Medical Tent Usage From Bank of America Chicago Marathon 2015-2017

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Background: As mass participation events continue to increase in popularity, the need for medical care continues to increase. Our objective was to evaluate the course medical tent usage throughout the Bank of America Chicago Marathon course. Our second objective was to evaluate emergency medical services (EMS) utilization during the event.

Hypothesis: We hypothesize that as the race progresses, medical tents will see more participants and EMS will have an increase in utilization.

Level of Evidence: Level 4.

Methods: This study was a retrospective analysis of data collected by the medical staff from 2015 to 2017. Documented patient encounters were analyzed from each course medical tent. Twenty medical tents were spaced roughly 1.2 miles apart depending on location and ease of EMS access to the medical tent location.

Results: From 2015 to 2017, the course medical tents saw 2973 patients, with a 96.3% discharge rate. The data showed a linear increase of 5.69 patients seen per mile until mile 20 (linear regression \( P < 0.01 \)). After mile 20, the number of patients seen per mile was about the same. The data also showed an increase in EMS utilization every 5 miles as the race progressed (\( P = 0.04 \)) and an increase in ratio of patients transported to the hospital compared with patients transferred to the main medical tents up to mile 20 (\( P = 0.02 \)).

Conclusion: Course medical tents saw a statistically significant linear increase in patients per mile until mile 20. Total EMS utilization showed a statistically significant increase in usage as the race progressed and a statistically significant increase in ratio of transports to transfers as the race progressed until mile 20.

Clinical Relevance: This study has the potential to influence medical tent and EMS placement for endurance events with increasing patient encounters and hospital transports as the mileage of the endurance event increases.

Keywords: medical tent; marathon; mass participation event

As mass participation endurance events continue to increase in popularity throughout the world, the need for medical care in the acute setting continues to increase as well. Many endurance events, including the Bank of America Chicago Marathon, have implemented systems to help decrease morbidity and mortality by using medical tents along the course with a main medical tent situated at the end of the course.\(^1,3,5\) Studies have shown the utility of increasing aid stations later in the course.\(^5,7\)

One study also showed that having physicians in the medical tents decreases emergency medical services (EMS) transports.\(^3\)

Understanding participant usage of course medical tents could provide information for race organizers, EMS personnel, and medical staff with regard to tent and EMS placement along the course.\(^2,6\) This study was undertaken to evaluate course medical tent usage throughout the Bank of America Chicago Marathon course. A second objective was to evaluate EMS utilization between main medical tents and surrounding hospitals.

METHODS

Study Design

This study is a retrospective analysis of data collected by the Bank of America Chicago Marathon medical staff and Superior Ambulance company who provided EMS coverage. Paper documentation of patient encounters were analyzed from each course medical tent, which was then transcribed into a database for evaluation. This study received approval from the institutional review board.

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Setting and Population

Data were collected at the 3 Bank of America Chicago Marathon events that took place between October 2015 and October 2017. All participants who reported to the course medical tents were included in the study. Twenty medical tents were spaced roughly 1.2 miles apart along the course depending on previous participant usage and ease of EMS access to the medical tent location. Medical tent staff included a variety of health care professionals, from physicians and nurses to physical and massage therapists.

Data Analysis and Sample Size

The primary outcome of the study was to determine participant use of each course medical tent. Data from each course medical tent between 2015 and 2017 were collected and disposition categorized into discharged, transferred to main medical tent, or transported to hospital. The secondary outcome looked at EMS utilization during the marathons, separated into transfers to main medical tents for further monitoring and transports to local hospitals. Because of the relatively low volume of EMS utilization, all 3 race years were combined and broken into 5-mile increments. The ratio of hospital transports to main medical tent transfers was also calculated. SPSS was used for statistics with linear regression modeling.

RESULTS

Participants

Overall, during the 3 races between 2015 and 2017, the course medical tents had 2973 documented patient encounters with an average age of 36.0 years. Table 1 provides descriptive statistics for the participants seen at the course medical tents. A total of 1589 (53.4%) of patient encounters were men with an average age of 37.0 years, while 1384 (46.6%) of patients seen were women with an average age of 34.9 years. Of all patients seen, 2862 (96.3%) patients were discharged from the course medical tents. A total of 111 (3.7%) patients utilized the EMS system with 75 (2.5%) being transferred to a main medical tent and 36 (1.2%) being directly transported to the emergency department from the course. Of those that used EMS, 64 (57.7%) were women with an average age of 35.8 years and 47 (42.3%) were men with an average age of 40 years. Table 1 provides descriptive statistics for the participants seen at the course medical tents. Overall, most patients seen in course medical tents were discharged but 3.7% of those seen needed to utilize EMS for further monitoring and management.

Course Medical Tents

Course medical tents are important for the safety of the participants. Table 2 provides location of each medical tent on the course as well as each tent’s patient encounters with disposition. In 2015, 757 patients were seen with 10 (1.3%) transferred to the main medical tent and 12 (1.6%) transported to the hospital. In 2016, 1376 patients were seen with 7 (0.5%) transferred and 9 (0.7%) transported to the hospital. In 2017, 840 patients were seen with 58 (6.9%) transferred and 15 (1.8%) transported to the hospital. As demonstrated in Figure 1, the data show a linear increase in 5.69 patients seen per mile until mile 20 (linear regression $P < 0.01; R^2 = 53.7%$). After mile 20,
the number of patients seen per mile was about the same, as demonstrated in Figure 2. Linear regression was not found to be significant ($P = 0.68$ and $R^2 = 1.1\%$).

**EMS Utilization**

While EMS resources can be scarce and stretched far apart during any event, they are an important resource for any mass participation event. Table 3 demonstrates EMS utilization throughout the race in 5-mile increments. From the start of the race to mile 5, 2 tents had 7 transfers and zero transports with a ratio of transports to transfers of zero. In miles 5.1 to 10, 4 tents had 14 transfers and 5 transports with a ratio of transports to transfers of 0.36. In miles 10.1 to 15, 4 tents had 18 transfers and 8 transports with a ratio of transports to transfers of 0.44. In miles 15.1 to 20, 4 tents had 12 transfers and 9 transports with a ratio of transports to transfers of 0.75. In miles 20.1 to the end of the race, 6 tents had 24 transfers and 14 transports with a ratio of transports to transfers of 0.58. From the start of the race to mile 20, linear regression (Figure 3) shows an increase in ratio of transports to a hospital compared with transfers to a main medical tent ($P = 0.02$). While total EMS utilization (Figure 4) showed a statistically significant increase in usage as the race progressed (linear regression $P = 0.04$; $R^2 = 80.8\%$), EMS utilization per medical tent was not found to be statistically significant ($P = 0.11$).

**DISCUSSION**

Mass participation events provide a unique challenge to the medical system, as medical teams can encounter all types of athletes, from the weekend warriors to the elite and Olympic athletes; therefore, they need to be prepared to deal with all types of injuries and athletes. While large races, such as the Bank of America Chicago Marathon, have tens of thousands of
participants, they also tend to have thousands of volunteers. The hope for this study was to provide data from a large, well-known marathon race on course medical tent usage so that all marathons, whether large or small, may be able to allocate medical resources and EMS personnel appropriately throughout the course.

Because of the high volume of participants and volunteers, the Chicago Marathon is able to place medical tents roughly every 1.2 miles along the course to provide aid to the participants. The recorded patient encounters showed a statistically significant linear increase in patients per mile up until mile 20. After mile 20, the number of patient encounters was consistent and had no statistical difference. More research may be needed to understand why an increase is seen until mile 20 but then a leveling off of participants until the end, but it could be that athletes who reach mile 20 are more likely to be experienced, more adequately trained, or simply willing and able to push themselves through adversity to finish the race. Medical staff should plan for increasing medical tent usage as the race progresses and allocate resources appropriately.

EMS utilization and placement throughout the course is also an important aspect of medical care for the participants. While part of placement for EMS providers includes access from the course to the main medical tents or hospital, placement based on course distance and participant use should be considered. This study demonstrated a statistically significant increase in EMS utilization as the race progressed. Participants are likely to develop higher acuity complaints needing EMS transportation as the race progresses; therefore, placement of more EMS personnel at later aspects of the race is needed. This study also
showed that from the start of the race to mile 20, there was a statistically significant increase in ratio of EMS transport to the hospital compared with transfers to a main medical tent. Hospital transport is an important consideration for EMS staffing, as transport removes EMS personnel from close proximity to the event, potentially straining EMS resources. More research will be needed to understand why this ratio increases, but it could be that increased course distance leads to increased fatigue and acuity that needs a hospital evaluation and treatment. We did find a general increase in transports to hospital per tent as the race progressed, but it was not found to be statistically significant. Overall, EMS personnel should be distributed throughout the course but increased in concentration in the later aspects of the race.

Overall, this study has the potential to influence medical tent and EMS placement for endurance events, because participants require more medical care and EMS utilization as the race progresses.

Limitations

This study consisted of a single, large-participant marathon event and therefore may not be generalizable to smaller participant events, shorter distances, or different types of mass participation events. The race course was stylized to a clover pattern through the city and therefore may not be generalizable to single-loop races or point-to-point races. The small number of EMS transports and transfers were aggregated, which can limit generalizability. Because of the retrospective nature of the study and no consistent method of documentation, we were unable to reliably report on the different pathologies presented to each medical tent.

CONCLUSION

Our data show course medical tents saw a statistically significant linear increase in patients per mile until mile 20. After 20 miles, the number of patients was consistent with no statistical difference. We also saw a statistically significant increase in EMS utilization as the race progressed and a statistically significant increase in ratio of patients transported to the hospital compared with the main medical tents until mile 20.

REFERENCES


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