**Summary for extended hour analysis**

A total of 3753 case end times (GC), and the corresponding extended hours times (PAF) were collected. We calculated a time discrepancy for each case by subtracting the GC end time from the PAF end time. Among these differences, 69 were more than 300 minutes or smaller than -60 minutes. These 69 observations were considered outliers and were listed, but not included in subsequent analysis. Descriptive analyses were performed to examine the distribution of time discrepancies. Cases with time differences greater than 120 minutes and where the PAF time occurred on the hour, 15 min, 30 min, or 45 min past the hour are listed in Table 1. Cases with time differences less than -30 minutes are listed in Table 2. Box-and-whisker plots were applied to present the overall distribution of time discrepancies (Figure 1), and its distribution by case disposition (Figure 2). Scatter plots were used to represent the distribution of time discrepancies by staff role (attending physician or CRNA) (Figure 3) and by PAF time of day (Figure 4).

Figure 4 illustrates that many of the PAF (physician/CRNA reported) times occur on the hour or half-hour, regardless of the magnitude of time discrepancy. This finding is indicative of "rounding" behavior. In another words, clinicians tend to report times on the hour or half-hour, whereas GC times are given with minute precision. The direction of rounding more commonly results in positive time discrepancies (“rounding up”) than negative discrepancies (“rounding down”).

Current policy specifies that clinicians should manually report all extended hours time. Using the data at hand to simulate the process of time reporting, we have evaluated the potential outcomes of implementing an alternative policy, wherein extended hours reports are generated automatically using GC procedure end times, with the addition of a “grace period” (M minutes). We hypothesized that the number of extended hours reports, and the associated “rounding” behavior could be mitigated by such a policy, thereby resulting is monetary savings and reduced administrative work. Under the proposed policy, we further assumed that clinicians would continue to report extra time beyond the grace period, as necessary. In order to account for this, we assumed that some percentage (E%) of discrepancies that occur beyond the grace period would have been reported regardless of the proposed policy.

In order to simulate the proposed policy, time discrepancies for E% of cases were kept unchanged, and all remaining time discrepancies were replaced with the automatic grace period length, M minutes. The cumulative time savings due to the proposed policy was computed by subtracting the sum of time discrepancies under the proposed policy from that under the current policy. The grace period length (0, 5, 10, 15, and 20 minutes) and percentage of “legitimate” time discrepancies (0, 20, 50, and 80%) were varied. Table 3 displays the number of hours that might have been saved under the proposed policy. Negative values represent hours saved, while positive values represent hours lost. For each savings estimate, a 95% confidence interval was computed using a bootstrap method. For example, under a 5 minute “grace period”, and assuming 20% legitimacy, we estimate that 699 hours could have been saved (95% CI 723, 677). However, not all policy scenarios resulted in time savings, and there is significant uncertainty regarding the percentage of “legitimate” time discrepancies.

A linear mixed effect model was used to estimate the average time discrepancy for each clinician, adjusting for staff role and case disposition. Figure 5 and Figure 6 illustrate the estimates and their 95% confidence intervals. The average time discrepancy was significantly positive for 23 out of 189 clinicians, and significantly negative for 19 clinicians out of 189. The corresponding staff IDs and their average time discrepancies are listed in Tables 5 and 6, respectively. Case disposition was also significantly associated with time discrepancy. Cases that were handed off or transferred to ICU had lesser time discrepancies, on average, than other case dispositions (p-value <0.001, and p-value =0.005 respectively). There was no evidence in these data that staff role is associated with time discrepancy (p-value 0.153).