THE USE OF SIMULATION IN OBSTETRIC ANESTHESIA

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La « machine » de Madame du Coudray

XVIIIᵉ Century; Musée Flaubert d’histoire de la médecine, Rouen
Plan

- What is simulation?
- Why should we use simulation-based training?
- Challenges in obstetric anesthesia
- Simulation in obstetric anesthesia
- Conclusions
Simulation is...

- A situation or environment created to allow persons to experience a representation of real events for the purpose of:
  - Learning
  - Practice
  - Evaluation / Testing
  - Gaining understanding of systems
  - Gaining understanding of human actions

(Harward CMS Definition)
Simulation allows...

- The creation of a safe environment in which to:
  - Teach, learn and practice
    - Technical skills
    - Non technical skills
    - Responses to both common and rare emergencies
  - Elicit responses to clinical scenarios in order to identify areas for improvement at the level of
    - Individuals, teams and systems
  - Promote reflection and provide corrective feedback
  - Explore end results of errors
  - Trial run new procedures and/or processes
## The spectrum of medical simulators

<table>
<thead>
<tr>
<th>Tool or approach</th>
<th>Description/examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-tech simulators</td>
<td>Models or mannequins</td>
</tr>
<tr>
<td>Simulated/standardized patient</td>
<td>Actors trained to role-play patients</td>
</tr>
<tr>
<td>Screen-based computer simulators</td>
<td>Programs to teach and assess clinical knowledge, PBL, decision-making, management.....</td>
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<tr>
<td>Complex task trainers</td>
<td>Hi-fi visual, audio, touch cues. Virtual reality devices.</td>
</tr>
<tr>
<td><strong>Realistic patient simulators</strong></td>
<td>Computer driven, full-length mannequins. Simulated anatomy and physiology. Lifelike setting.</td>
</tr>
</tbody>
</table>
Full scale realistic patient simulators

Control room

High fidelity mannequin + simulated environment

Debriefing room
Plan

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Why should we use simulation-based training?

Educational rationale

- **Principles of “Adult learning”**
  - Contextual learning
  - Experiential learning
  - Reflective practice

- **Other reasons:**
  - Specific competences
  - Possibility to repeat the exercises (drills)
  - Rare events
The experiential cycle in simulation

1. Simulation experience (10-20’)
2. Reflection and interpretation (45’-60’)
3. Compare to existing knowledge
4. Formation of new construct
Why should we use simulation-based training?

- Psycho-cognitive arguments
  - Memory and emotions

- Safety and risk management
  - No risk for the patients
  - Desired outcomes = improved safety and patient care
    
  "To err is human" Institute of Medicine, 1999

- Ethical imperative
Plan

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The labor and delivery suite: A challenging environment

Characterized by:
- Acute stress
- Heavy workload
- 2 (or more) patients
- High stakes for decisions and actions errors

Requires intense:
- Planning and anticipation
- Error free vigilance
- Effective Communication
- Effective multidisciplinary teamwork

Ex Utero Intrapartum Treatment
Kern C et al, SMW 2007

Planning / preparation
Anticipation
Coordination
Avoidable factors

Some maternal deaths remain unavoidable and the care many of these women received was of extremely high quality. However, whilst there has been no increase in the overall percentage of maternal deaths considered to have had avoidable or remediable factors, the assessors were struck by the number of health care professionals who appeared to fail to be able to identify and manage common medical conditions or potential emergencies outside their immediate area of expertise. Resuscitation skills were also considered poor in an unacceptably high number of cases.

In many cases the care provided was hampered by a lack of cross disciplinary or cross agency working and problems with communication. These included:

- poor or non-existent team working
- inappropriate delegation to junior staff
- inappropriate or too short consultations by phone
- the lack of sharing of relevant information between health professionals, including between General Practitioners (GPs) and the maternity team
- poor interpersonal skills.
Joint Commission in the US

Communication and teamwork issues are the most common contributors to:

- Unexpected perinatal deaths and injuries
- Unexpected maternal deaths and injuries
Risk reduction in obstetric practice requires training in:

- Obstetric and neonatal emergencies ("fire drills")
- Multidisciplinary team working
- Human factors
How can we improve teamwork in obstetric?

- Didactic sessions are effective to introduce teamwork concepts and influence safety attitude.
  
  Ex: “The ENSEMBLE Project at the HUG”


- However: “Translation of teamwork concepts into clinical behaviors ...requires a deeper level of integration and hands on experience through clinical team simulations/drills combined with a structured curriculum…”

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Example of complex procedural skills: GA for emergency CS

- At HUG ≈ 1% of the CS are performed under GA!
- ≈ 10/4000 deliveries/year

→ Residents training may be insufficient and inadequate

- Simulation drills may complement clinical teaching

Scavone B et al, Anesthesiology 2006
Simulation and non-technical skills

Nontechnical Skills in Anesthesia Crisis Management with Repeated Exposure to Simulation-based Education


**Anesthesia Residents (n=20)**

- Session #1 → Debriefing #1
- Session #2 → Debriefing #2
- Session #3 → Debriefing #3

1 month

Evaluation of technical by blind raters using the ANTS scale system
Improvement in anesthesia trainees’ non-technical skills
Improving multidisciplinary teamwork and communication at the HUG

- Simulated scenarios to complement existing didactic training

- Participants:
  - Obstetricians
  - Midwives
  - Anesthesiologists
  - Nurse anesthetists
  - OR nurses
  - pediatricians
Objectives of the session:

- Highlight and discuss teamwork issues and Crisis Resource Management principles during critical obstetric emergencies

- Identify areas of improvement
  - Communication
  - Coordination
  - Cognitive bias
  - New strategies
SBAR mnemonics

**SBAR Mnemonics**

SBAR provides a mechanism to frame a conversation so information is conveyed between people in a consistent and reliable way.

<table>
<thead>
<tr>
<th>S – ** Situation:**</th>
<th>What is happening at the present time?</th>
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<tbody>
<tr>
<td>B – ** Background:**</td>
<td>What are the circumstances leading up to this situation?</td>
</tr>
<tr>
<td>A – ** Assessment:**</td>
<td>What do I think the problem is?</td>
</tr>
<tr>
<td>R – ** Recommendation:**</td>
<td>What should we do to correct the problem?</td>
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</table>
Effective SBAR communication

Scenario script:

33 year-old G1 P0
Refuses epidural analgesia
Umbilical cord prolapse
Emergency CS in the delivery room
Situation:
We have a cord prolapse.

Background:
All OR are busy.

Assessment:
We have to do the CS here.

Recommendation:
“Put her off to sleep!”
Effective SBAR communication

- Situation: “We have a cord prolapse”
- Background: “All OR are busy”
- Assessment: “We have to do the CS here”
- Recommendation: “Put her off to sleep!”
Communication and coordination

Lack of communication

↓

Leading to poor coordination
CRM and communication

Closed loop communication

Meant...
  Is not said
Said...
  Is not heard
Heard...
  Is not understood
Understood...
  Is not done!

This is true for Sender and Receiver!
Retrospective cohort study
- All new born singleton from 1998 to 2003

In 2000 teaching Intervention:
- 1 annual day multidisciplinary training
- Didactic + interactive (CTG, EFM guidelines, case base discussion)
- Hands-on sessions : 6 scenarios (Shoulder dystocia, PPH, Eclampsia, Twins, Breech, Adult and neonatal resuscitation)

Outcome measures (pre-post intervention):
- APGAR score at 5’ ≤ 6
- Neonatal Hypoxic-ischeamic-encephalopathy (HIE)
## Results

<table>
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<tr>
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<th>1998–1999</th>
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<tbody>
<tr>
<td></td>
<td>(n= 8430)</td>
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<tr>
<td>5’ Apgar ≤ 6, n (rate / 10,000)</td>
<td>73 (86.6)</td>
</tr>
<tr>
<td>HIE n (rate / 10,000)</td>
<td>23 (27.3)</td>
</tr>
<tr>
<td>Mod/severe HIE n (rate/10,000)</td>
<td>16 (19.0)</td>
</tr>
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<tr>
<td></td>
<td>(n= 11,030)</td>
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<tr>
<td>5’ Apgar ≤ 6, n (rate / 10,000)</td>
<td>49 (44.4)</td>
</tr>
<tr>
<td>HIE n (rate / 10,000)</td>
<td>15 (13.6)</td>
</tr>
<tr>
<td>Mod/severe HIE n (rate/10,000)</td>
<td>11 (10.0)</td>
</tr>
</tbody>
</table>

Relative risk

- 5’ Apgar ≤ 6, n (rate / 10,000): 0.51 (0.35–0.74)
- HIE n (rate / 10,000): 0.50 (0.26–0.95)
- Mod/severe HIE n (rate/10,000): 0.53 (0.24–1.13)
Plan

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Conclusions:
Simulation in obstetric anesthesia ...

- is a useful educational technique
- can be used to teach procedural and non-technical skills
- is a promising tool to foster teamwork and communication
- its use needs to be tailored according to:
  - Learning objectives
  - The level of training of the participants
- needs to be integrated in a broader curriculum
- to fulfill these objectives, we need:
  - Development of regional/national network
  - Support from our specialty society...
Thank you for your attention!