

Heart Rate Variability as a Measure of Emergency Medicine Physician Stress: Interns versus Attendings

BACKGROUND
Heart rate variability (HRV) has been used as an effective measure of stress in physicians but has not been used to monitor emergency physicians for entire clinical shifts or to determine stressors.

METHODS

- Emergency medicine interns (10) and attending (10) physicians wore a HRV clip-on ear on their clinical shift.
- Participants completed a short survey to evaluate perseverance and resilience.
- Each clinical activity was documented in real time and time linked to HRV data.
- HRV data was analyzed in relationship to actions completed in order to identify "stressors", as measured by LF/HF and SSDN, see Figure 1.
- Numerical score from resilience survey was compared to number of stressors that participants experienced.

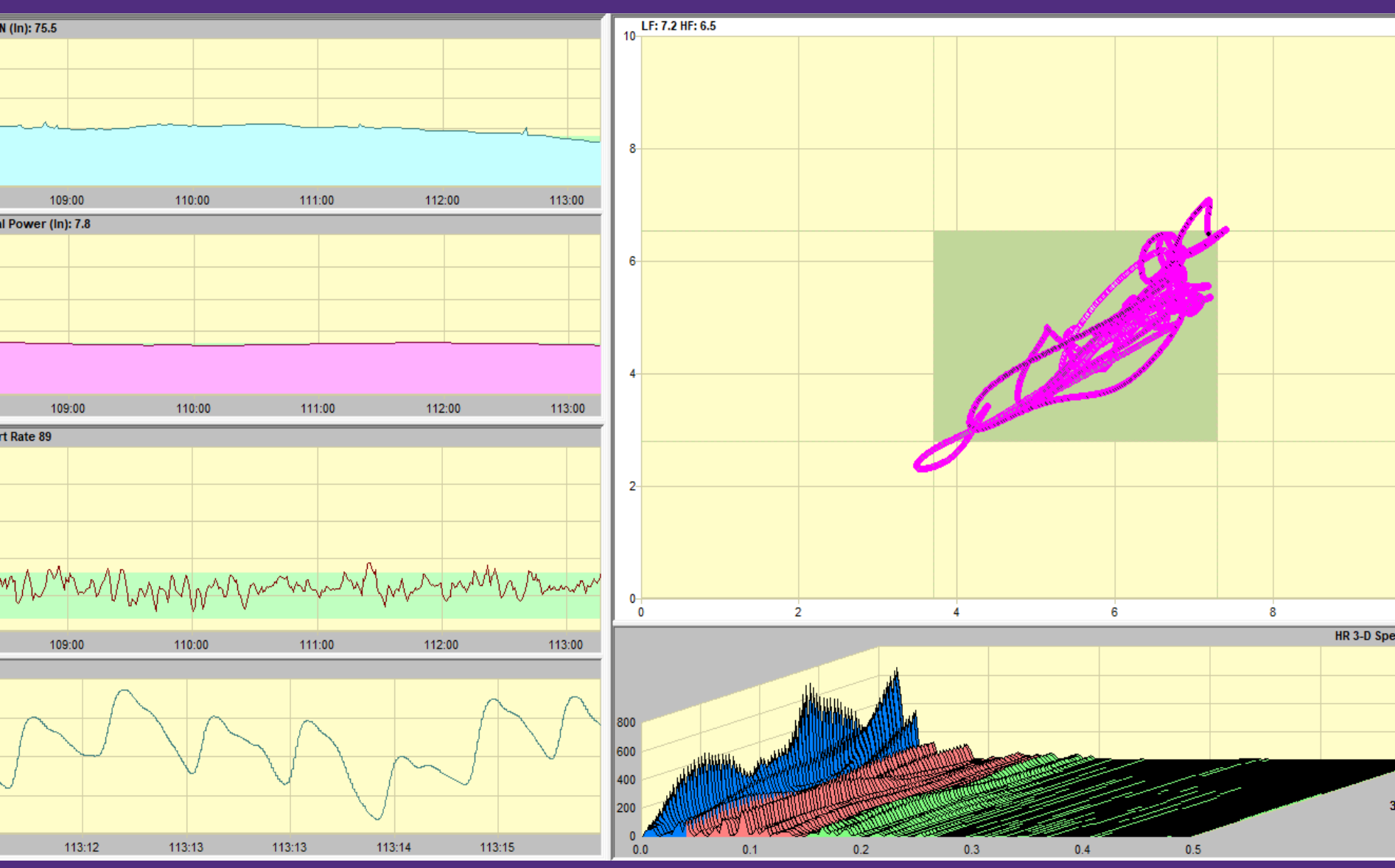
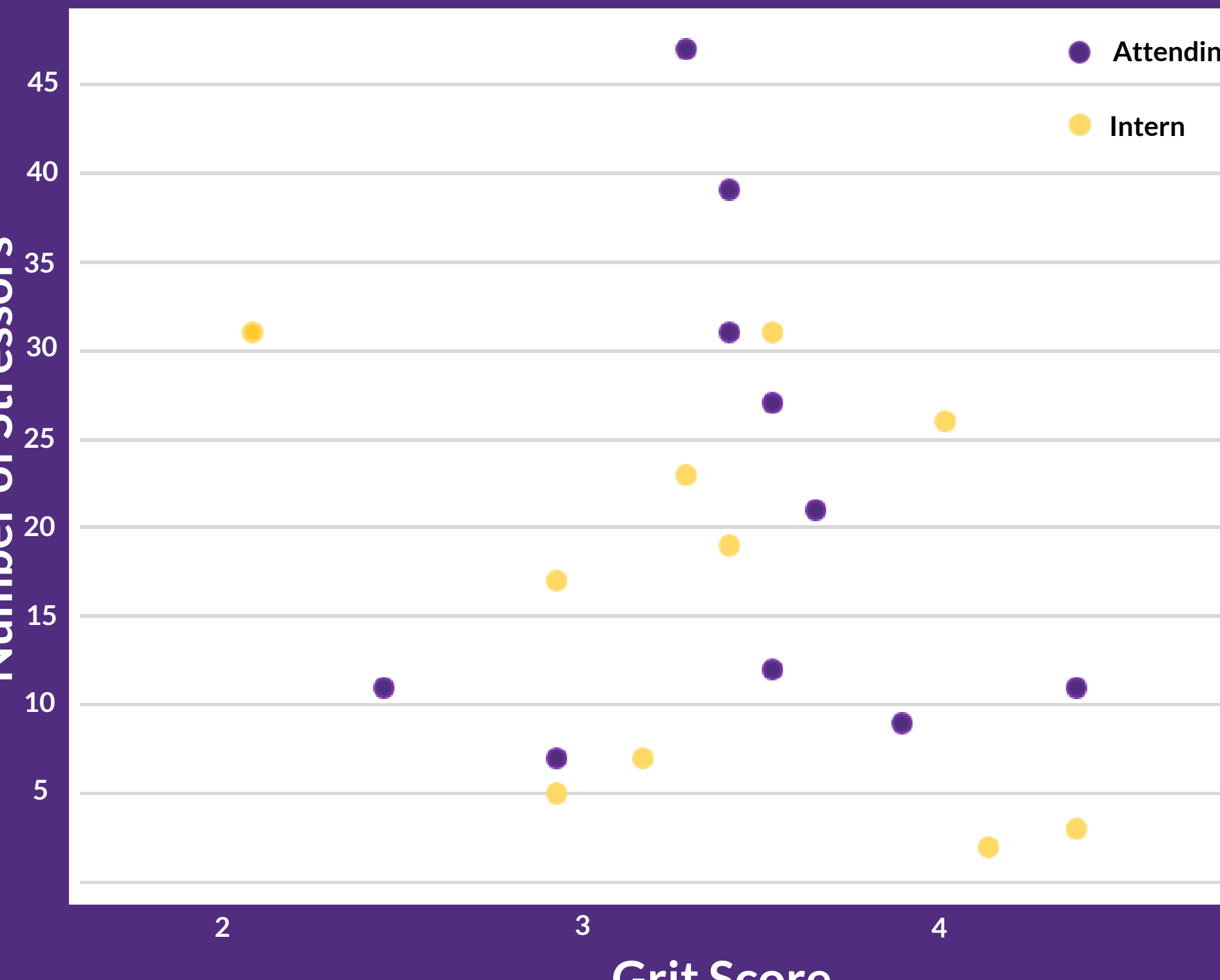


Figure 1. Sample of live HRV data

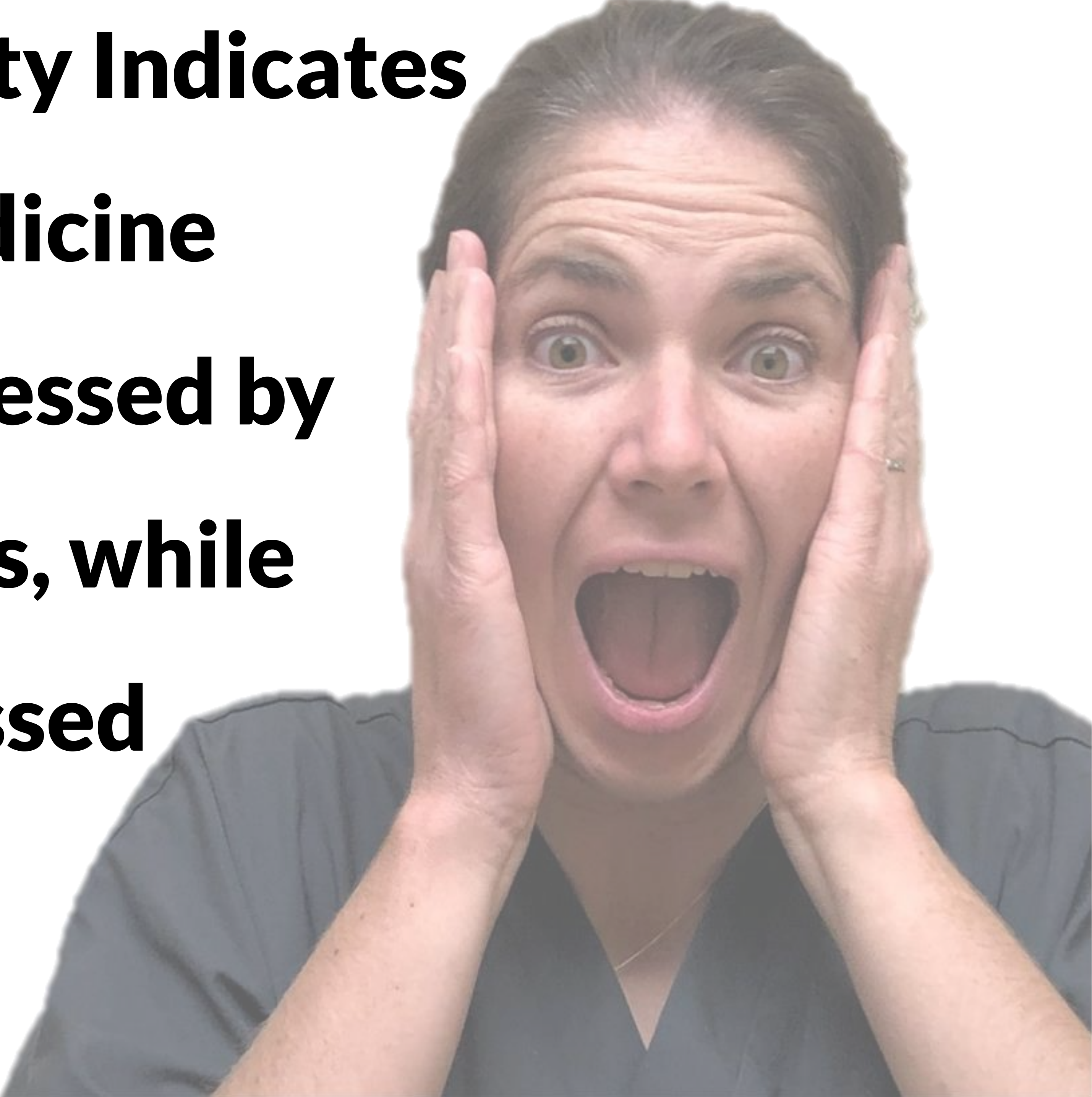
RESULTS

- Attending physicians were stressed less than 10% of the time when interacting with high acuity patients.
- Grit was not correlated with number of stressors (see Graph 1).

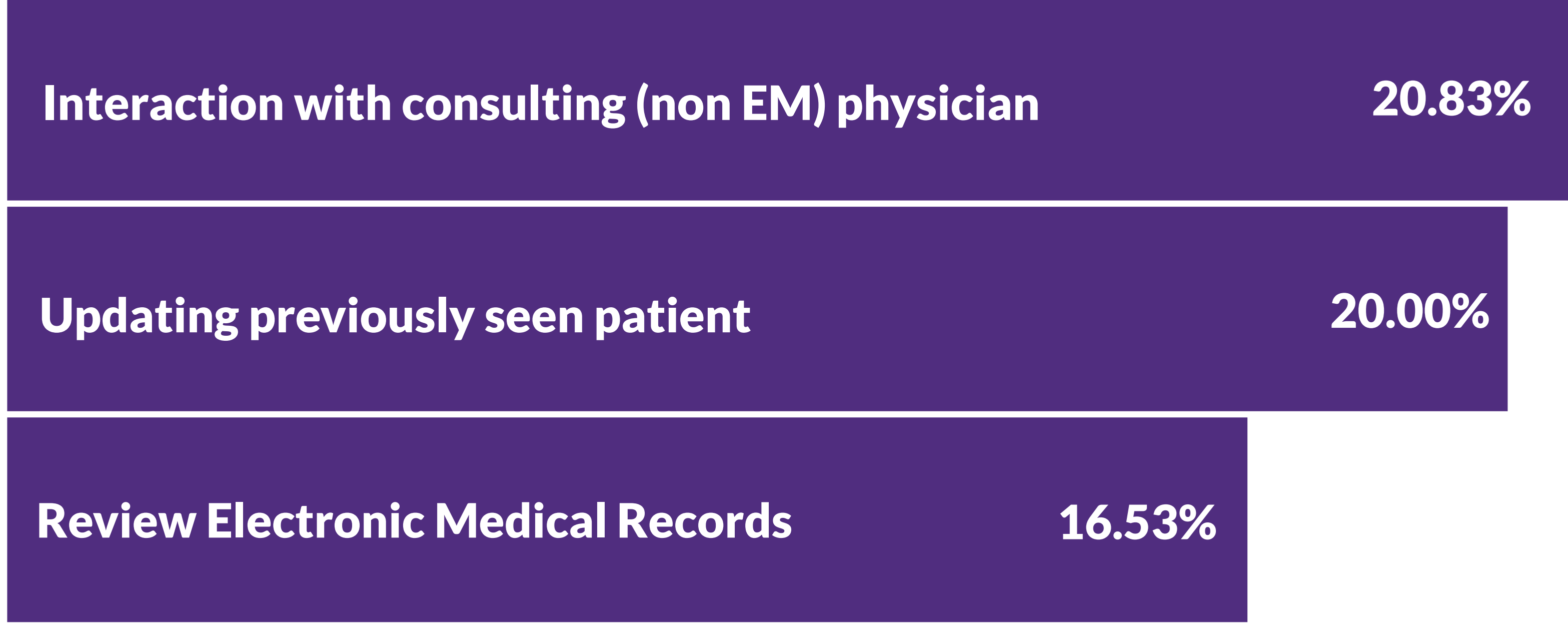


Graph 1. Grit Score vs. Number of Stressors

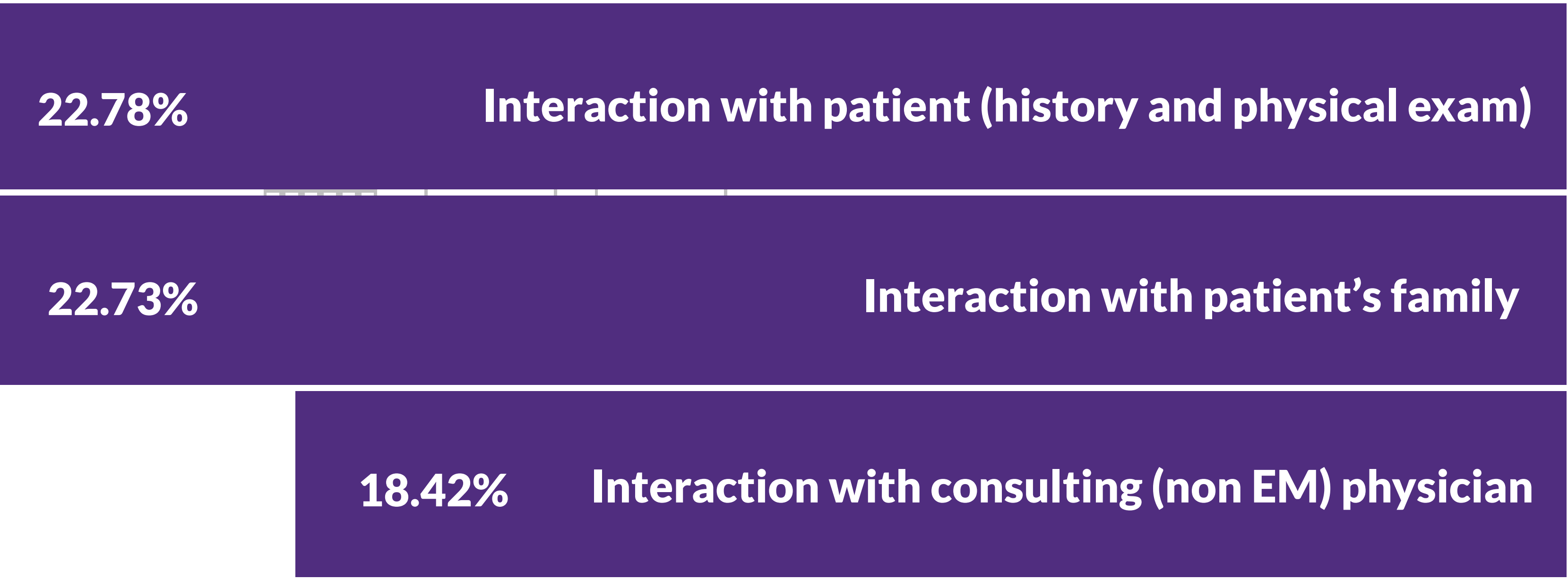
Heart Rate Variability Indicates that Emergency Medicine Interns are Most Stressed by Patients Interactions, while Attendings are Stressed by Consults with Non EM Physicians



Most Common Stressors (Attendings)



Most Common Stressors (Interns)



Grit Survey
Created by Angela Duckworth. A high Grit score is associated with individuals being less prone to stress

HRV Metrics
HF: High frequency interval changes during rest controlled by parasympathetic nervous system
LF: Low frequency interval changes during stress/action controlled by sympathetic nervous system
LF/HF: Shows balance between sympathetic and parasympathetic nervous systems

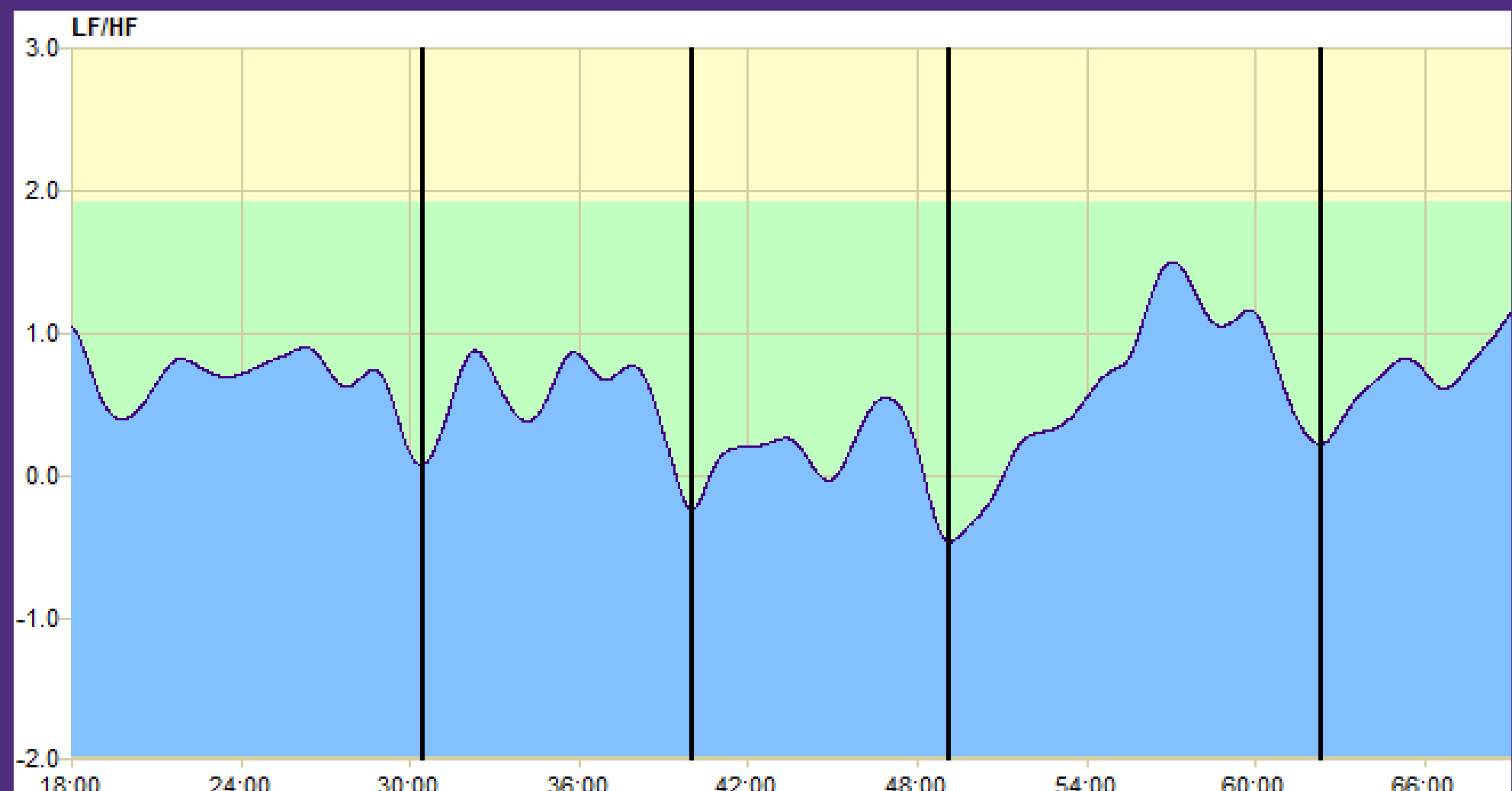


Figure 2. Sample of HRV report

Interactions with high acuity patients
9.10% were stressful
95.01% were not stressful
Weighted averages were determined by multiplying number of interactions by percent and dividing sum by total number of interactions in order to get a more accurate number.
High acuity is defined as a patient who is considered a medical yellow, trauma red, or trauma yellow, or otherwise concerning as indicated by the physician.

	Attending	Intern
Minimum	7.0	2.0
Maximum	47.0	31.0
Average	21.5	16.4
Median	16.5	18.0

Table 1. Number of Stressors

Stressful Interaction	Frequency (%)	
	Attending	Intern
Non EM Provider	20.83	18.42
Update Patient	20.00	17.65
Review Records	16.53	14.81
Patient's Family	16.00	22.73
Documentation	14.46	18.02
EMS	14.29	-
History & Physical Exam	13.61	22.78
EKG Review	12.66	-
Supervise Procedure	12.50	-
EM Resident Physician	11.84	11.45
Nurse	11.61	10.47
EM Attending Physician	11.11	8.05
Order Entry	10.20	13.83

Table 2. Most Frequent Stressors

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