerns efforts to improve health professions education systems and learning.	Title and abstract explicitly refer to 'an objective framework for scrub nurse training' and the abstract explains development of a structured educational framework.
EDU 2	Keywords include a focus on education and learning.	Abstract and keywords emphasise 'training', 'education', 'evaluation' and 'feedback'.
EDU 3	Describe the nature and significance of the need for change in the local educational system.	Introduction highlights a lack of structured feedback, dependence on apprenticeship models and absence of competency-based evaluation in Japan.
EDU 5	Identify the guiding theory (learning, change, implementation) and how it aligns with local needs.	Introduction and methods demonstrate that the BID model and OSATS/NOTSS frameworks guide the intervention, aligning with the need for practical and structured feedback.
EDU 7a	Describe contextual elements for learning before intervention (setting, resources etc.).	Methods section (needs assessment) describes Japan's OR training context, educational gaps and available resources.
EDU 7b	Describe relationships between contextual elements and local educational and healthcare systems.	Introduction and discussion note OR hierarchy, time pressure and feedback culture and discuss how these affect intervention feasibility.
EDU 8a	Describe the primary and co-interventions.	Methods section describes how the SCOPE tool is integrated with BID educational model.
EDU 8b	Describe how the interprofessional team was involved.	Methods section describes how the development and implementation involved instructor nurses, scrub nurses, surgeons and researchers.
EDU 9a	Approach to understand impact on learners and broader systems.	Results and discussion report on score progression, inter-rater reliability and impact on learner confidence and system feasibility.
EDU 9b	Approach to assess fidelity and iteration of interventions.	Results section reports that SCOPE was used across 26 procedures and adapted during BID-based feedback loops.
EDU 10	Measures used to assess education outcomes and impact.	Methods and results include ICC, Pearson correlations, domain-specific score trends and comparison of self-evaluation versus instructor evaluation.
EDU 12	Approaches to address vulnerability of learner participants.	Methods section (ethical considerations) reports that IRB approval was obtained, data was anonymised and written informed consent was secured.
EDU 13a	Detail iterative modifications based on assessment of learning.	Results and discussion report that feedback evolved as novices progressed (emphasised in Figures 2–4).
EDU 14	Connect findings to guiding theory used to direct change.	Discussion reflects alignment between SCOPE outcomes and OSATS/NOTSS/BID-based theory of structured feedback.
EDU 15c	Include impact on learners, faculty, programs, patients, systems or communities.	Discussion describes improved learning efficiency, reflective practice, feasibility of integration and implications for team education.
EDU 17b	Scalability of work to other learners/contexts.	Discussion proposes adaptation to other institutions, roles (circulating nurses, surgical trainees) and broader perioperative settings.
EDU 17d	Lessons learned for clinical practice, education and policy.	Discussion and conclusion emphasise structured feedback's role in safe practice, and the need for objective, scalable assessment systems.

Note: SQUIRE items 4, 6, 11, 13b–f, 15a,b,d,e, 16 and 17a,c,e are either optional or not applicable to the design of this pilot educational intervention, as indicated in the original SQUIRE-EDU guidelines[1]; therefore, these items have not been included in this checklist.

Reference:

1. Ogrinc G, Armstrong GE, Dolansky MA, Singh MK, Davies L. SQUIRE-EDU (Standards for QUality Improvement Reporting Excellence in Education): Publication guidelines for educational improvement [Internet]. Acad Med. 2019[cited 2025 May 3];94(10):1461–70. DOI: 10.1097/ACM.0000000000002750.