

Laparoscopic Surgical Skills (LSS) Curriculum – Grade 1 Level 1



Description of the LSS Multi-Level Programme

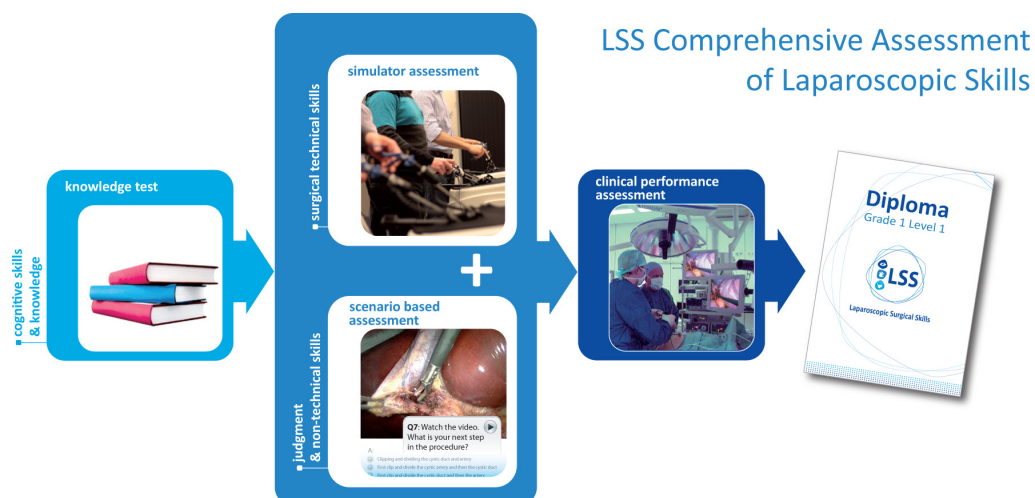
Recent reports on safety and quality of surgical performance, as for example by the World Health Organization, stress the urgent need for improvement of training, assessment, and accreditation for technology dependent surgical procedures such as laparoscopy. Laparoscopic Surgical Skills (LSS) is the answer to satisfy the needs of both the surgeons and the healthcare authorities. LSS is an initiative by the European Association for Endoscopic Surgery (EAES) to provide a standard to (re)credential surgeons to perform laparoscopic surgery effectively and safely. LSS focuses on safeguarding the quality of performance in laparoscopic procedures and goes beyond the basic skills. LSS is the first standard that combines criterion-based assessment in the skills lab with clinical assessment of performance on index procedures. Within each LSS level, the assessment

incorporates a sequence of tests to evaluate a surgeon's proficiency in cognitive skills, surgical technical skills, and judgment.

The LSS programme is divided into two grades. Grade 1 is divided into three consecutive levels and includes all basic laparoscopic skills and fundamental laparoscopic procedures. Grade 2 consists of several separate assessments each focusing on a specific advanced laparoscopic procedure.

Description of LSS Grade 1 Level 1 Accredited Courses

The LSS accredited courses follow a goal-oriented and criterion-based approach which takes the training needs of each individual participant into account. The courses are constructed around hands-on simulator training and interactive expert discussions. The LSS assessments are an integrated part of LSS accredited courses.



Description of the LSS Assessments

To certify that participants have reached the appropriate level of performance required to obtain the certificate for LSS Grade 1 Level 1, they need to pass all of the following performance assessments:

- ◆ Knowledge test
- ◆ Scenario based assessment
- ◆ Simulator assessment
- ◆ Clinical performance assessment

Objectives

The LSS Grade 1 Level 1 accredited courses aim to teach and assess the knowledge and skills that a surgeon requires to effectively and safely perform laparoscopic cholecystectomy, laparoscopic appendectomy, and diagnostic laparoscopy.

Specialties

- ◆ All surgical specialties involving laparoscopic procedures.

Target Audience

All who meet the eligibility requirements can enrol for the LSS Grade 1 Level 1 assessment. For the subsequent levels additional conditions for enrolment apply. Eligible candidates can enrol either for the LSS assessment or for an LSS accredited course, of which the LSS assessment is an integral part. This provides surgeons of all levels of expertise the opportunity to efficiently obtain LSS accreditation.

Eligible to register for LSS assessments or LSS accredited courses are:

- ◆ Surgical trainees and fellows enrolled in an accredited programme for general surgery, urology, gynaecology, paediatric surgery, or other specialty involving laparoscopic procedures.
- ◆ Certified practicing surgeons, urologists, gynaecologists, paediatric surgeons, or other physicians performing laparoscopic procedures.

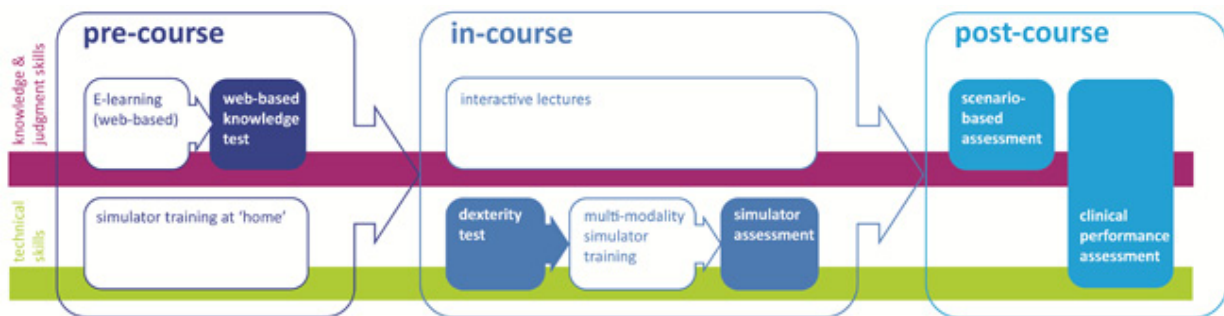
Assumptions

Knowledge

All participants who enrol for LSS Grade 1 Level 1 are provided with the course documents describing the theory and knowledge that need to be acquired on the index procedures corresponding to LSS Grade 1 Level 1. Proper knowledge of the generic laparoscopic topics is also considered to be essential within each LSS level. Adequate acquaintance with the theory presented in the LSS course documents is tested using a knowledge test. Passing this web-based exam is a requirement to being admitted to the scenario based assessment and simulator assessment.

Basic psychomotor skills

Possessing basic laparoscopic skills is essential before mastering the procedural skills. To get the most out of the LSS Grade 1 Level 1 course, participants are expected to start practicing their basic laparoscopic skills at their home institute prior to the course. The pre-course training can be done on any kind of validated simulator system offering basic laparoscopic skills training- box trainer, virtual reality, or augmented reality systems. To verify the baseline basic laparoscopic skills level of each participant, LSS accredited courses start with a dexterity test.



Authors

Development, validation and project coordination of LSS are done by:

Project leaders:

- ◆ Prof. dr. Jack Jakimowicz
- ◆ Prof. dr. George Hanna
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Scientific project coordination:

- ◆ Dr.ir. Sonja Buzink

Operations, logistics & finance:

- ◆ Excellence in Society and Congress

Hands-On Training within LSS Grade 1 Level 1 Accredited Courses

A large portion of the course is allocated to deliberate and repetitive hands-on training of basic and procedural laparoscopic skills on simulators. For each task or skill the best fitted simulation modality is selected. Virtual reality simulation tools, box trainers and augmented reality simulation tools can be utilized in the course. A variation of simulation modalities enlarges the transferability of skills and keeps repetitive training of basic skills interesting.

1. Knowledge Test

Passing the web-based knowledge test for LSS Grade 1 Level 1 is a requirement to be admitted to the scenario based assessment and simulator assessment.

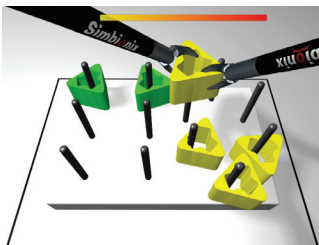
2. Prepare for an LSS Grade 1 Level 1 Accredited Course

Course participants are expected to practice their basic laparoscopic skills at their home institute prior to the course. The pre-course training can be done on any kind of validated simulator system offering basic laparoscopic skills training; box trainer, virtual reality, or augmented reality systems.

The 'Laparoscopic basic skills' and 'Essential skills' modules on the LAP Mentor™ simulator provide a variety of exercises to train in the different basic skills and prepare for an LSS Grade 1 Level 1 accredited course.

Instructions:

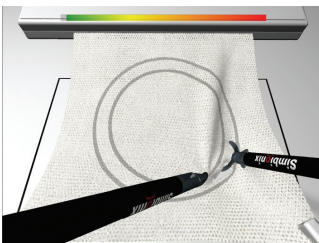
- ◆ Before each training task, participants should become properly familiar with the objectives of the exercise and how to perform it well. Preferably this is done by an expert instructor.
- ◆ Repetitive practice of a broad variety of exercises to train in basic skills is recommended.
- ◆ Distributing the training sessions over multiple days is recommended.
- ◆ The performance benchmarks set for the Dexterity Test can be used to support the pre-course simulator training.



Essential Skills Task 1 – Peg Transfer

Task Description:

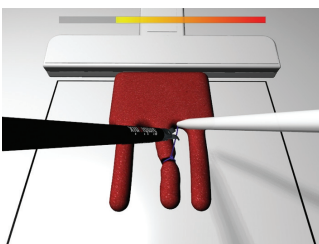
Lift objects from the pegboard with one hand, transfer to the other hand and place them over the pegs on the other pegboard. Then reverse the procedure.



Essential Skills Task 2 - Pattern Cutting (Training Gauze)

Task Description:

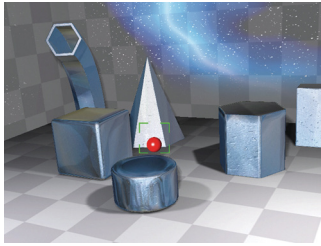
Cut out a circle from a square piece of gauze suspended between clips.



Essential Skills Task 3 – Placement of Ligating Loop

Task Description:

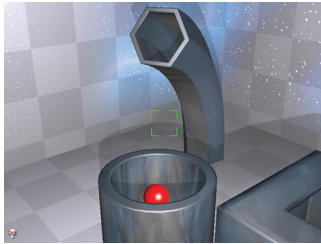
Place the ligating loop around a foam appendage on the provided mark as accurately as possible.



Basic Skills Task 1 - Camera Manipulation 0°

Task Description:

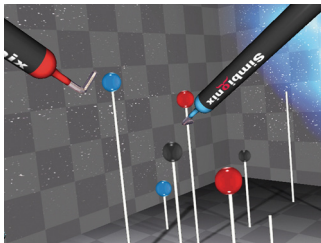
Using a 0° camera, locate and snap photographs of ten balls, in an abstract environment.



Basic Skills Task 2 - Camera Manipulation 30°

Task Description:

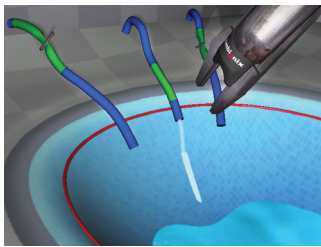
Using a 30° angled camera, locate and snap photographs of ten balls, in an abstract environment.



Basic Skills Task 3 - Eye-Hand Coordination

Task Description:

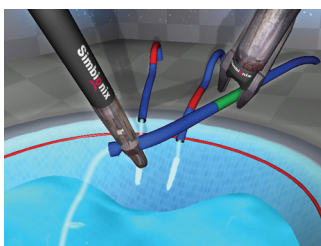
Locate each flashing ball and touch it with the tool of the appropriate color.



Basic Skills Task 4 - Clip Application

Task Description:

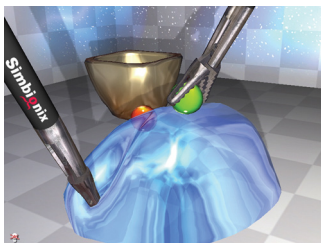
Clip leaking ducts within a specified segment, before the pool fills.



Basic Skills Task 5 - Clipping and Grasping

Task Description:

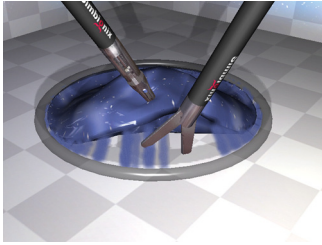
Safely grasp and clip leaking ducts within a specified segment, before the pool fills.



Basic Skills Task 6 - Two-Handed Maneuvers

Task Description:

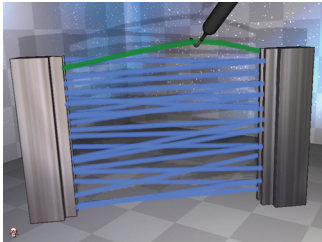
Use two graspers to locate the balls within the jelly mass and then place them in the endbag.



Basic Skills Task 7 - Cutting

Task Description:

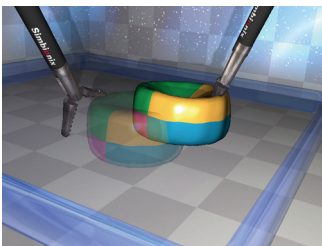
Safely cut and separate a circular form using one tool to retract, and the scissors to cut accurately.



Basic Skills Task 8 – Electrocautery

Task Description:

Use a hook to burn the highlighted band, while retracting other bands with an accessory instrument.



Basic Skills Task 9 - Translocation of Objects

Task Description:

Manipulate object with two graspers and, with a minimum number of translocations, place the object into the orientation of the matching transparent object.

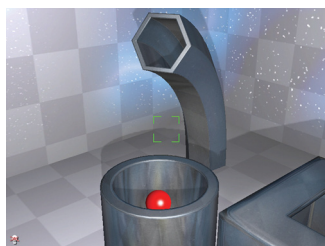
3. Dexterity Test

The hands-on training of LSS Grade 1 Level 1 accredited courses commences with a baseline assessment of basic laparoscopic skills: the Dexterity Test. This test gives the participant and trainers insight as to the baseline performance level of the participant. It also provides means to monitor the progression of the participants during the training.

The dexterity test for LSS Grade 1 Level 1 includes three basic tasks: Navigation with a 30° laparoscope, Transferring pegs, and Pattern cutting.

Instructions:

- ◆ Prior to the Dexterity Test all exercises included in the test are explained by an expert instructor.
- ◆ 2 repetitions should be preformed of each task.



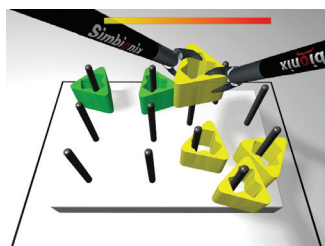
Basic Skills Task 1 - Camera Manipulation 30°

Task Description:

Using a 30° camera, locate and snap photographs of ten balls, in an abstract environment.

Benchmarks to be achieved concurrently within one task repetition:

- ◆ Number of correct hits 10
- ◆ Accuracy rate of hits $\geq 90.9\%$
- ◆ Total time $\leq 1:24$



Essential Skills Task 1 – Peg Transfer

Task Description:

Lift objects from the pegboard with one hand, transfer to the other hand and place them over the pegs on the other pegboard. Then reverse the procedure.

Benchmarks to be achieved concurrently within one task repetition:

- ◆ Pegs not transferred 0
- ◆ Total time to complete $\leq 2:30$



Essential Skills Task 2 - Pattern Cutting (Training Gauze)

Task Description:

Cut out a circle from a square piece of gauze suspended between clips.

Benchmarks to be achieved concurrently within one task repetition:

- ◆ Accuracy error – Outside of 1mm No
- ◆ Total time to complete $\leq 2:30$

4. In-Course Training

Hands-on simulator training in LSS Grade 1 Level 1 accredited courses focuses mainly on the procedural tasks of laparoscopic cholecystectomy, laparoscopic appendectomy and diagnostic laparoscopy.

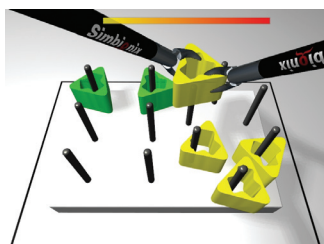
The hands-on training in LSS accredited courses is criterion-based. The performance parameters provided by the simulators throughout the training provide the participants and trainers with direct feedback on milestone achievements. The participants are able to adjust the hands-on training to their individual needs and training style within the outlined course schedule.

Participants who succeed in achieving the training benchmarks within the course should not have much difficulty to pass the Simulator Assessment.

The 'Procedural Tasks – Lap Chole', 'Full Procedures – Lap Chole', 'Laparoscopic Basic Skills', and 'Essential Skills' modules on the LAP Mentor simulator provide a variety of exercises to practice the various procedural skills and prepare for the LSS Grade 1 Level 1 Simulator Assessment.

Instructions:

- ◆ Before each training task, participants should become properly familiar with the objectives of the exercise and how to perform it well. Preferably this is done by an expert instructor.
- ◆ Repetitive practice of a broad variety of exercises to train in procedural skills is recommended.
- ◆ Exercises to train in basic skills should also be deliberately practiced.
- ◆ Training benchmarks are provided for most of the simulator tasks that are part of the Simulator Assessment, except for the complete LAP Chole procedures.



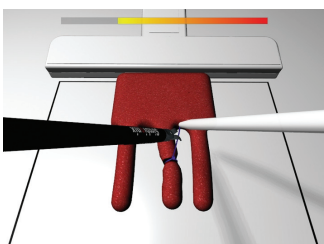
Essential Skills Task 1 – Peg Transfer

Task Description:

Lift objects from the pegboard with one hand, transfer to the other hand and place them over the pegs on the other pegboard. Then reverse the procedure.

Benchmarks to be achieved concurrently within one task repetition:

- ◆ Pegs not transferred 0
- ◆ Total time to complete ≤ 1:30



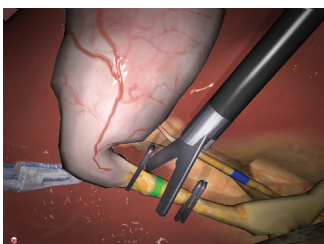
Essential Skills Task 3 – Placement of Ligating Loop

Task Description:

Place the ligating loop around a foam appendage on the provided mark as accurately as possible.

Benchmarks to be achieved concurrently within one task repetition:

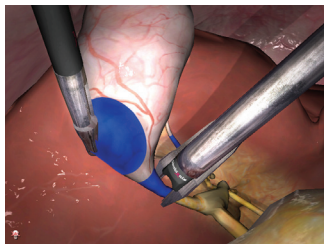
- ◆ Insecure knot No
- ◆ Accuracy error – Outside of 1 mm No
- ◆ Total time ≤ 0:53



Procedural Task 1 - Clipping and Cutting - Retracted Gallbladder

Task Description:

Gallbladder already exposed with Hartmann's pouch retracted by a static tool. Clip the cystic artery and duct within a specified area and then cut safely between the clips.



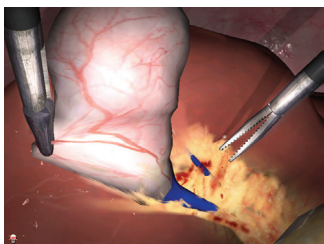
Procedural Task 2 - Clipping and Cutting Using Two Hands

Task Description:

With the gallbladder already exposed use a blunt grasper to retract Hartmann's pouch. Once correct retraction is achieved, clip the cystic artery and duct within a specified area and then cut safely between the clips.

Benchmarks to be achieved concurrently within one task repetition:

◆ Safe clipping (distance distal clip - infundibulum)	≥ 8 mm
◆ Number of perforations	0
◆ Number of non-cauterized bleedings	0
◆ Number of serious complications	0
◆ Total time	≤3:51



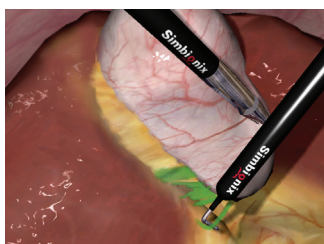
Procedural Task 3 - Dissection - Achieving the 'Critical View'

Task Description:

Grasp the infundibulum of the gallbladder, retract away from the liver, and dissect the peritoneal coverings to expose the cystic duct and artery.

Benchmarks to be achieved concurrently within one task repetition:

◆ Completed dissection	60 - 85 %
◆ Safe cautery	≥ 75 %
◆ Efficiency of cautery	≥ 60 %
◆ Number of perforations	0
◆ Number of non-cauterized bleedings	0
◆ Number of serious complications	0
◆ Total time	≤ 4:38



Procedural Task 4 - Gallbladder Separation

Task Description:

Separate the gallbladder from the liver bed with appropriate retraction and dissection of the peritoneal adhesions to the liver bed. Continue dissection until the gallbladder is free from the liver.

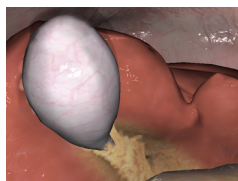
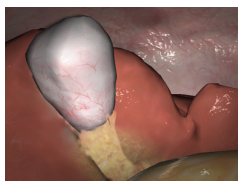
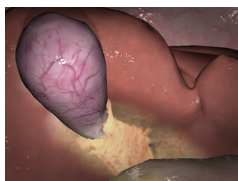
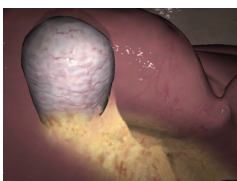


Cases 1-6 - Laparoscopic Cholecystectomy

Task Description:

Practice a complete cholecystectomy procedure.

18 anatomical variations of easy to difficult anatomical variations to the cystic duct and positions of arteries, which may otherwise not be experienced during a training period. The module enables free-style training using different techniques, alternative approaches, and acquisition of the skill and knowledge necessary to safely cope with possible complications.



5. Simulator Assessment

The simulator assessment certifies that participants have achieved a sufficient level of psychomotor and technical surgical skills to start performing the specific index procedures in the clinic under supervision of an acknowledged trainer. To pass the simulator assessment successfully, the participant needs to reliably demonstrate sufficient performance of a selection of basic and procedural tasks on the assessment simulator. The LSS assessment focuses on procedural knowledge and skills. Since possessing basic laparoscopic skills is essential before mastering the procedural skills, the simulator assessments of all LSS levels comprise some basic tasks as well.

Instructions:

Participants who take part in an LSS accredited course for Grade 1 Level 1 and succeed to achieve the training benchmarks within the course should not have much difficulty to pass the Simulator Assessment. Participants who do not pass the Simulator Assessment are required to take the Simulator Assessment again on another day, after additional training. Passing the Simulator Assessment is required to take part in the Clinical Performance



Assessment.

The simulator assessment for LSS Grade 1 Level 1 consists of multiple repetitions of one basic task, three procedural tasks and one complete laparoscopic cholecystectomy procedure:

- ◆ Transferring pegs
- ◆ Placing a ligating loop
- ◆ Achieving critical view of safety
- ◆ Clipping & cutting cystic duct & artery
- ◆ Complete laparoscopic cholecystectomy procedure

Become an LSS Accredited Training Centre

LSS assessments and accredited courses are offered in an increasing number of training centres throughout Europe. Your training centre can become an LSS accredited training centre too! All training centres that run courses for laparoscopic surgery are invited to apply. There are specific accreditation requirements that need to be fulfilled to warrant the contents and quality of LSS accredited courses and LSS assessments. Still, training centres have freedom in the selection of (validated) simulation tools for the training. The LSS office issues the LSS diploma.

For more information on the accreditation process for training centres, please contact the LSS office.

Acknowledgements



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