Assessing Healthcare Outcomes: 
Best Practices for Simulation-Based Learning 
and Information Technology

Laura Haubner, MD 
Sonya Malbrough, DNP, MS, CRNA
Agenda

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Review of the literature</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Presentation of assessment tools</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Discussion of tool development</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Workshop activity/interactive exercise</td>
<td>40 minutes</td>
</tr>
</tbody>
</table>

- Provide general instructions
- Video: use of OSCAR assessment tool
- Video: use of TEAM assessment tool
- Discussion of challenges to assessing teams | 30 minutes |

Wrap-up

Learning Objectives

- Discuss peer-reviewed scored tools for a variety of specialty areas
- Evaluate the importance of inter-rater reliability and validation of scoring tools
- Appreciate the need for training the raters using teams performance scoring tools
- Appraise different interdisciplinary team scoring tools designed to meet objectives of a training course
Educational Outcomes

- Participants will be able to:
  - Utilize multiple team performance tools
  - Be able to establish or evaluate inter-rater reliability and validation of scoring tools
  - Choose team performance scoring tools to meet the objectives of a training course
  - Select one tool to be integrated into practice

Review of the Literature:
Assessment Tools
Team Training Assessment Tools

• Assessment of:
  – Knowledge
  – Skills
  – Attitudes (behaviors, non-technical skills)
  – Team/ Individual/ Environment/ System

• Assessment of knowledge/skills/attitudes by:
  – Faculty/Instructors/Trainers
  – Independent raters
  – Learners

Existing non-technical skills assessment tools

• OTAS (Observational teamwork assessment for surgery)
• ANTS (Anesthetist non-technical skills)
• NOTECHS (non-technical skills)
• OSCAR (Observational Skill-based Clinical Assessment tool for Resuscitation)
• TEAM (Team Emergency Assessment Measure)
Existing Tools-Examples

- Learner attitudes
  - TeamSTEPPS perceptions and attitudes

- Team Performance
  - Team: TEAM, OTAS
  - Individual within team: OSCAR, NOTECHS, ANTS

- Clinical Outcomes???

Team STEPPS Perceptions Scale

**Interdisciplinary Education Perceptions Scale: Pre-Test**

1. Individuals in my profession are well trained.
2. Individuals in my profession are able to work closely with individuals in other professions.
3. Individuals in my profession demonstrate a great deal of respect for one another.
4. Individuals in other professions respect the work done by my profession.
5. Individuals in my profession are very positive about their work and accomplishments.
6. Individuals in my profession need to cooperate with other professions.
7. Individuals in my profession are very positive about their work and accomplishments.
8. Individuals in my profession need to cooperate with other professions.
9. Individuals in other professions think highly of my profession.
10. Individuals in my profession treat each other's
differently from individuals in other professions.
11. Individuals in my profession have a higher status
different from individuals in other professions.
12. Individuals in my profession make every effort to understand
their responsibilities and the responsibilities of other professions.
13. Individuals in my profession are willing to share
information and influence with other professions.
14. Individuals in my profession are willing to share
information and influence with other professions.
15. Individuals in my profession are willing to share
information and influence with other professions.
16. Individuals in my profession are willing to share
information and influence with other professions.

Team STEPPS Attitudes Scale

Interdisciplinary Education Attitudes Scale: Pre-Test

<table>
<thead>
<tr>
<th>Attitudes Towards Health Care Teams Scale</th>
<th>Strongly Agree</th>
<th>No Opinion</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Working in teams increases the quality of care for patients</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Communication improves the quality of care for patients</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Team performance impacts patient outcomes</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Physicians from the right of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Physicians from the left of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Physicians from the center of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Physicians from the right of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Physicians from the left of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Physicians from the center of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Physicians from the right of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Physicians from the left of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Physicians from the center of a health care plan</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparison of 2 Tools


• Conclusion:
  – Both OSCAR and TEAM can be used in simulation setting
  – Correlate well with one another
  – High levels of inter-rater reliability
  – Scores demonstrated a high degree of correlation

Methodology and Phases of development of OSCAR


<table>
<thead>
<tr>
<th>Tool</th>
<th>Individual performance</th>
<th>Team performance</th>
<th>Clinical Setting</th>
<th>Simulation Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTECHS</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ANTS</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OTAS</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSCAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEAM</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Validating the Tool

- Exemplar behaviors should be defined
  - Good and bad performance exemplars
  - Exemplars must be agreed upon (typically by experts)
  - Minimizes bias among raters

Reliability of Tool

- Internal consistency
- Inter-rater reliability
- Tool applied by multiple expert observers (typically 2)
- Analyzed statistically
  - Cronbach coefficient (internal consistency)
  - Interclass correlation (inter-rater agreement)
### Rater Errors

<table>
<thead>
<tr>
<th>Rater Errors</th>
<th>Description</th>
<th>Threats to Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Tendency</td>
<td>Avoid extreme +/- ratings</td>
<td>Reduces ability to discriminate performance levels</td>
</tr>
<tr>
<td>Halo Error</td>
<td>Ratings based on one positive or negative observation</td>
<td>Introduces systematic bias and reduces accuracy</td>
</tr>
<tr>
<td>Leniency</td>
<td>Avoiding poor performance scale items</td>
<td>Positively skews and reduces accuracy</td>
</tr>
<tr>
<td>Primary/Recency Effect</td>
<td>All ratings based on early or late observations</td>
<td>Introduces systematic bias and reduces accuracy</td>
</tr>
<tr>
<td>Contrast Effect</td>
<td>Ratings are based on the performance of another group/individual</td>
<td>Positively skew ratings when first group performs; negatively skew ratings when prior group performed well</td>
</tr>
<tr>
<td>Similar-to-me</td>
<td>Ratings based on degree of similarity to rater</td>
<td>Introduces systematic bias and may reduce accuracy</td>
</tr>
<tr>
<td>Stereotype Effect</td>
<td>Ratings based on group inclusion rather than individual differences</td>
<td>Positively or negatively biases ratings; and may reduces accuracy</td>
</tr>
</tbody>
</table>

### Components of Interdisciplinary Team Communication

**Interdisciplinary Team (External Structure)**

- **External Services**
  - Home care
  - Hospice
  - Social services

- **External Clinicians**
  - Specialists
  - Family Physicians
  - Homecare/Community practitioners

**E-Teams Support**

**Interdisciplinary Team (Internal Structure)**

- **Communication channels**
- **Data Needs**: Real-time medication, lab and radiology data
- **Process Needs**: Electronic charting, capture of team teaching and cases
- **Reminders for processes (i.e. follow ups)**
- **Compliance to facilitate coordination**
Studies Designed to Improve IP/Team Effectiveness

1. Interprofessional training class [38]
   - Interdisciplinary team training
   - Interdisciplinary teams in primary care (n=19 participants)
   - Increase in educational needs of participants and taught. Results for third group not presented.
   - No significant improvements
   - C - pre- and post-survey

2. Clark et al. [31]
   - Interdisciplinary team training
   - Interdisciplinary teams in primary care (n=19 participants)
   - Participants attended modules on workflow, communication and collaboration.
   - No significant improvements
   - C - pre- and post-survey

3. Coley [22]
   - Training on interdisciplinary teamwork and communication
   - Interdisciplinary teams in primary care (n=23 participants)
   - Effects of training are consistent
   - C - mixed methods, high quality observations and post-survey

4. Gough et al. [33]
   - General interprofessional team training (GITT)
   - Interdisciplinary teams in primary care (n=23 participants)
   - Positive changes in team skills (p<0.05) and attitudes (p<0.001)
   - C - pre- and post-survey

5. Lichtenthal et al. [34]
   - Introductory team training in geriatrics (ITG)
   - Interdisciplinary teams in primary care (n=23 participants)
   - No significant changes in attitudes (p<0.05)
   - C - mixed methods, post-survey (control group) and interviews

6. Valsas et al. [35]
   - Interprofessional learning program
   - Interdisciplinary teams in primary care (n=23 participants)
   - No significant improvements
   - C - pre- and post-survey

7. Team training
   - Berenson et al. [36]
   - Assessment training
   - Multidisciplinary teams in the case setting (n=12 participants)
   - Increasing team members' perception of the efficacy of treatment planning and execution (p<0.05)
   - No differences in team development (p>0.05)
   - C - pre- and post-survey

8. Graf [37]
   - Leadership program
   - Multidisciplinary teams in the case setting (n=12 participants)
   - Impact of program variable
   - C - pre and feedback

9. Ebbesen et al. [38]
   - Team building intervention
   - Multidisciplinary teams in the case setting (n=12 participants)
   - Improving group cohesion (p<0.05), nurse satisfaction (p<0.05) and nurse turnover rate (p<0.05)
   - D - case study

10. Bresnahan et al. [39]
    - Fairly strict culture principles, benchmarking and leadership guidelines
    - Goal setting training program
    - Multidisciplinary teams in the case setting (n=12 participants)
    - Increasing self-efficacy (p<0.05), relationship effectiveness (p<0.05) and team cohesion (p<0.05)
    - B - quasi-experimental design, pre- and post-survey (control group)

Tools Designed to Measure the Effectiveness of IP/Team Training

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Intervention</th>
<th>Group Type</th>
<th>Discussion</th>
<th>Quality of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>LeBlanc et al. [40]</td>
<td>Team-based feedback intervention program</td>
<td>Group 1</td>
<td>Improving patient satisfaction (p&lt;0.05)</td>
<td>A - experimental study, pre- and post-survey (control group)</td>
</tr>
<tr>
<td>Males and Buchanan [41]</td>
<td>Team building activity</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stevens et al. [42]</td>
<td>Team-building activity</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stevens et al. [43]</td>
<td>Team-building activity</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson et al. [44]</td>
<td>Training based on principles of cognitive-orientated therapy</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arndt and Reinert [45]</td>
<td>Training with intervention for learning</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smith et al. [46]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erhardt et al. [47]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lempert et al. [48]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
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<tr>
<td>Lempert et al. [49]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phillips et al. [50]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
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<tr>
<td>Singletary et al. [51]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verner et al. [52]</td>
<td>Cognitive-behavioral feedback intervention</td>
<td>Group 1</td>
<td></td>
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</table>
### Measurement Tools for Information Transfer & Communication (ITC)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Outcome Measure</th>
<th>Results</th>
<th>Conclusion/Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agarwal et al</td>
<td>LOS</td>
<td>No significance in LOS; but increased communication &amp; understanding of daily goals</td>
<td>Self-reported data; volunteer bias</td>
</tr>
<tr>
<td>Awad et al</td>
<td>Antibiotic &amp; DVT prophylaxis</td>
<td># of patients receiving intervention increased</td>
<td>Improved communication in the OR</td>
</tr>
<tr>
<td>Catchpole et al</td>
<td>Duration of handover; technical errors</td>
<td>Decreased turnover time; increased team performance</td>
<td>Easily trainable handover process reduced errors &amp; information transfer</td>
</tr>
<tr>
<td>Dodek and Raboud</td>
<td>Rounding time; presentation by nurse and resident</td>
<td>Improved approach &amp; communication</td>
<td>Improved communication</td>
</tr>
</tbody>
</table>

### Development of Assessment Tools for Communication in Surgical Care

<table>
<thead>
<tr>
<th>Authors</th>
<th>Aims</th>
<th>Measurement Tool</th>
<th>Conclusions/ Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flin et al</td>
<td>Measures attitudes of anesthetists toward human and organizational factors</td>
<td>Modified version of ORMAC</td>
<td>Positive attitudes toward IP aspects of their job</td>
</tr>
<tr>
<td>Frankel et al</td>
<td>Develop a behavior based tool to assess communication and team skills</td>
<td>CATS</td>
<td>Requires further evaluation</td>
</tr>
<tr>
<td>Lingard et al</td>
<td>Develop an instrument to measure communication among OR team members by documenting failures</td>
<td>4 communication errors—recorded by 3 observers: failures; content; audience; &amp; purpose</td>
<td>Reasonably reliable; measures the effects of communication intervention; small sample size</td>
</tr>
<tr>
<td>Yule at al</td>
<td>Tool to measure non-surgical skills for surgeons</td>
<td>NOTTS—5 categories of skills rated 0-4</td>
<td>Needs to be validated</td>
</tr>
</tbody>
</table>
Rate the teams using both tools…

1. Tally your scores!
2. Let's compare our assessment findings!

Testing… are you ready to start?

A. Yes
B. No
Your overall score for “communication” using the OSCAR assessment tool?

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6

Your overall score for “cooperation” using the OSCAR assessment tool?

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6
Your overall score for “coordination” using the OSCAR assessment tool?

A. 1  
B. 2  
C. 3  
D. 4  
E. 5  
F. 6  

Your overall score for “monitoring” using the OSCAR assessment tool?

A. 1  
B. 2  
C. 3  
D. 4  
E. 5  
F. 6
Your overall score for “leadership” using the OSCAR assessment tool?

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6

Your overall score for “decision making” using the OSCAR assessment tool?

A. 1
B. 2
C. 3
D. 4
E. 5
F. 6
Your overall score for “leadership” using the TEAM assessment tool?

A. 0
B. 1
C. 2
D. 3
E. 4

Your overall score for “teamwork” using the TEAM assessment tool?

A. 0
B. 1
C. 2
D. 3
E. 4
Your overall score for “task management” using the TEAM assessment tool?

A. 0
B. 1
C. 2
D. 3
E. 4

Discussion:
Challenges to Assessing Teams
Wrap-up