

Supplemental digital content 3 - BARS Instrument and Rating guide^{1,2}

BARS (Behaviorally Anchored Rating System)												
	Vigilance Situation-Aware			Decision-Making			Communication			Teamwork		
	<input type="checkbox"/> Poor	<input type="checkbox"/> Med	<input type="checkbox"/> Excl	<input type="checkbox"/> Poor	<input type="checkbox"/> Med	<input type="checkbox"/> Excl	<input type="checkbox"/> Poor	<input type="checkbox"/> Med	<input type="checkbox"/> Excl	<input type="checkbox"/> Poor	<input type="checkbox"/> Med	<input type="checkbox"/> Excl
	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6
	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Comments:												

BEHAVIORALLY ANCHORED RATING SYSTEM (BARS)									
Using the above scale, please rate...	1	2	3	4	5	6	7	8	9
The team's Vigilance - Situational Awareness									
The team's Decision - Making									
The team's Communication									
The team's Teamwork									
The team's overall behavioral and non-technical performance.									

THE BEHAVIORAL/NON-TECHNICAL RATING SYSTEM

In addition to the technical elements of performance, the RTRs will rate the behavioral, or non-technical skills (NTS) of the scenario's Hot Seat participant. The four categories of NTS performance to be rated are: vigilance/awareness, dynamic decision-making and task management, communication, and teamwork.

Raters must observe the entire scenario before making NTS and holistic ratings. Equal weight should be given to behaviors at all periods of the scenario, and raters should be wary of being biased either by early behaviors (interpreting later events with "haloes" or "pitchforks" established early) or by the occurrence of late behaviors (which may be the most recent in memory before the rating is assigned).

(PLEASE LOOK AT THE BARS MATRIX ON THE FOLLOWING PAGE)

The first row shows the 4 **CATEGORIES** of Behavioral/Non-Technical performance:

- Vigilance/Awareness
- Dynamic Decision-making and Task Management (Abbreviated as 'Decision-Making')
- Communication
- Teamwork

Row 2 of the NTS BARS Rating Matrix provides a set of **DESCRIPTORS** for three gross levels of performance for each of the **CATEGORIES** ("Poor, Med (for 'medium'), and Excl (for 'excellent'). We call a gross level of performance a 'BIN.' Row 3 shows that within each **BIN** there are three possible numbers that can be chosen as a sub-score for the participant's performance in that **BIN**. These sub-scores can be thought of as adding a "-", neutral, or "+" to the grade corresponding to that **BIN**.

The matrix cells each describe the kinds of performance elements for a given **CATEGORY** that would place someone's performance rating in that BIN. The lists of performance items in each descriptor are presented as examples. They are NOT to be rated individually, nor will they all be present or observable/observed for any given scenario or for any given candidate. The descriptors "paint a picture" of the types of behaviors likely to be seen for a given performance domain and a given level (BIN) of performance. The descriptors should allow raters to match what they observed to the general nature of what is described at the different levels.

Behavioral (Non-Technical) Category (Typical issues included in each category – not exhaustive)	Worst/Poor (Often or consistently performs) Score: 1, 2, 3	Middle/Satisfactory Score: 4, 5, 6	Best/Superior (Often or consistently performs) Score: 7, 8, 9
Vigilance/Awareness •Attention •Monitoring •Monitoring errors •Available & redundant information	Lets situation wander, allows distractions to interfere with communication or focus, becomes fixated Misses key changes in data streams Interprets transient/artificial data as real without checking veracity; conversely – assumes abnormal data are only artifacts ("everything is OK") without checking Does not utilize redundant data streams or relevant sources of information; does not add additional data streams even when they are of high utility Inattentive to results of key interventions Has persistent fixation errors: tunnel vision (this & only this); "flight of ideas" (everything but this); or "Everything's OK" Does not re-evaluate changing situation Does not adjust to new info & status changes	<i>No Descriptors Are Needed for This Bin, which is intermediate between the Best/Superior Bin and the Worst/Poor Bin</i>	Attention is focused throughout. Does not become fixated and maintains global picture Maintains monitoring of patient, equipment, room Modulates distractions as appropriate to situation Uses all available information sources including chart, handoff Utilizes redundant data streams to determine true state of the patient; double checks possible ambiguous, transient or artificial data Adds additional data streams as necessary (e.g., art line, echo, ECG, X-ray); makes reasonable tradeoffs of time/effort vs. utility of new data Reviews and re-evaluates information on evolving patient status; attentive to results of key interventions Incorporates and adjusts to new info and status changes
Dynamic Decision-Making and Task Management •What could be wrong (differential diagnosis) •Assessment & treatment •Plan of action, including tradeoffs of pros/cons of alternative courses of action •Anticipation & Planning •Use of protocols & cognitive aids	Does not recognize problem(s) and/or their criticality Differential diagnosis inaccurate or limited Fails to obtain critical information that would markedly affect assessment/plan Never diagnoses actual problem Has no apparent plan of action; chooses or executes actions haphazardly Never or weakly/ineffectively treats actual problem Launches powerful interventions that are inappropriate to the situation without considering alternatives, risks, benefits, tradeoffs, (shoots from the hip) Does not titrate drugs to the situation Work is inefficient; significant errors are made and not corrected Fails to anticipate next steps; makes plans or contingencies only after the problem is obvious Ignores available protocols or cognitive aids	--	Recognizes problems & their criticality Makes reasonable differential diagnosis Obtains critical information and incorporates results into assessment/plan Diagnoses actual problem Creates and executes plan of action that is appropriate to the nature & urgency of the problem(s) Considers risks, benefits, tradeoffs of alternatives before making major decisions Titrates drugs appropriately to the situation Modifies plan of action as necessary Works efficiently; makes no significant mistakes in actions Anticipates future problems and prepares them in advance Uses accepted protocols and/or any available cognitive aids
Communication •Intros & briefings •Closed loop communication including readback & status report •Alerts surgeon to ongoing problems/issues •Team made aware of plan	Provides no introduction of self to team; does not brief other team members on situation Requests/commands are ambiguous, directed "into thin air"; communication is condescending; never uses names of team members Quiet – rarely communicates at all Leader does not "think out loud" or explicitly verbalize plan of action; never recaps situation out loud; Follower does not update leader on task progress or opinions Makes no use of closed-loop communication or readback Doesn't modulate tone to match urgency of communication Non-verbal communication is condescending or conflict inducing	--	Gives appropriate introduction of self and briefings to other team members on situation Communication is clearly directed, specific, explicit, unambiguous, and respectful; Addresses team members by name (if possible) Speaks up whenever appropriate to inform, clarify or question Leader thinks out loud to facilitate shared mental model; periodically recaps situation out loud; Follower provides updates to leader on task progress & opinions Uses/volunteers closed-loop communication and readback Modulates tone appropriately to the situation Non-verbal communication is open and collegial
Teamwork •Call for help •Role clarity •Leadership (HS) – followership (FR) •Distribution of workload •Seeks input (HS) from others /speaks up (FR) to leader •Monitoring of team performance & gaps •Manages conflict	Calls for help or resources late or not at all Role clarity not established Leadership is weak; indecisive, not prioritized, poor distribution of workload, lack of monitoring of situation So involved in activities that cannot oversee situation Leader does not seek input from others or dismisses it FR is passive and does not speak up or suggest how to help Leader does not monitor team performance or modify appropriately Initiates or is involved into conflicts; fails to defuse conflict Inappropriate takeover by FR when Leader performing adequately	--	Calls for help and specific resources early Establishes and confirms role clarity Leadership strong; decides, prioritizes, delegates, monitors Remains free enough to oversee situation Leaders seeks or listens to input & considers it appropriately FR regularly provides updates to leader on task progress and advice Leader monitors team performance & modifies assignments as necessary Detects conflict early; acts to defuse conflict and focus attention on patient care Appropriate takeover by FR that is requested/approved by Leader or when Leader is ineffective

To qualify for a rating within one of the **BINS**, the OVERALL performance should be assessed as most similar to the kinds of behaviors listed in that BIN's descriptors. Performances at the top level are expected to show frequent and consistent behaviors similar to those described, but there may be occasional lapses to lower levels. Similarly, performances at the bottom level are expected to show frequent or consistent behaviors similar to those described but with occasional performance at higher levels. At the middle level, some excursions to higher and lower levels may occur.

To make the rating of NTS, the rater should:

1. Watch the entire scenario performance, perhaps taking notes regarding performance in the 4 domains
2. Choose the bin ('Poor, Med, or Excl') that best describes the overall performance of the individual or team being rated
3. Then decide upon the sub-score within that bin, by determining if the observed performance was closest to the bottom performance belonging in that **BIN**, in the middle of that bin's performance, or closer to superior behavior within that bin. A higher frequency or consistency of behaviors in one or the other direction may influence the choice of the numerical rating. The occurrence of occasional outliers of behavior outside the bin may also influence the choice.

Using 'vigilance' as an example, a real-time rater may watch a participant initially get stuck in a fixation error, but then reasonably quickly pick up on another clinical clue and start to develop a broader differential diagnosis; they may ask for other data (a blood gas, for example), interpret that information correctly, but end by getting distracted by artifact on the ECG. After observing the entire performance, the RTR determines if the performance was poor or excellent. If was neither of those, they determine that the 'vigilance' performance was medium. In this example, the RTR might think that the person's 'vigilance' score was closest to excellent, and make a determination that that score should be in the 'Excl' bin. Now, the RTR considers the degree of excellence (by evaluating the amount of time that the participant's vigilance was excellent, and the degree and magnitude of lapses into 'poor' or 'med' behavior displayed), and determines if the participant's vigilance was closer to poor-excellent, superior-excellent or if determined to be neither of those, is medium-excellent. In this example, the rater determined that there were enough lapses of vigilance that this subject behaved closest to the 'poor-excellent' limit, and therefore assigned them a score of 6 for this element of non-technical behavior.

Adapted from -

1. Watkins SC, Roberts DA, Boulet JR, McEvoy MD, Weinger MB: Evaluation of a Simpler Tool to Assess Nontechnical Skills During Simulated Critical Events. *Simulation in Healthcare* 2017
2. Weinger MB, Banerjee A, Burden AR, McIvor WR, Boulet J, Cooper JB, Steadman R, Shotwell MS, Slagle JM, DeMaria S: Simulation-based Assessment of the Management of Critical Events by Board-certified Anesthesiologists. *Anesthesiology: The Journal of the American Society of Anesthesiologists* 2017