The Association of Laparoscopic & Robotic Surgeons of Great Britain and Ireland (ALRSGBI)

Robotic Driving Licence

Overview

This a competence-based training curriculum which is endorsed by the ALRSGBI and aims to train and accredit surgeons in basic robotic surgical skills. This modular pre-clinical core robotic skills training curriculum is designed to address specific competencies related to the acquisition of knowledge, technical and non-technical basic robotic skills. This can be used to inform institutions and training programmes about the specific attained skills and can guide subsequent subspecialty robotic training programmes.

The Robotic Driving Licence curriculum is delivered over a four-day course at The Griffin Institute covering the foundation of robotic skills, incorporating proficiency-based training with formative and summative assessment across four domains of robotic skills: non-technical skills, virtual reality, dry and wet lab. This programme has been fully evaluated using validated objective assessment tools and curriculum methodologies.

Selection process

The course is targeted at senior trainees, fellows and consultants who are robotic surgery novices. The selection process will be carried out via ALSGBI and managed by the Robotic Steering Group of the association. Priority will be given to those who have direct access to robots (either at their current institution or in their immediate post within 6 months from attending the programme to apply the learned skills. The main components of the curriculum are:

1. Knowledge component

A pre-course manual has been prepared to provide the learners with educational materials including which must be read prior to attending the course. The main components of this material will be re-visited during the programme and delegates will be tested on their knowledge with multiple choice questions.

2. Hands-on practice on the console

A four-day course with extensive faculty input to supervise the delegates across all the phases

1. Introduction to the robot including system and instrument appraisal
2. Port placement
3. Docking and undocking
4. Troubleshooting, including instrument clashing and emergency undocking
5. Simulation exercises using VR
6. Dry lab exercises (see timetable)
7. Wet lab exercises (see timetable)

TIMETABLE

Day 1

Time	**Topic: Introduction to systems, VR and Dry Lab**	Venue
09:00	Registration	TGI seminar room
09:10	Introduction from ALSGBI faculty	TGI seminar room
09:30	1. Systems run through, docking, targeting anatomy (Xi only), safe instrument insertion, safe communication, undocking **(All participants to practice**) 2. VR simulation- explanation, run through, then practice - Start with "Intro to DV" then complete FRS (>90% in all modules with evidence)	TGI Robotics lab
12:30	Lunch	
13:30	1. Docking/undocking 2. VR Simulation 3. Formative feedback with dry model tasks: - Sea Spikes - Ring Rollercoaster 4. - Docking Assessment	TGI Robotics lab
16:30	Reflection and final discussion	TGI seminar room
17:00	Close	

Day 2

Time	**Topic: VR and Dry Lab**	Venue
09:00	Registration	TGI seminar room
09:30	1. All participants to dock 2. VR Simulation 3. Complete formative feedback sessions of dry model tasks: - Glove cutting - Camera target relay - Interrupted suture 4. Undocking and stowing for lunch	TGI Robotics lab
12:30	Lunch	
13:30	1. Docking 2. VR simulation and Dry model practice 3. Undock	TGI Robotics lab
16:30	Reflection and final discussion	TGI seminar room
17:00	Close	

Day 3

Time	**Topic: Wet Lab**	Venue
09:00	Registration	TGI seminar room

09:30	1. Wet Lab with air docking: Porcine small bowel handsewn & stapled anastomosis and chicken vessel dissection/ligation	TGI Robotics lab
12:30	Lunch	
13:30	1. Wet Lab: Porcine small bowel handsewn & stapled anastomosis and chicken vessel dissection/ligation 2. Continued VR 3. Summative assessments for: o Chicken Thigh o Sea Spikes o Ring Rollercoaster o Glove Cut 4. Run through of emergency undocking then all participants to do in groups	TGI Robotics lab
16:30	Reflection and final discussion	TGI seminar room
17:00	Close	

Day 4

Time	**Topic: Complete VR competency & Summative assessments**	Venue
09:00	Registration	TGI seminar room
All Day	**VR Competency (>90% in the stated VR Tasks)** **Other assessments:** 1. Summative assessments: - Interrupted suture, - Camera Target Relay 2. Docking Assessment 3. MCQ	TGI Robotics lab
12:30	Lunch	
13:30	Complete outstanding tasks	TGI Robotics lab
16:30	Reflection, feedback and final discussion	TGI seminar room
17:00	Close	

Formative assessment

During the course, delegates will receive feedback on their performance and

a. Robotic virtual simulation and technical skills rehearsal: Candidates will be asked to complete VR tasks from the Intro to DV and FRS curriculum on da Vinci SimNow. Requiring 90% or over, a validated benchmark, on all tasks to reach competency.
Feedback will be provided on 5 dry model tasks (sea spikes, ring rollercoaster, glove cutting, camera target relay and suture/knot tying) using a formative assessment tool, Modifiable-Global Evaluative Assessment of Robotic Skills (M-GEARS).

b. Robotic systems and non-technical skills rehearsal: delegates are expected to practice all the various components of basic robotic skills including docking and undocking; target anatomy, reverse communication, port placement and troubleshooting of recoverable and non-recoverable faults. Non-technical skills will be assessed on the summative cyst model assessment as the surgeon and as the bedside/patient cart assistant.

Summative assessment

The accreditation of this programme will be carried out via objective assessment of:

a) *Knowledge:* will be assessed via MCQs (which will take place on the last day 20 MCQs for 30 minutes). This represents 20% of the total marks. Alternatively we are considering using the validated, benchmarked online Fundamentals of Robotic Skills MCQ via the app (FRS Registration — Institute for Surgical Excellence) which will be trialled on this course. We will look to gain your feedback from this.
b) *Dry model M-GEARS scores for all 5 tasks.* This represents 40% of your total marks
c) *OSCE stations* to assess the technical and non-technical skills (represents 40% of the total marks):
   i) robotic docking, safe instrument insertion and undocking scenario
   ii) robotic cyst model
d) *VR simulation* sign off required to complete the course reaching 90% or over in the defined 10 tasks (see Appendix 1). This can be completed before, during or after the programme.

Appendix 1: VR simulation exercises in ALSGBI/EAES robotic curriculum

1. SEA SPIKES 1 (Intro to DV section)
2. RING ROLLERCOASTER 1 (Intro to DV section)
3. WRIST ARTICULATION 1 (Intro to DV section)
4. CAMERA 0 (Intro to DV section)
5. VESSEL ENERGY DISSECTION (FRS curriculum section)
6. KNOT TYING (FRS curriculum section)
7. PUZZLE PIECE DISSECTION (FRS curriculum section)
8. RING TOWER TRANSFER (FRS curriculum section)
9. RAILROAD TRACK (FRS curriculum section)
10. 4th ARM CUTTING (FRS curriculum section)

The last page shows the global rating scale tool, modifiable-GEARS, used for dry lab assessments.

Modifiable- Global Evaluative Assessment of Robotic Skills (M-GEARS)	
Assessment: **Trainer/Assessor Name:** **Hospital/Venue:** **Skill/Procedure:** **Trainee Name and Level of Expertise:** **Date:**	
Depth Perception	☐ **1.** Constantly overshoots target, wide swings, slow to correct ☐ **2.** ☐ **3**. Some overshooting or missing target, but quick to correct ☐ **4**. ☐ **5**. Accurately directs instruments in the correct plane to target
Dexterity with multiple wristed instruments	☐ **1.** Uses only one hand, ignores non dominant hand including 3rd arm. No/poor co-ordination, No/poor use of wristed instrumentation or creation of workspace. Swapping instrument control disrupts flow of task progress. ☐ **2.** ☐ **3.**Uses both hands but does not optimize interaction between hands. Wristed degrees of freedom used for most tasks, multiple attempts to optimise angle. If using 3 instruments; attempts to create workspace may have collisions. Managing positions of all 3 instruments may lack coordination or disrupt flow of task progress. ☐ **4.** ☐ **5**. Expertly uses both hands in a complementary way to provide optimal exposure, if using 3 instruments: Creates optimal workspace, rare/no collisions, efficient use of all instruments inc wristed degrees of freedom, dynamic flow and task progress.
Efficiency/Flow of operation	☐ **1**. Inefficient efforts; many tentative movements; constantly changing focus or persisting without progress ☐ **2**. ☐ **3**. Slow, but planned movements are reasonably organized ☐ **4.** ☐ **5**. Confident, efficient and safe conduct, maintains focus on task, fluid progression
Force sensitivity & tissue handling	☐ **1.** Rough moves, tears tissue, injures nearby structures, poor control, frequent suture breakage ☐ **2.** ☐ **3.** Handles tissue reasonably well, minor trauma to adjacent tissue, rare suture breakage ☐ **4.** ☐ **5.** Applies appropriate tension, negligible injury to adjacent structures, no suture breakage
Autonomy N/A ☐	☐ **1.** Unable to complete entire task, even with verbal guidance ☐ **2.** ☐ **3.** Able to complete task safely with moderate verbal guidance ☐ **4.** ☐ **5.** Able to complete task independently without verbal prompting
Master manipulator workspace/Robotic control N/A ☐	☐ **1.** Consistently does not optimize view, hand position, or repeated collisions even with guidance ☐ **2.** ☐ **3.** View is sometimes not optimal. Occasionally needs to relocate arms. Occasional collisions and obstruction of assistant ☐ **4.** ☐ **5.** Controls camera/hand position optimally and independently. Minimal collisions or obstruction of assistant
Basic energy Skills N/A ☐	☐ **1.** Does not know which energy pedals/buttons do which function. Does not use on screen icons, incorrect use with near miss or consequential error ☐ **2.** ☐ **3.** Rarely needs multiple attempts to select and press intended energy pedal/button. Uses onscreen icons to assist if needed ☐ **4.** ☐ **5**. Presses pedal/button only for intended instrument. Uses onscreen icons to assist if needed
Overall performance/quality of the final product	☐ **1**. Very poor ☐ **2**. ☐ **3.**Competent ☐ **4.** ☐ **5.**Clearly superior
Total score: **/40** (Please modify score if the domain if it is not assessed i.e. autonomy not assessed if blinded review or energy device if not used) **Case difficulty:** ☐ 1. Very easy task, ideal anatomy, if simulator is it novice level task 2. Moderately difficult task, if simulator is it intermediate level 3. Difficult task or anatomy e.g. obesity, chemoradiotherapy, adhesions, narrow workspace, if simulator is it advanced level **Additional comments** Feedback for improvement and Trainee learning points:	