

# **Assessing Technical & Non-Technical Skills in the Operating Theatre**

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# Study Aim

- To evaluate the **validity, reliability, user satisfaction and educational impact** of three different methods of assessing trainee surgeons' skills in theatre
- PBA      Procedure Based Assessment
- OSATS   Objective Structured Assessment of Technical Skills
- NOTSS   Non-Technical Skills for Surgeons

# PBA example

## General Surgery PBA: Laparoscopic cholecystectomy

APPROVED SURGICAL  
TEMPLATE Jun 06

<b>Trainee:</b>	<b>Assessor:</b>	<b>Date:</b>
<b>Start time:</b>	<b>End time:</b>	<b>Duration:</b>
Operation more difficult than usual? Yes / No (If yes, state reason)		

The Trainee should explain what he/she intends to do throughout the procedure  
The Assessor should provide verbal prompts, if required, and intervene if patient safety is at risk.

Rating: N = Not observed or not appropriate      D = Development required  
S = Satisfactory standard for CCT (no prompting or intervention required)

Competencies and Definitions		Rating N/D/S	Comments
<b>I.</b>	<b>Consent</b>		
C1	Demonstrates sound knowledge of indications and contraindications including alternatives to surgery		
C2	Demonstrates awareness of sequelae of operative or non operative management		
C3	Demonstrates sound knowledge of complications of surgery		
C4	Explains the perioperative process to the patient and/or relatives or carers and checks understanding		
C5	Explains likely outcome and time to recovery and checks understanding		
<b>II.</b>	<b>Pre operative planning</b>		
PL1	Demonstrates recognition of anatomical and pathological abnormalities (and relevant co-morbidities) and selects appropriate operative strategies/techniques to deal with these e.g. nutritional status		
PL2	Demonstrates ability to make reasoned choice of appropriate equipment, materials or devices (if any) taking into account appropriate investigations e.g. x-rays		
PL3	Checks materials, equipment and device requirements with operating room staff		
PL4	Ensures the operation site is marked where applicable		
PL5	Checks patient records, personally reviews investigations		
<b>III.</b>	<b>Pre operative preparation</b>		
PR1	Checks in theatre that consent has been obtained		
PR2	Gives effective briefing to theatre team		
PR3	Ensures proper and safe positioning of the patient on the operating table		
PR4	Demonstrates careful skin preparation		
PR5	Demonstrates careful draping of the patient's operative field		
PR6	Ensures general equipment and materials are deployed safely (e.g. catheter, diathermy)		
PR7	Ensures appropriate drugs administered		
PR8	Arranges for and deploys specialist supporting equipment (e.g. image intensifiers) effectively		
<b>IV.</b>	<b>Exposure and closure</b>		
E1	Demonstrates knowledge of optimum skin incision / portal / access		
E2	Achieves an adequate exposure through purposeful dissection in correct tissue planes and identifies all structures correctly		
E3	Completes a sound wound repair where appropriate		
E4	Protects the wound with dressings, splints and drains where appropriate		

Competencies and Definitions		Rating N/D/S	Comments
<b>V.</b>	<b>Intra operative Technique</b>		
IT1(G)	Follows an agreed, logical sequence or protocol for the procedure		
IT2(G)	Consistently handles tissue well with minimal damage		
IT3(G)	Controls bleeding promptly by an appropriate method		
IT4(G)	Demonstrates a sound technique of knots and sutures/staples		
IT5(G)	Uses instruments appropriately and safely		
IT6(G)	Proceeds at appropriate pace with economy of movement		
IT7(G)	Anticipates and responds appropriately to variation e.g. anatomy		
IT8(G)	Deals calmly and effectively with unexpected events/complications		
IT9(G)	Uses assistant(s) to the best advantage at all times		
IT10(G)	Communicates clearly and consistently with the scrub team		
IT11(G)	Communicates clearly and consistently with the anaesthetist		
IT12 (T)	Creates a pneumoperitoneum safely		
IT13 (T)	Safely inserts an appropriate number of ports		
IT14 (T)	Dissects cholecystectomy triangle safely		
IT15 (T)	Safely ligates and divides cystic duct and artery		
IT16 (T)	Carefully mobilises gallbladder off the liver		
IT17 (T)	Safely extracts gallbladder from a port site		
<b>VI.</b>	<b>Post operative management</b>		
PM1	Ensures the patient is transferred safely from the operating table to bed		
PM2	Constructs a clear operation note		
PM3	Records clear and appropriate post operative instructions		
PM4	Deals with specimens. Labels and orientates specimens appropriately		

### Global summary

Level at which completed elements of the PBA were performed on this occasion		Tick as appropriate
Level 0	Insufficient evidence observed to support a summary judgement	
Level 1	Unable to perform the procedure, or part observed, under supervision	
Level 2	Able to perform the procedure, or part observed, under supervision	
Level 3	Able to perform the procedure with minimum supervision (needed occasional help)	
Level 4	Competent to perform the procedure unsupervised (could deal with complications that arose)	

Comments by Assessor (including strengths and areas for development):

Comments by Trainee:

Trainee Signature:

Assessor Signature:

# OSATS example

## DIAGNOSTIC LAPAROSCOPY

Trainee Name:		StR Year:		Date:	
Assessor Name:		Post:			
<b>Clinical details of complexity/ difficulty of case</b>					

	Performed independently	Needs help	Not Applicable
PLEASE TICK RELEVANT BOX			
<b>Preparation of the patient:</b>			
Ensures correct positioning of the patient			
Checked or observed catheterisation, pelvic examination and insertion of uterine manipulator where appropriate			
<b>Establishing pneumoperitoneum</b>			
Demonstrates knowledge of instruments and can trouble shoot problems			
Check patency and function of Veress (if used)			
Correct incision			
Controlled insertion of Veress (if used)			
Insufflation to at least 20 mmHg			
Controlled insertion of primary port			
Controlled insertion of secondary port under direct vision			
<b>Operative procedure</b>			
Maintains correct position of optics			
Clear inspection of pelvic and abdominal structures			
Movements: fluid and atraumatic			
Appropriate use of assistants (if applicable)			
Correct interpretation of operative findings			
Removal of ports under direct vision			
Deflation of pneumoperitoneum			
Appropriate skin closure			

Both sides of this form to be completed and signed

## GENERIC TECHNICAL SKILLS ASSESSMENT

Assessor, please ring the candidate's performance for each of the following factors:

<b>Respect for tissue</b>	Frequently used unnecessary force on tissue or caused damage by inappropriate use of instruments.	Careful handling of tissue but occasionally causes inadvertent damage.	Consistently handled tissues appropriately with minimal damage.
<b>Time, motion and flow of operation and forward planning</b>	Many unnecessary moves. Frequently stopped operating or needed to discuss next move.	Makes reasonable progress but some unnecessary moves. Sound knowledge of operation but slightly disjointed at times.	Economy of movement and maximum efficiency. Obviously planned course of operation with effortless flow from one move to the next.
<b>Knowledge and handling of instruments</b>	Lack of knowledge of instruments.	Competent use of instruments but occasionally awkward or tentative.	Obvious familiarity with instruments.
<b>Suturing and knotting skills as appropriate for the procedure</b>	Placed sutures inaccurately or tied knots insecurely and lacked attention to safety.	Knotting and suturing usually reliable but sometimes awkward.	Consistently placed sutures accurately with appropriate and secure knots and with proper attention to safety.
<b>Technical use of assistants Relations with patient and the surgical team</b>	Consistently placed assistants poorly or failed to use assistants. Communicated poorly or frequently showed lack of awareness of the needs of the patient and/or the professional team.	Appropriate use of assistant most of the time. Reasonable communication and awareness of the needs of the patient and/or of the professional team.	Strategically used assistants to the best advantage at all times. Consistently communicated and acted with awareness of the needs of the patient and/or of the professional team.
<b>Insight/attitude</b>	Poor understanding of areas of weakness.	Some understanding of areas of weakness.	Fully understands areas of weakness.
<b>Documentation of procedures</b>	Limited documentation, poorly written.	Adequate documentation but with some omissions or areas that need elaborating.	Comprehensive legible documentation, indicating findings, procedure and postoperative management.

Based on the checklist and the Generic Technical Skills Assessment, Dr ..... has achieved/failed\* to achieve the OSAT competency

Needs further help with: * *	Competent to perform the entire procedure without the need for supervision
Date	Date
Signed (trainer)	Signed
Signed (trainee)	Signed

Delete where applicable, and date and sign the relevant box

# NOTSS example

Hospital ..... Trainer name ..... Date .....

Trainee name ..... Operation .....

Category	Category rating*	Element	Element rating*	Feedback on performance and debriefing notes
Situation Awareness		Gathering information		
		Understanding information		
		Projecting and anticipating future state		
Decision Making		Considering options		
		Selecting and communicating option		
		Implementing and reviewing decisions		
Communication and Teamwork		Exchanging information		
		Establishing a shared understanding		
		Co-ordinating team activities		
Leadership		Setting and maintaining standards		
		Supporting others		
		Coping with pressure		

\* 1 Poor; 2 Marginal; 3 Acceptable; 4 Good; N/A Not Applicable

- 1 Poor Performance endangered or potentially endangered patient safety, serious remediation is required
- 2 Marginal Performance indicated cause for concern, considerable improvement is needed
- 3 Acceptable Performance was of a satisfactory standard but could be improved
- 4 Good Performance was of a consistently high standard, enhancing patient safety; it could be used as a positive example for others
- N/A Not Applicable

# Subjects and Sample Size

- Trainees surgeons in five surgical specialties  
(Upper GI, Vascular, Cardiothoracic, Orthopaedic, Obs & Gynae)
- Two index procedures per speciality
- 50 cases for each of 10 index procedures

PBA/OSATS    Supervising Consultant/SpR  
                  + Independent Assessors

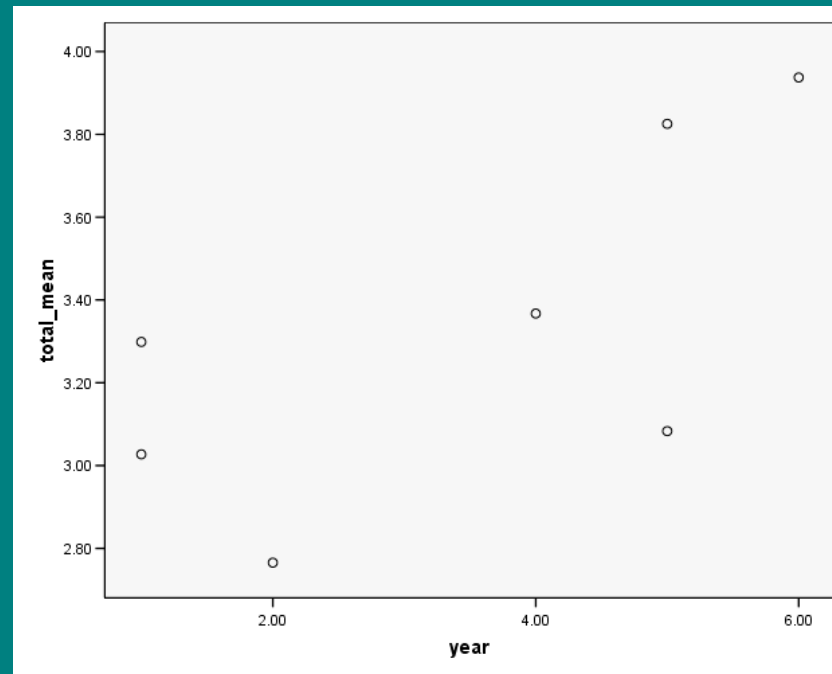
NOTSS        Consultant/Senior Anaesthetist  
                  + Independent Assessors

# Interim Data

- 9 trainees (male, mean age 34, median ST level 3)
- 12 observers (10 anaesthetists, 2 independent assessors)
- 43 cases assessed = 62 total NOTSS
- Mean NOTSS 4.8 (1-10) per trainee
- Case mix: 14 hernias, 28 lap cholecyst, 1 TKR
- Case Complexity: 48% (assessed by supervising surgeons)

# Validity

- Construct validity: relationship between NOTSS score and training year
- Factor analysis: strong 'category' structure



# Factor Analysis

	1	2	3	4
<b><u>Situation category</u></b>	0.26	0.25	0.88	0.20
Gathering info	0.24	0.29	0.69	0.14
Understanding info	0.46	0.19	0.57	0.26
Projecting	0.54	0.36	0.35	0.36
<b><u>Decision category</u></b>	0.85	0.33	0.25	0.27
Options	0.72	0.34	0.38	0.17
Selecting option	0.83	0.32	0.28	0.26
Implementing	0.72	0.32	0.27	0.27
<b><u>Communication category</u></b>	0.39	0.82	0.34	0.22
Exchanging info	0.39	0.77	0.19	0.25
Shared understanding	0.45	0.65	0.3	0.32
Co-ordinating	0.25	0.66	0.49	0.27
<b><u>Leadership category</u></b>	0.27	0.25	0.35	0.68
Setting standards	0.39	0.37	0.39	0.49
Supporting	0.18	0.17	0.09	0.86
Coping	0.39	0.2	0.13	0.44

Use of exploratory factor analysis

# Reliability (Generalisability theory)

		Numbers of Observers			
		1	2	3	4
Cases per Observer	1	0.39	0.56	0.66	0.72
	2	0.48	0.65	0.74	0.79
	3	0.52	0.69	0.77	0.81
	4	0.55	0.71	0.78	0.83

Nested design (assuming 1 observer/case and no overlap of observers across trainees)

# Future research

- Ethics approval for assessments of emergency cases within obs and gynae
- Sharing of video recordings with NOTSS team for further reliability work

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