

Examining the Frequency of Calls to LVPG Sports Medicine to Treat Sport Related Concussions in High School Athletes

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Examining the Frequency of Calls to LVPG Sports Medicine to Treat Sport Related Concussions in High School Athletes

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Concussions are a common injury in high school athletes, with an estimated 400,000 sport related concussions (SRCs) occurring in high school athletes per year in the US¹. Despite increasing research, the diagnosis of a concussion remains a clinical diagnosis based on history and physical exam findings²⁻³. Sideline tools such as the SCAT5 are helpful in determining if an athlete is concussed⁴⁻⁶. Once a concussion is diagnosed, follow up evaluation in the outpatient office provides the opportunity to more thoroughly evaluate the athlete, treat symptoms, and develop a graduated return to play plan⁷⁻⁸.

LVPG Sports Medicine provides coverage for nine high schools in the Lehigh Valley area. There is a fixed amount of appointments reserved in LVPG Sports Medicine physicians' schedules for the treatment of concussions. Despite this policy, the demand for concussion appointments usually exceeds the number of appointments reserved per day.

Kerr et al. (2019)⁹ examined the frequency of concussions in 20 high school sports from 2013-2018. Of the 9542 concussions reported:

- 63.7% occurred in competition vs 36.3% in practice
- 81.6% occurred in the regular season vs. 14.2% in the preseason
- Football and girls soccer had the highest concussion rates out of all sports with a rate of 10.4 and 8.19 per 10,000 athletic events, respectively

Football and girls soccer seasons begin in mid-August, with state tournament competition beginning and concluding in November¹⁰. Given these findings and observations, it is likely that the demand to treat SRC as measured by the frequency of calls to LVPG to treat SRC in high school athletes varies by day and month. This data may help inform a decision to change the amount of concussion appointments reserved per day for LVPG Sports Medicine providers.

Problem Statement

Does the demand to treat SRCs as measured by the frequency of calls to LVPG Sports Medicine to treat SRCs in high school athletes vary by day and month for Fall 2019?

September 2019: Initial study design was deemed to be human subject research.

October 2019: Current study design for an observational study was approved as non-human subject research.

- Calls to LVPG to treat SRCs were chosen to measure the demand for treatment of SRCs since appointments are scheduled as soon as possible when a call is made. This data was also trackable without using patient identifying information to ensure that this project did not qualify as human subject research.

October 2019- January 2020: Data was gathered from athletic trainers, who kept a log of the date of calls made to schedule appointments for high school athletes with SRC. Data for the Fall 2019 season from August to November 2019 was used for this study.

The frequency of these calls by day and month was then calculated.

The frequency of these calls was compared to data from previous studies regarding the incidence of concussion. Secondly, the Pearson correlation coefficient between the frequency of calls and the frequency of football competitions for all high school football teams covered by LVPG Sports Medicine was calculated using Microsoft Excel.

Figure A. Frequency of Calls by Day

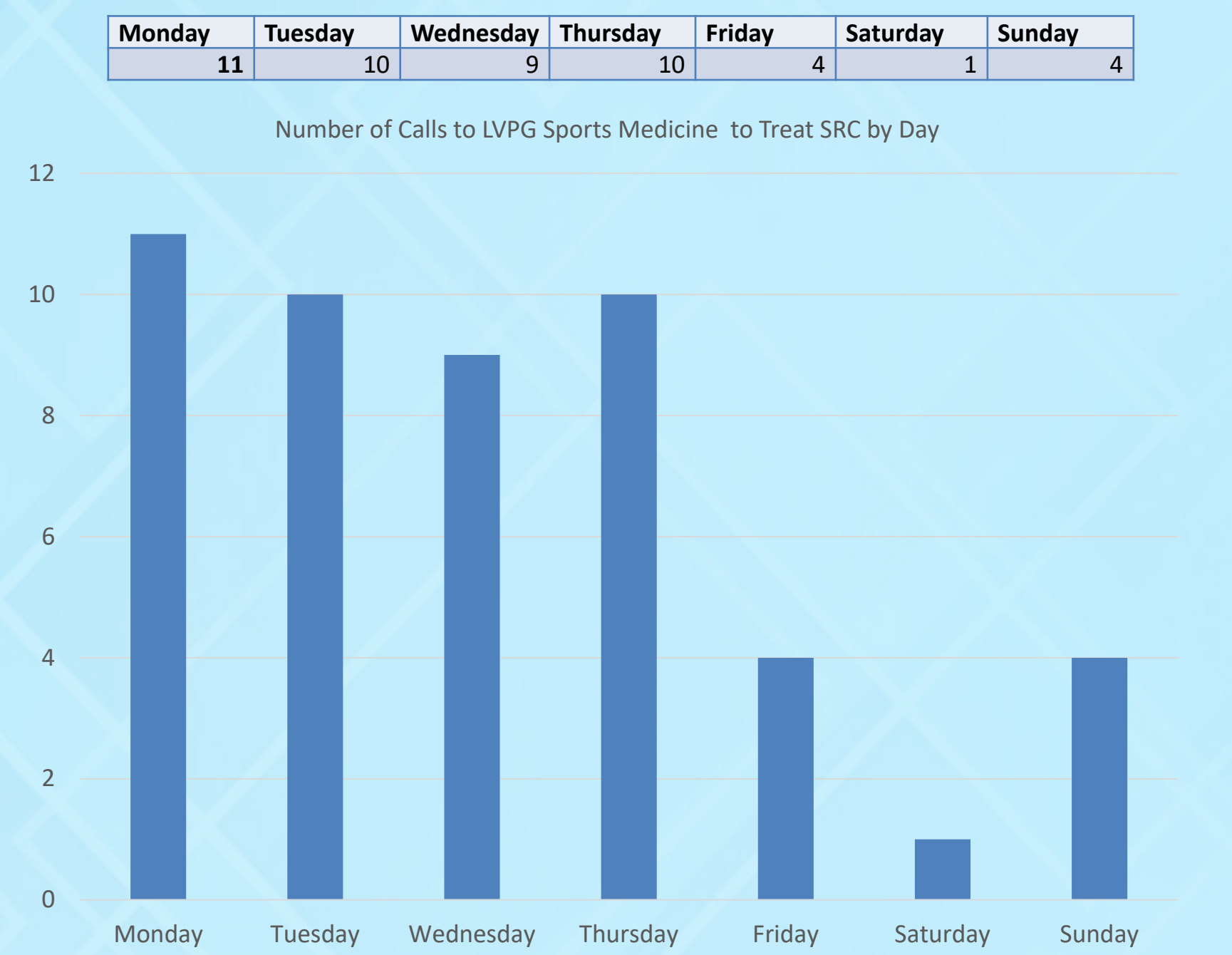


Figure B. Frequency of Football Games by Day

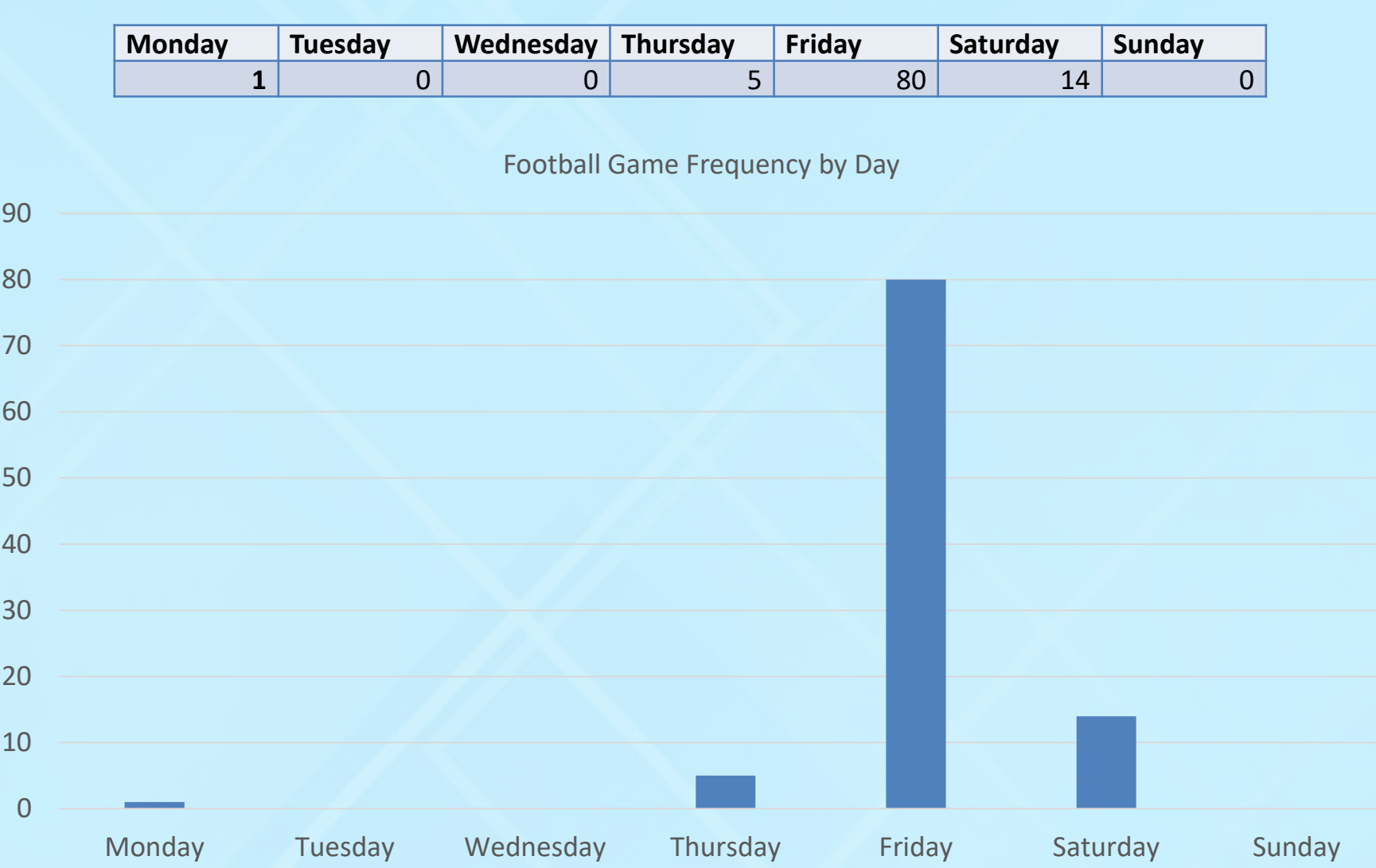


Figure C. Frequency of Calls by Month

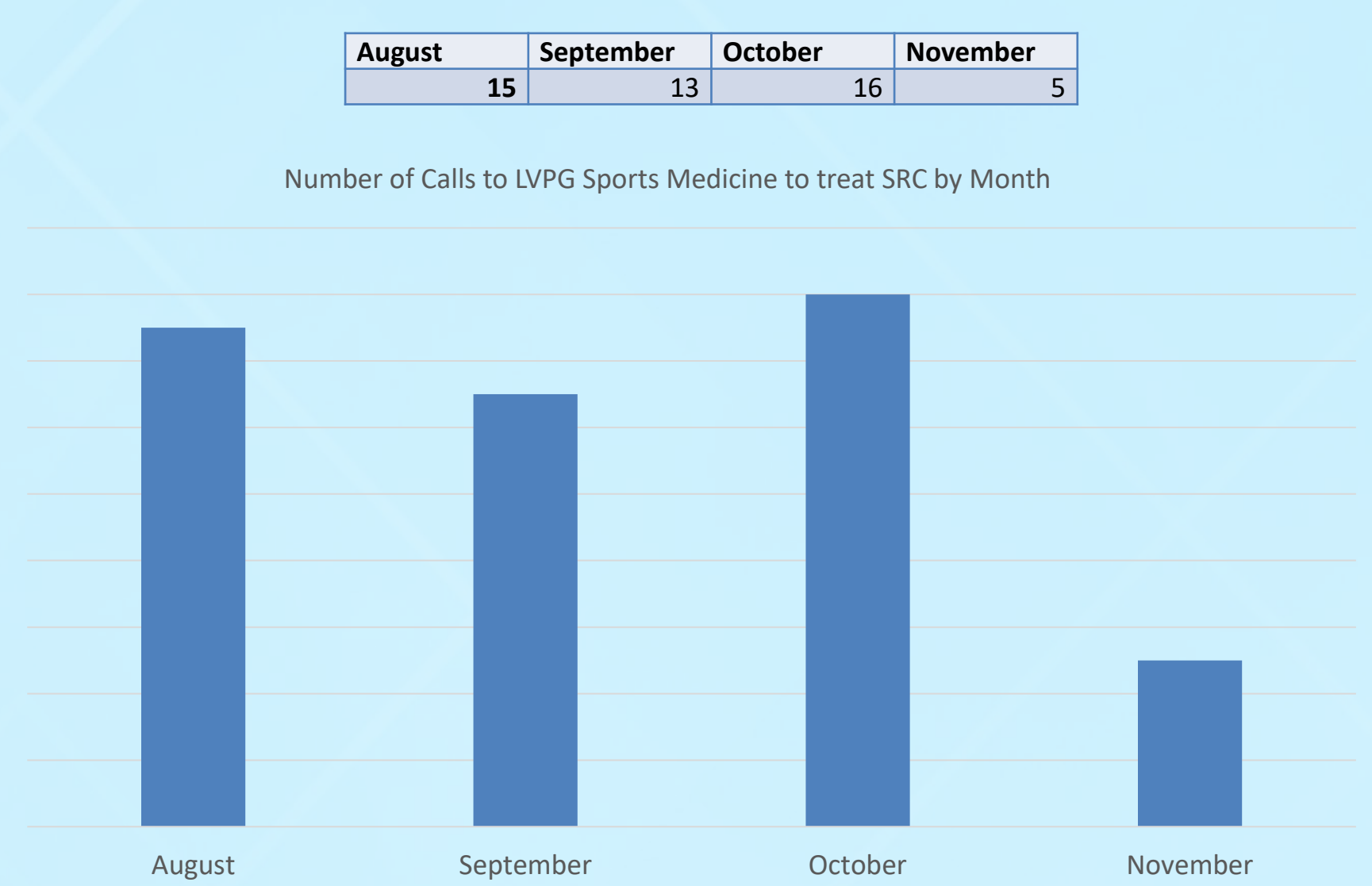
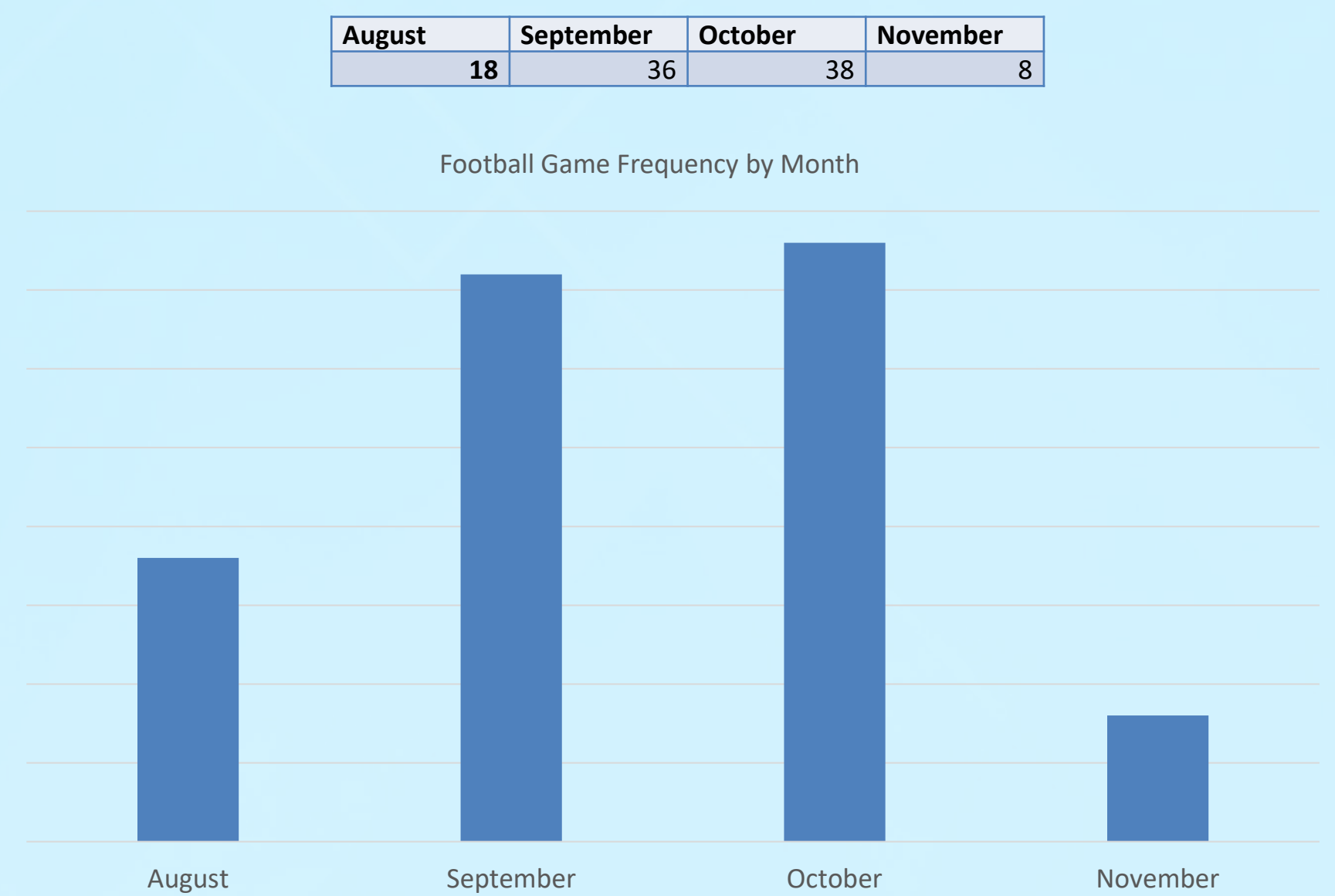


Figure D. Frequency of Football Games by Month



Thank you to Dr. Chelsea Evans, John Swartz ATC, and LVPG Sports medicine

By day, the most calls to treat SRC occurred Monday-Thursday (Figure A). This did not correlate well with frequency of football games by day (Figure B), with a Pearson's r of $-.441$. Given the results from Kerr et al. (2019), it would be expected that the most calls would occur Friday through Saturday.

- Concussions that occur Friday and Saturday may be treated in the Emergency Room or Urgent Care Clinic
- Concussions occurring Friday or Saturday may be called in on Monday once normal business hours for outpatient offices resume.
- Other sports such as girls soccer that have high incidences of SRC have competitions throughout the week

By month, the most calls to treat SRC occurred from August through October (Figure C). This correlated well with frequency of games by month (Figure D), with a Pearson's r of $.743$. This data is consistent with the previous observations by Kerr et al. (2019).

- The majority of football and girls soccer competitions occur from August through October, with Pennsylvania state championship play beginning in November
- Not all high school teams qualify for state competition in November, and so the amount of football and girls soccer competitions decreases as the month progresses

Limitations:

This study shows correlation, not causation, between monthly frequencies of calls to treat concussion and football competitions. The calls examined in this study include all fall sports, not just football, so this correlation can be confounded by other sports. The study has a small sample size, and only looks at the Fall 2019 season. Additional athlete information from a human subject study would have allowed for sub analysis that could have made the results of this project more impactful.

For the Fall 2019 season, the most calls to treat concussions at LVPG Sports Medicine Monday-Thursday despite most football competitions occurring Friday and Saturday. This is different than expected from previous studies, but may be explained by several factors such as:

- Concussions that are treated in the emergency room or urgent care clinic over the weekend
- Other fall sports having a more evenly balanced competition schedule during the week
- Calls to treat concussions occurring over the weekend being placed during business hours on Monday.

August-October had the highest frequency of calls. This correlated well with football game frequency by month. This is consistent with data from previous studies.

Further cost/benefit analysis is required to examine the financial and practical benefit of implementing changes in provider scheduling that reflect the demand for concussion treatment found in this study.

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