Supplemental Digital Appendix 1—End-of-rotation evaluation (pg. 1-3)
Supplemental Digital Appendix 2—SIMPL questions for intraoperative performance and autonomy (pg. 4)
Supplemental Digital Appendix 3—Random effects data (pg. 5)

Supplemental Digital Appendix 1
End-of-rotation Evaluation Used for Assessing Surgical Residents at Northwestern University Feinberg School of Medicine, 2015-16

<table>
<thead>
<tr>
<th>RESIDENT EVALUATION</th>
<th>Evaluator</th>
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</thead>
<tbody>
<tr>
<td>[Subject Name]</td>
<td></td>
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<tr>
<td>[Subject Status]</td>
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<tr>
<td>[Evaluation Dates]</td>
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<tr>
<td>[Subject Rotation]</td>
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<tr>
<td>[Evaluator Name]</td>
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<tr>
<td>[Evaluator Status]</td>
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</tbody>
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### PATIENT CARE

1) Diagnosis
- Unable to perform accurate H&P of all patients including critically ill patients
- Performs a focused, efficient and accurate H&P of all patients
- Accurately diagnoses many common conditions and initiates management for some
- Accurately diagnoses and initiates management for most common conditions
- Recognizes physical presentations of a large number of conditions
- Not observed

2) Postoperative care
- Does not recognize or manage post op problems with a senior resident physically present
- Manages common post op problems with a senior resident available by phone independently
- Manages common and complex postoperative problems
- Supervises junior residents managing common and complex postoperative problems
- Not observed

3) Technical skills
- Lacks basic surgical skills (e.g. knot tying, NG tube, foley, I+D)
- Has basic surgical skills (e.g. knot tying, NG tube, foley, I+D)
- Has respect for tissue and developing instrument handling skills
- Proficient at most instrument handling and exhibits technical efficiency
- Proficiency in use of all instruments and equipment for essential operations
- Not observed

4) Operative autonomy
- Unprepared for most operative experiences
- Show and tell for most common operations
- Active help for most common operations
- Passive help for most common operations
- Supervision only for most common operations
- Not observed

### MEDICAL KNOWLEDGE

5) Knowledge about diseases
- Lacks basic knowledge expected of a medical student
- Understands signs, symptoms and treatment of some common conditions
- Basic knowledge and recognizes variations in presentation of many common conditions
- Significant knowledge of many common conditions
- Comprehensive knowledge of common conditions and basic knowledge of advanced conditions
- Not observed

6) Knowledge about operations
- Does not know steps of common operations
- Basic knowledge of steps and perioperative care for many common operations
- Basic knowledge of some common surgical operations
- Significant knowledge of most common operations, basic knowledge of some complex operations
- Comprehensive knowledge of common operations, basic knowledge of many complex operations
- Not observed

### SYSTEMS-BASED PRACTICE

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7) **Discharge Planning**  
No knowledge of steps required for sale discharge  
- Lists resources available (e.g. social work, OT, PT)  
- Knows how to access complex ones (e.g. home TPN or antibiotics)  
- Efficiently arranges disposition planning, including preparing all necessary materials  
- Coordinates activities of residents, nurses, etc. to optimize discharge planning  
- Not observed

8) **Health systems**  
No understanding of health care systems or recognizes systems component to medical errors  
- Understands how local hospital works and follows protocols and guidelines for care  
- Makes suggestions for changes and reports problems with technology  
- Participates in QI project and develops protocols to improve care  
- Not observed

**PRACTICE-BASED LEARNING**

9) **Teaching**  
- Ignores or abuses students  
- Teaches willingly and uses media and effectively to learners  
- Effective teaching when responsible for conference or formal presentation  
- Recognizes teachable moments and engages learners  
- Not observed

10) **Self-directed learning**  
- No self-directed learning activities  
- Participates in conferences and learning activities  
- Independently uses literature to answer questions related to patient care and uses literature to understand them  
- Leads skills experiences and conferences for junior learners  
- Not observed

11) **Personal learning plan**  
- Unaware of gaps in knowledge of errors or technical skills  
- Identifies weaknesses in knowledge base  
- Develops learning plan to address gaps  
- Independently practices surgical skills  
- Develops process to keep up with literature  
- Not observed

12) **Care improvement**  
- Does not recognize impact of errors or demonstrate interest in improving  
- Actively participates in M+M, responds appropriately to feedback  
- Uses relevant literature to support discussions at M+M  
- Identifies probable causes for bad outcomes and strategies for improving care  
- Ongoing self-evaluation and improvement developed from M+M to patients  
- Not observed

**PROFESSIONALISM**

13) **Professional behaviors**  
- Undesirable behaviors (e.g. lying, disrespectful)  
- Polite, respectful, maintains composure under stress, recognizes limits of knowledge  
- Accepts responsibility for error and initiates corrective actions  
- Role model for colleagues, consistently prioritizes patient needs  
- Not observed

14) **Personal Health**  
- Behavior and physical standards, understands  
- Monitors own personal health and mitigates fatigue or stress,  
- Models appropriate management  
- Promotes a healthy work environment

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### 15) Administrative tasks
- **Poor response time to pages/emails, many incomplete records**
- **Op logs, duty hours up to date, minimal reminders**
- **Prompt conference attendance and supervision responses**
- **Ensures others under their supervision respond to responsibilities**
- **Sets an example for attendance, promptness and attention to administrative tasks**

### INTERPERSONAL AND COMMUNICATION SKILLS

#### 16) Communication with patients
- **Effective communication of basic information to patients and families**
- **Customizes communication and ensures appropriate updates as plan changes**
- **Delivers bad news sensitively and effectively**
- **Negotiates and manages conflicts with patients and families**

#### 17) Communication with team
- **Willingly exchanges information with team, consultants, sharing with other team members**
- **Disrespectful or resentful**

#### 18) Communication in the OR
- **Given**: Communicates key facts, understands or incorrect elements of information, informed consent discussion
- **Leads a time out, performs informed consent discussion for basic procedures**
- **Anticipates logistical issues for OR, performs informed consent discussion for complex procedures**
- **Capable of leadership during unexpected events in the OR**

#### 19) In the comment box below, please provide feedback regarding the resident's Technical Skills:

Comment Box

Remaining Characters: 5,000

**In the comment box below, please list 3 strengths and 3 areas of improvement for this resident:**

Overall Comments:
Supplemental Digital Appendix 2

SIMPL Questions Used to Assess the Intraoperative Performance (A) and Autonomy (B) of Surgical Residents from the Northwestern University Feinberg School of Medicine, (2015-2016)

*SIMPL (system for improving and measuring procedural learning), a smartphone-based application, is an assessment tool used to provide immediate feedback to residents in the workplace. SIMPL ratings are based on the Zwisch Scale. For more information on the Zwisch Scale, see Bohnen JD, George BC, Williams RG, et al. The feasibility of real-time intraoperative performance assessment with SIMPL (System for Improving and Measuring Procedural Learning): Early experience from a multi-institutional trial. J Surg Educ. 2016;73:e118-e130.

A

What was this resident's performance for the majority of the critical portion of this procedure?

- Unprepared / Critical Deficiency
- Inexperienced w/ Procedure
- Intermediate Performance
- Practice-Ready Performance
- Exceptional Performance

B

How much guidance did you provide for the majority of the critical portion of this procedure?

- Show & Tell
- Active Help
- Passive Help
- Supervision Only
Supplemental Digital Appendix 3

Random Effects Contributing, to Different Degrees, to Variance in Both End-of-Rotation (EOR) and SIMPL Scores in a 2017 Study Comparing EOR and SIMPL, a Workplace-Based, Post Operative Case Feedback Tool at Northwestern University Feinberg School of Medicine

<table>
<thead>
<tr>
<th></th>
<th>Variance</th>
<th>Proportion of Total Variance</th>
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</thead>
<tbody>
<tr>
<td>Faculty on EOR Evaluation</td>
<td>0.21</td>
<td>0.21/0.59</td>
</tr>
<tr>
<td>Resident on EOR Evaluation</td>
<td>0.02</td>
<td>0.02/0.59</td>
</tr>
<tr>
<td>Rotation on EOR Evaluation</td>
<td>0.11</td>
<td>0.11/0.59</td>
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<tr>
<td>Residual on EOR Evaluation</td>
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<td>0.26/0.59</td>
</tr>
<tr>
<td>Resident on SIMPL</td>
<td>0.14</td>
<td>0.14/0.82</td>
</tr>
<tr>
<td>Rotation on SIMPL</td>
<td>0.51</td>
<td>0.51/0.82</td>
</tr>
<tr>
<td>Residual on SIMPL</td>
<td>0.17</td>
<td>0.17/0.82</td>
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