Veterinary surgery skills lab

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Veterinary surgery skills lab

- Integrated part of small animal clinical master curriculum
  - Since December 2010
- Practice surgery skills using inanimate models
- Prepare for clinical practice on real animals
- Very low level of personal guidance
- At this time primarily soft tissue surgery
Veterinary surgery skills lab

- Background
- Aims
- Model development
- Assessment of student perception
- Preliminary conclusions
- Future perspectives
Veterinary surgery skills lab
- background -

• ‘see one, do one, teach one’
  • observation without involvement is not effective training
  • Does not provide sufficient skills education in modern VTH

• Modern veterinary teaching hospital (VTH):
  • High specialist case-load
    – Complex procedures
  • ‘Need for speed’ (efficiency -> profit)
  • Ethical considerations
    – Practice on patients
  • Pressure on students

No adequate hands-on teaching of basic surgical procedures in operating room
Veterinary surgery skills lab
- background -

• Final year students:
  • 33% consider themselves incompetent\(^a\)
  • 80% are concerned to perform ovariohysterectomy (OHE)\(^b\)
  • 50% of instructors feel that students need better training\(^c\)

• At least 4 hands-on assisted OHE’s are required for graduates to be assessed as ‘competent’ by senior surgeons\(^b\)

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Veterinary surgery skills lab
- background -

• **Stages in acquisition of motor (surgical) skills**\(^{a,b,c}\)

<table>
<thead>
<tr>
<th>Phase</th>
<th>Psychomotor element</th>
<th>Focus of instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cognition</td>
<td>Perceptual awareness (understand theory)</td>
</tr>
<tr>
<td>2</td>
<td>Integration</td>
<td>Conversion into mechanical procedures</td>
</tr>
<tr>
<td>3</td>
<td>automation</td>
<td>Speed, efficiency, precision, automatic</td>
</tr>
</tbody>
</table>

• **Inadequate basic skills** -> inefficient learning of advanced procedure (which relies on mastery of basic skills) -> stress and anxiety in operation room

**Example:**
inadequate knot tying impairs learning of the ovariohysterectomy procedure

Veterinary surgery skills lab
- background -

• Traditional solutions for surgical skills training
  • Shelter animals (OHE, castration)
    – For learning *basic* skills -> ethics..
  • Laboratory animals
    – Ethics
    – expensive
• Cadavers
  – Also expensive
  – Also ethical problem (most are purpose-bred)
  – Tissue characteristics not optimal (freezing and decay)
Veterinary surgery skills lab
- background -

- Training outside operation room (OR)
  - Stress-free, quite environment
  - More time to practice
  - Independent learning at own speed

- Acquire automaticity of basic skills -> improve learning in OR

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Veterinary surgery skills lab
- background -

• Inanimate model solutions (bench models)

  – Can improve practical skills and knowledge
    • Improve basic skills and knowledge of procedures\textsuperscript{a,b,c,d,e,f}
    • Students enjoy the type of learning\textsuperscript{a,b,e,f}
    • Students feel more confident to later practice with live animals\textsuperscript{b,f}

Veterinary surgery skills lab  
- background -

• Inanimate model solutions
  – Equally effective as cadavers for basic skills\(^a\)
  – No ethical concerns
  – Better cost-effectiveness than cadavers
  – Limited commercially available ‘high fidelity’ veterinary models
    • expensive
    • Not ‘high fidelity’ concerning actual surgical procedures
  – Low cost, ‘low fidelity’ models
    • Can be equally effective for basic skills teaching\(^a,b\)
    • Functional similarity\(^b\) between model and actual procedure

\(^a\) Anastakis et al. AmJSurg 1999; \(^b\) Langebaek 2011 thesis 2011
Veterinary surgery skills lab

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Veterinary surgery skills lab

- aims -

To develop a surgical skills lab for new curriculum

• Decrease costs
  • Teaching (less contact hours)
  • Inanimate, low cost, low maintenance models

• Decrease use of cadavers and live animals

• Improve learning
  • Basic skills (suturing etc) and ‘advanced’ procedures
  • Provide more time to practice
  • Stress free environment

• Prepare students for surgical practice on real animals
Veterinary surgery skills lab

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Veterinary surgery skills lab
- model development -

• 4 research students
  • visit established skills labs (human and veterinary)
    – Copenhagen skills lab by dr. Rikke Langebaek
  • Set up a list of important procedures to model
  • Find good and cheap materials to mimic tissues
  • Build and test prototypes of surgery models
Veterinary surgery skills lab
- model development -

• Important features of effective surgical skills models
  • Clear step-by-step instructions (with photo/video)
  • Functional similarity (not true anatomical similarity)
  • Model all important steps of specific procedures
  • Use materials with realistic tissue-like characteristics
  • Low maintenance
    — Disposable replaceable parts

Langebaek et al. 2011 PhD thesis
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
  • Basic cutting and suturing
  • Alike the DASIE model\(^a\)

\(^a\): Holmberg et al. JvetMedEdu 1993
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
  • Castration male cat
  • Emphasis on auto-ligation of spermatic cord
Veterinary surgery skills lab
- model development -

- Example of skills lab models in Utrecht
  - Prescrotal castration of male dog
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
• Placement of emergency tracheostomy tube
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
  • Ovariectomy dog
    – Ligate bleeding pedicle
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
  • Placement of esophageal feeding tube
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht
  • venipuncture
Veterinary surgery skills lab
- model development -

• Example of skills lab models in Utrecht

• Tumor excision
  – Surgery planning
  – Ligate bleeding vessels in subcutis
Veterinary surgery skills lab
- implementation -

Surgical education in the Utrecht small animal curriculum

1. Skills lab  
   Basic surgical skills  
   practice common procedures

2. Cadavers  
   basic skills and procedures

3. Operation room (patients)  
   perform spays and castrations  
   under guidance of surgeon  
   and assist in surgery
Veterinary surgery skills lab
- implementation -

- Each student purchases a standard instrument set
  - 15 euro
Veterinary surgery skills lab
- implementation -

• 1 dedicated skills lab room, educational grant by Johnson&Johnson
Veterinary surgery skills lab
- implementation -

• 4 sessions of 3 hours scheduled in student program
  • Abdominal, urological, ENT, tumor surgery

• Each session:
  • Easy model set-up
    – using pre-fabricated replaceable model-parts
  • Cheap suture
    – monofilament nylon (fishing wire) and multifilament sewing wire
  • Limited use of real disposable suture,
    – provided by Johnson&Johnson™
Veterinary surgery skills lab

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Veterinary surgery skills lab
- student assessment -

• Questionnaire before and after skills lab training
  • Questions concerning usefulness, effectiveness, etc
  • One marked difference after vs. before skills practice:

  **amount of guidance** during practice (which is nearly zero)

• Before:  44% positive, 39% indifferent
• After:   64% positive, 19% indifferent

-> students appreciate independent skills training
Veterinary surgery skills lab
- student assessment -

• Questionnaire results first year

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>– Models are boring?</td>
<td>&lt;5%</td>
<td>&gt;95%</td>
</tr>
<tr>
<td>– Good preparation for clinics?</td>
<td>&gt;90%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>– Models are too simplified?</td>
<td>30%</td>
<td>70%</td>
</tr>
<tr>
<td>– Useful to practice model first?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Suturing</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>• Surgical procedures</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Veterinary surgery skills lab
- student assessment -

• Questionnaire results first year

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>Encouraged study theory?</td>
<td>88%</td>
<td>12%</td>
</tr>
<tr>
<td>Increase knowledge?</td>
<td>&gt;95%</td>
<td>0%</td>
</tr>
<tr>
<td>More secure about skills?</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>Was fun to do?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Irrelevant parts?</td>
<td>8%</td>
<td>92%</td>
</tr>
<tr>
<td>Instructions clear?</td>
<td>89%</td>
<td>11%</td>
</tr>
</tbody>
</table>
Veterinary surgery skills lab
- student assessment -

• Questionnaire results first year

overall rating given by students: **7.5** (out of 10)

>35% of students would have liked more training sessions and more models
Veterinary surgery skills lab

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- Assessment of student perception
- Preliminary conclusions
- Future perspectives
Veterinary surgery skills lab
- preliminary conclusions -

• Successful concept
  • high rating and appreciation students

• Useful to combine basic skills and complete procedures
  • Encourages studying of surgical procedures

• Very cost effective

• Students appreciate independent learning environment
  • But would like some sort of feedback

• Point of possible concern
  • enough control on correct surgical technique?
Veterinary surgery skills lab

- Background
- Aims
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- Assessment of student perception
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- Future perspectives
Veterinary surgery skills lab
- future perspectives -

- Objective evaluation of improvement basic skills
- Short evaluation after each session (feedback)
- Model improvement
- New models
  - endoscopic surgery trainer
  - cooperation with human gynecological endoscopic surgeon
    » PhD validation endoscopic training models
- Orthopedic models?
  - Fracture treatment (conservative and surgical)?
    – Difficult without guidance
  - Arthrocentesis
Veterinary surgery skills lab

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