Process to compare the impact of fatigue in SOC shift patterns

Determine Sample Date Range

We will be generating the FAID Scores based on a standard ALPHA schedule and generating SOC schedules based on actual call data from the corresponding stations. To do this, we will use response data between January 1, 2018 and December 31, 2018.

Establish ALPHA Baseline and set TARGET

1) Select the most common ALPHA shift hours (based on the # of paramedics working that shift pattern). In this case, two days working 06:30-18:30 followed by two nights working 18:30-06:30 followed by four days off is the most common ALPHA shift pattern.
2) Generate the ALPHA shift pattern based on scheduled hours worked only. We will assume that there was no shift overruns and every shift started and ended at the scheduled start/end times.
3) Input this ALPHA shift pattern into the FAID tool and use the tool to predict associated sleep patterns of paramedics working on that shift pattern.
4) For this shift pattern and associated sleep pattern, run the FAID tool using a FAID Score threshold of 72. Record the % of time above threshold for this shift pattern. This is the ALPHA Baseline.
5) Reduce the ALPHA Baseline number by 10% to obtain the TARGET. All generated SOC shift patterns should score below the **TARGET**. Specifically, the % of time that each SOC shift is above the threshold should be below (**TARGET**) %.

Select the Four Stations with the "Busiest" Shift Patterns

6) We have identified 92 candidate stations for SOC shifts. These stations either had fewer than 1,000 ambulance responses in 2018, or fewer than 2,000 responses if they have two ambulances at that station
7) For every candidate SOC station, determine which shifts at the station would potentially become the SOC shift pattern. These current shifts are defined as the 'primary unit' at the station and enable analysis for the stations with two ambulances.
8) For each candidate station, calculate:
   a) The number of responses the primary unit completed in 2018
   b) The total time on task for all responses the primary unit completed in 2018
9) Select the two stations that had the busiest primary units according to number of responses in 2018.
10) Select the two stations that had the busiest primary units in terms of total time on task in 2018. If either (or both) of the two stations were already selected in Step 9) above, then include the third (and fourth) stations to arrive at four distinct candidate stations where the primary units appeared "busiest" in 2018.

Generate SOC Shift Patterns Based on Historic Call Data

Generate all possible SOC Schedules on a per-station basis

For each of the four candidate SOC stations:

1. Assume that the responses (9-1-1 calls and inter-facility transfer calls) that were handled by the primary unit in 2018 will now be handled by the SOC unit.
2. Pull the 2018 response data from the primary unit at each of the four stations. This response data can be formed as intervals of work, with respective start and end timestamps.
3. Merge the response data with the new daily 8-hour work schedule (08:00 to 16:00 daily) that is part of the SOC shift pattern.
4. Form a merged dataset of non-overlapping work intervals: for every overlapping set of work intervals, merge them into a single, larger work interval by using the earliest start time and the latest end time from that set of intervals.
5. We now have a 365-day estimate of work activity for the SOC unit. It is assumed that the variability across this period sufficiently reflects the statistical variation in workload that may be experienced in the future for the SOC unit.
6. Overlay work schedules by selecting work days versus off days. Each SOC shift pattern is comprised of 24-hour shifts, with 8 hours of regular scheduled work (08:00 to 16:00) and 16 hours of passive standby
7. Generate a number of SOC Schedules based on different combinations of 24-hour periods. This is to establish the risk levels associated with different possible working patterns, as follows:
    a. 3 days on /3 days off (6 day rotation),
    b. 4 days on/4 days off (8 day rotation),
    c. 5 days on, 5 days off, 2 days on, 2 days off (14 day rotation),
    d. 3 days on, 3 days off, 4 days on, 4 days off (14 day rotation),
    e. 7 days on/7 days off (14 day rotation).
8. SOC Schedules will correspond to working all work intervals that occur during the “on” days of the schedule with change-over between “on”/”off” at 8 am every day (for example, if a person works January 2 - 4 and is off on January 1 and off on January 5, then the person will be responsible for all work intervals between 8 am on January 2 and 8 am on January 5).

Generate SOC FAID Scores and compare to **TARGET**

For each SOC Schedule generated above:

1. Insert each SOC Schedule into the FAID tool and generate a corresponding sleep schedule
2. Run the FAID tool using a FAID Score threshold of 72. Record the % of time above threshold for this shift pattern. Compare this percentage against the **TARGET** percentage.

Although we are only required to determine whether the FAID Score of each SOC shift is 10% below the ALPHA Benchmark FAID Score, we plan to also perform this analysis in parallel, using the KSS scores.