REVIEW OF COMPLAINTS ABOUT THE LATE ARRIVAL OF AMBULANCES

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ABSTRACT

INTRODUCTION: The arrival times of ambulances to the scene are a significant health quality indicator in terms of patient health and the public's trust in the system. In this study, it was reviewed whether complaints regarding ambulances are concentrated on certain days, hours, months, diagnoses, and triage codes. This study aims to contribute to the missing part of the literature and to improve emergency health services. Using these evaluations, pre-hospital health services can be assessed and required corrections can be implemented.

MATERIAL AND METHODS: This was a retrospective registrational study. Complaints sent to the 112 head physician offices by petitions and to SABIM (Ministry of Health Communication Centre) and CIMER (Republic of Türkiye Presidency's Communication Centre) online regarding the late arrival of ambulances in Ankara Province between 1 January 2021 and 31 December 2023 were reviewed. The data analysis was conducted using IBM SPSS 27.0 (Armonk, NY, USA: IBM Corp.).

RESULTS: The study included 161 complaints sent within three years. Of the complaints, 54.3% were made by males. The highest number of complaints was received in the summer months and the lowest number was in November. The highest number of complaints was made on Fridays. In 2022, the command reaction times were shorter than in the other years. Reaction and case arrival times in off-site cases were longer compared to those for in-site cases.

CONCLUSIONS: In this study, significant data were obtained about the active and effective use of 112 emergency ambulance services. Schedules should be drawn up taking into consideration the weekends and times when the number of patients is greater. Strategic arrangements can be made to utilize resources by reviewing previous data and complaints about ambulance systems. Such evaluations can be important sources for improving emergency healthcare services. Conducting these assessments and tasks regularly will inform future improvements such as reduced case transport times, reduced command reaction times and better pre-hospital care.

KEYWORDS: ambulance service; complaint; delay; reaction time; emergency healthcare

Disaster Emerg Med J 2024; 9(3): 158–165

INTRODUCTION

Pre-hospital healthcare services play a significant role in public health. Ambulances are one of the cornerstones of pre-hospital care. The 112-ambulance service used both for in-site cases and patient transfers,

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Recieved: 24.07.2024; Accepted: 07.08. 2024; Early publication date: 12.08.2024

was created to help patients and injured individuals access healthcare services as fast as possible [1].

Complaints received for a particular service play an important role in the development of that service. an important branch of pre-hospital health services is the 112-ambulance service. 112 ambulance service is the system that the public in Turkey uses to receive health care in any emergency. It serves a large number of ambulances and stations throughout the country. When the literature is examined, the number of studies examining the complaints made to ambulance services in Turkey is limited. This study aims to contribute to this missing part of the literature and to improve emergency health services [2].

In an emergency, reaction and response times are vital. Studies have shown that these times are closely related to mortality and morbidity rates [3, 4]. Speed and efficiency in emergencies are two important factors that affect the survival of patients. Moreover, ambulances, positioned at the centre of such services, enable the fastest and most suitable intervention for individuals who are experiencing health issues such as accidents, diseases, or injuries. They play a critical part not only in the transfer of patients but also in the first response at the scene.

The arrival times of ambulances to the scene are a significant health quality indicator in terms of patient health and the public's trust in the system. Maintaining the quality of the provided healthcare services is only possible through feedback and supervision. Complaints and feedback sent by the public, who receive healthcare services in the first place, are significant resources in enhancing the overall quality of the services. In the present study, the complaints made through petitions and online feedback systems for the Ankara Provincial Ambulance services over three years were evaluated.

MATERIAL AND METHODS

This was a retrospective registrational study. Complaints sent to the 112 head physician offices by petitions and to SABIM (Ministry of Health Communication Centre) and CIMER (Republic of Türkiye Presidency's Communication Centre) online regarding the late arrival of ambulances in Ankara Province between 1 January 2021 and 31 December 2023 were reviewed. The permission was obtained from the relevant institution for the study. Ethical approval was granted by the Scientific and Ethics Evaluation Committee for Medical Research No. 1 with TABED-1-24-284 number on 22.05.2024 at Ankara Bilkent City Hospital. The study included 161 complaints about the late arrival of ambulances on the specified dates. Due to the structure of the emergency healthcare services, patients of all ages and groups were included in the study. Groundless complaints and those with missing research parameters were excluded from the study. The data analysis was conducted with IBM SPSS 27.0 (Armonk, NY, USA: IBM Corp.). In addition to descriptive statistical methods (frequency, percentage, mean, standard deviation, median, interguartile range), the chi-squared test was used to compare quantitative data. The fit of the data to the normal distribution was evaluated through methods such as the Kolmogorov-Smirnov test, skewness and kurtosis, and graphical methods (histogram, Q-Q plot, stem and leaf, boxplot). Mann-Whitney U and Kruskal-Wallis tests were used for the comparisons between the quantitative data groups that do not have a normal distribution. Post-hoc Bonferroni correction was used in instances where the difference was found in multiple comparisons. The statistical significance level was set at p = 0.05.

RESULTS

This study included a total of 161 cases in which 112 emergency ambulance services were used over three years and a complaint was filed afterwards. The mean age was 48.4 ± 21.2 . Furthermore, 36.6% of the complaints (n: 59) were received in 2021, 31.7% (n: 51) in 2022, and 31.7% (n: 51) in 2023. Regarding the days of the week, the highest number of complaints was made on Fridays (n: 37). Further, 85.7% of the complaints (n: 138) were on weekdays and 14.3% (n: 23) on weekends. While 57.8% of the patients attended (n: 93) were off-site, 42.2% (n: 68) were in-site. Looking at the reasons for calls, 81.4% (n: 131) were medical and 18.6% (n: 30) were trauma-related calls. On the other hand, the cases were finalized as transfer to hospital 89.4% (n: 144), transfer rejection 7.5% (n: 12), on-site intervention 1.9% (n: 3), and 3.1% (n: 2) death when the patient was left at the scene. Considering the diagnosis codes, the highest number of calls in specific diagnoses were trauma-related (18%, n: 29) (Tab. 1).

Command, station reaction times, and scene arrival times are provided in Table 2.

In the comparisons made based on years, a significant difference (p < 0.05) was found

| Table 1. Characteristics of | of participants | | |
|-----------------------------|------------------------|-----|------------------|
| | | n | % |
| Year | 2021 | 59 | 36.6 |
| | 2022 | 51 | 31.7 |
| | 2023 | 51 | 31.7 |
| Seasons | Spring | 38 | 23.6 |
| | Summer | 53 | 32.9 |
| | Fall | 39 | 24.2 |
| | Winter | 31 | 19.3 |
| Months | January | 10 | 6.2 |
| | February | 11 | 6.8 |
| | March | 12 | 7.5 |
| | April | 9 | 5.6 |
| | Мау | 17 | 10.6 |
| | June | 14 | 8.7 |
| | July | 14 | 8.7 |
| | August | 25 | 15.5 |
| | September | 20 | 12.4 |
| | October | 11 | 6.8 |
| | November | 8 | 5 |
| | December | 10 | 6.2 |
| Day of the week | Monday | 26 | 16.1 |
| | Tuesday | 19 | 11.8 |
| | Wednesday | 28 | 17.4 |
| | Thursday | 28 | 17.4 |
| | Friday | 37 | 23 |
| | Saturday | 14 | 8.7 |
| | Sunday | 9 | 5.6 |
| Weekday/Weekend | Weekdays | 138 | 85.7 |
| | Weekends | 23 | 14.3 |
| Hour range | 12 a.m.–07:59 a.m. | 31 | 19.3 |
| | 08:00 a.m.– 03:59 p.m. | 58 | 36 |
| | 04:00 p.m.– 11:59 p.m. | 72 | 44.7 |
| Work | Working hours | 70 | 43.5 |
| | Outside working hours | 91 | 56.5 |
| Sex | Female | 75 | 46.6 |
| | Male | 86 | 53.4 |
| Age (year) [Median (IQR)] | | | 52.0 (30.0–65.0) |
| | < 18 Age | 13 | 8.1 |
| | ≥ 18 Age | 148 | 91.9 |
| Region | Off-site | 93 | 57.8 |
| | In-site | 68 | 42.2 |
| Reason for Call | Medical | 131 | 81.4 |
| | Trauma | 30 | 18.6 |

| Table 1. Characteristics of participants (continued) | | | | | |
|------------------------------------------------------|---------------------------------|-----|------|--|--|
| | | n | % | | |
| Finalization | Transfer — to hospital | 144 | 89.4 | | |
| | Training and Research Hospitals | 79 | 54.9 | | |
| | Public Hospitals | 29 | 20.1 | | |
| | Universities | 21 | 14.6 | | |
| | Private Institutions | 15 | 10.4 | | |
| | Transfer — rejection | 12 | 7.5 | | |
| | On-site intervention | 3 | 1.9 | | |
| | Death — left at the site | 2 | 1.2 | | |
| Triage | Green code | 51 | 31.7 | | |
| | Yellow code | 68 | 42.2 | | |
| | Red code | 37 | 23 | | |
| | Black code | 5 | 3.1 | | |
| Diagnosis | Trauma | 29 | 18 | | |
| | Neurological complaints | 25 | 15.5 | | |
| | Psychiatric complaints | 19 | 11.8 | | |
| | Arrest | 17 | 10.6 | | |
| | Infectious diseases | 14 | 8.7 | | |
| | Cardiac complaints | 13 | 8.1 | | |
| | Gastrointestinal system | 12 | 7.5 | | |
| | Other system complaints | 32 | 19.9 | | |

IQR — interquartile range

| Table 2. Command, station reaction and scene arrival times | | | | |
|------------------------------------------------------------|-----------------------|--|--|--|
| | Median (IQR) | | | |
| Command reaction time (s) | 246.0 (149.0–440.0) | | | |
| Station reaction time (s) | 42.0 (22.5–57.0) | | | |
| Arrival Time – 1 (s) (Scene Arrival —Call) | 675.0 (495.5–1.018.0) | | | |
| Arrival Time – 2 (s) (Scene Arrival —Case) | 363.0 (276.5–560.0) | | | |

between years in terms of Command Reaction Time and Arrival Time-1 values, and in two instances where differences were found, the reaction times in 2022 were shorter. No significant difference was found between years in terms of other variables (p > 0.05). In the comparisons made based on seasons, no significant difference was found in terms of all times (p > 0.05). In the comparisons made based on Weekday/Weekend, a significant difference (p < 0.05) was found between years in terms of Command Reaction Time and Arrival Time-1 values, and in two instances where differences were found, the reaction times on weekends were shorter. No significant difference was found in terms of other variables (p > 0.05). In the comparisons made based on the hour range, no significant difference (p > 0.05) was found in terms of hour ranges in terms of all times. In the comparisons made based on work status, a y significant difference (p < 0.05) was found between the work status in terms of Arrival Time-2 values, and the time outside the working hours was shorter. No significant difference was found in terms of other variables (p > 0.05). In the comparisons made based on sex, no significant difference (p > 0.05) was found between the sexes in terms of all variables. In the comparisons made based on age groups, no significant difference (p > 0.05) was found between age groups in terms of all variables. In the comparisons made based on regional status, a significant difference (p < 0.05) was found between regional status in terms of Command Reaction Time and Arrival Time-1 and -2 values, and in three instances where differences were found, off-site times were longer. No significant difference was found in terms of other variables (p > 0.05). In the comparisons made based on the reason for calls, a significant difference (p < 0.05) was found between the reasons for calls in terms of Command and Station Reaction Times, and it was found that in reaction time trauma-related calls and in station reaction time medical calls were longer. No significant difference was found in terms of other variables (p > 0.05). In the comparisons made based on finalization, no significant difference (p > 0.05) was found between the finalization in terms of all times. In the comparisons made based on triage, no significant difference (p > 0.05) was found between triages in terms of all times. In the comparisons made based on the Transferred Hospital type, no significant difference (p > 0.05) was found between the transferred hospital types in terms of diagnoses (Tab. 3).

| Table 3. Cor | Table 3. Comparison of Reaction and Arrival Times | | | | |
|--------------|---------------------------------------------------|------------------------------|------------------------------|----------------------------------------------|----------------------------------------------|
| | | Command Reaction Time (s) | Station Reaction Time (s) | Arrival Time-1 (s) (Scene Arrival — Call) | Arrival Time-2 (s) (Scene Arrival — Case) |
| Year | 2021 (n = 59) | 314 | 41 | 726 | 420 |
| | | (173.0–623.0) | (21.0–56.0) | (526.0–1.381.0) | (314.0–586.0) |
| | 2022 (n = 51) | 175 | 34 | 550 | 331 |
| | | (118.0–332.0) | (20.0–56.0) | (446.0–751.0) | (290.0–543.0) |
| | 2023 (n = 51) | 255 | 45 | 700 | 379 |
| | | (177.0–533.0) | (27.0–58.0) | (527.0–941.0) | (242.0–565.0) |
| | p* | 0.003 | 0.378 | 0.012 | 0.348 |
| | Difference | 2 and 1–3 | - | 2 and 1–3 | - |
| Seasons | Spring (n $=$ 38) | 269 | 35.5 | 811 | 375 |
| | | (174.5–536.0) | (25.8–57.0) | (544.3–1.180.3) | (260.8–598.8) |
| | Summer (n $=$ 53) | 228 | 42 | 589 | 356 |
| | | (127.0–385.0) | (24.0–59.0) | (441.5–972.0) | (266.0–542.5) |
| | Fall (n = 39) | 293 | 45 | 695 | 420 |
| | | (148.0–516.0) | (21.0–55.0) | (502.0–1.368.0) | (290.0–610.0) |
| | Winter (n $=$ 31) | 222 | 45 | 638 | 350 |
| | | (150.0–384.0) | (17.0–56.0) | (456.0–917.0) | (285.0–495.0) |
| | p* | 0.434 | 0.869 | 0.198 | 0.552 |
| Weekday/ | Weekdays (n = 138) | 264 | 41 | 695 | 379.5 |
| /Weekend | | (155.3–516.3) | (21.8–56.3) | (508.0–1.080.0) | (291.5–567.5) |
| | Weekends (n = 23) | 192 | 50 | 543 | 350 |
| | | (110.0–281.0) | (33.0–58.0) | (437.0–720.0) | (225.0–394.0) |
| | p** | 0.048 | 0.202 | 0.019 | 0.107 |
| Hour | 12:00 a.m07:59 a.m. (n = 31) | 242 | 42 | 599 | 351 |
| Range | | (156.0–369.0) | (17.0–56.0) | (491.0–901.0) | (229.0–572.0) |
| | 08:00 a.m03:59 p.m. (n = 58) | 278 | 36 | 745 | 454.5 |
| | | (174.5–542.5) | (25.3–58.0) | (530.8–1.202.5) | (298.3–658.8) |
| | 04:00 p.m.–11:59 p.m. | 218 | 45.5 | 623.5 | 355 |
| | (n = 72) | (124.5–500.8) | (22.5–56.8) | (458.0–1.032.0) | (273.8–489.0) |
| | p* | 0.39 | 0.84 | 0.086 | 0.084 |
| Work | Working Hours $(n = 70)$ | 256.5 | 40.5 | 705 | 422 |
| | | (165.8–515.3) | (21.8–58.5) | (499.8–1.095.5) | (299.8–601.0) |
| | Outside Work Hours (n = 91) | 242 | 43 | 638 | 349 |
| | | (139.0–419.0) | (24.0–56.0) | (491.0–1.003.0) | (250.0-496.0) |
| | p** | 0.656 | 0.814 | 0.248 | 0.027 |

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| Table 3. Comparison of reaction and arrival times (Continued) | | | | | |
|---------------------------------------------------------------|------------------------------------|------------------------------|------------------------------|----------------------------------------------|----------------------------------------------|
| | | Command Reaction Time (s) | Station Reaction Time (s) | Arrival Time-1 (s) (Scene Arrival — Call) | Arrival Time-2 (s) (Scene Arrival — Case) |
| Sex | Female (n $=$ 75) | 259 | 42 | 710 | 385 |
| | | (156.0–517.0) | (24.0–57.0) | (501.0–1.169.0) | (271.0–576.0) |
| | Male (n = 86) | 237.5 | 41 | 636.5 | 360 |
| | | (145.3–404.0) | (21.8–56.3) | (492.5–932.0) | (279.3–546.0) |
| | p** | 0.463 | 0.988 | 0.212 | 0.36 |
| Age Group | < 18 Age (n = 13) | 160 | 46 | 654 | 362 |
| | | (105.5–524.0) | (28.5–57.5) | (440.0–968.5) | (291.5–706.5) |
| | ≥ 18 Age (n = 148) | 256 | 41 | 678.5 | 364 |
| | | (153.8–433.3) | (22.0–56.8) | (501.3–1.037.0) | (270.3–553.0) |
| | p** | 0.263 | 0.479 | 0.495 | 0.763 |
| Region | Off-site (n = 93) | 279 | 41 | 742 | 420 |
| | | (175.5–549.0) | (24.0–58.0) | (544.0–1.194.5) | (305.5–613.0) |
| | In-site (n = 68) | 221.5 | 42 | 560.5 | 322 |
| | | (122.5–386.3) | (18.0–55.8) | (428.3–796.8) | (235.3–432.0) |
| | p** | 0.046 | 0.462 | 0.001 | 0.001 |
| Reason for | Medical (n = 131) | 234 | 45 | 654 | 363 |
| Call | | (140.0–404.0) | (26.0–58.0) | (491.0–1.003.0) | (285.0–542.0) |
| | Trauma (n = 30) | 376.5 | 27.5 | 732.5 | 364.5 |
| | | (175.8–827.8) | (17.0–47.3) | (524.3–1.427.3) | (205.0–584.5) |
| | p** | 0.036 | 0.014 | 0.165 | 0.965 |
| Finalization | Transfer — to hospital $(n = 144)$ | 244 | 41 | 694 | 368 |
| | | (148.5–515.8) | (22.0–57.0) | (491.5–1.066.3) | (270.3–575.0) |
| | Transfer — Rejection (n = 12) | 283 | 47.5 | 622 | 333 |
| | | (175.8–397.5) | (24.3–54.3) | (470.5–679.8) | (248.8–365.0) |
| | On-site Intervention | 143 | 60 | 638 | 480 |
| | (n = 3) | (108.0–0.0) | (32.0–0.0) | (588.0–0.0) | (452.0–0.0) |
| | Death — Left at the site | 260.5 | 30.5 | 651 | 390.5 |
| | (n = 2) | (228.0–0.0) | (1.0–0.0) | (589.0–0.0) | (361.0–0.0) |
| | p* | 0.655 | 0.568 | 0.628 | 0.393 |
| Triage | Green Code (n $= 51$) | 227 | 42 | 609 | 350 |
| | | (143.0–455.0) | (25.0–57.0) | (464.0–1.107.0) | (261.0–495.0) |
| | Yellow Code (n = 68) | 237 | 42 | 688 | 387.5 |
| | | (150.8–516.8) | (24.8–56.0) | (494.3–1.037.0) | (286.3–541.5) |
| | Red Code (n = 37) | 266 | 33 | 695 | 362 |
| | | (120.0–402.5) | (14.0–57.0) | (479.0–926.0) | (261.5–604.0) |
| | Black Code (n = 5) | 293 | 60 | 941 | 572 |
| | | (253.5–461.0) | (17.5–77.5) | (651.0–1.239.5) | (390.5–823.5) |
| | p* | 0.795 | 0.567 | 0.63 | 0.256 |

*Kruskal-Wallis Test [Median (IQR)] ** Mann-Whitney U Test [Median (IQR)]

DISCUSSION

An important part of the pre-hospital healthcare services is the 112 ambulance service. Reaching

patients and reaction times are closely related to the mortality and morbidity of patients [3]. Studies have shown a correlation between the time patients spend in an ambulance and their mortality rates [4]. Therefore, it is essential that previous cases are evaluated while arranging ambulance services and plans are made in accordance with these evaluations so that resources are utilized effectively.

Alarilla et al. [5], in 2022, stated that people in England are waiting for an ambulance longer than ever, and revealed the target response time for the most critical calls was 7 min, the patients waited an average of 8.5 minutes in 2021/22, and this number was almost one fifth longer than they would have waited in 2018/19 . Moreover, the waiting period for less urgent cases where ambulance response is required increased more than double, reaching an average of 3 h. The present study, however, showed that, unlike the literature, command reaction times in 2022 were shorter than those in 2021 and 2023 (p < 0.03). The reason behind this could be increasing ambulance and call centre services. However, due to increased demand, the waiting duration for ambulances is increasing both in Türkive and in the rest of the world.

Cantwell et al. [6], who discussed the time distribution of emergency calls, found the command reaction times to be longer on weekends compared to on weekdays. They stated that emergency calls displayed a bimodal distribution with the highest numbers of calls at 10:00 a.m. and 07:00 p.m. in the daytime. They revealed that the highest number of cases was on Fridays and the lowest on Tuesdays and Wednesdays. The distribution on Fridays, Saturdays, and Sundays was significantly different from that on the rest of the days (p < 0.001). They found that the trauma cases were highest on Friday and Saturday at midnight [6]. Al-Thani et al. [7], on the other hand, showed similar results to the present study, namely a shorter reaction time of call command reaction on weekends. Most of the cases occurred on weekdays. The present study showed that the call durations were significantly shorter on weekends than on weekdays. These differences might have occurred due to accessible and increased emergency healthcare services on weekends in Türkiye. In addition, the traffic density on weekends in cities was less dense compared to that on weekdays, which might have caused a shorter patient arrival time. Zang et al. [8] also found less traffic density on weekends than on weekdays. This study also supports the authors' opinion on the matter. The authors think that planning the emergency call

services by reviewing these demands and distributions can help improve durations.

Al-Thani et al. [7], in their study in which they reviewed emergency calls, found that the time spent at the scene and the total pre-hospital time were especially higher in rural areas. They only studied patients with trauma-related calls and found that the mean response time, the time spent at the scene, and the total pre-hospital time were 6, 21, and 72 min, respectively. Similarly, the present study found the in-site command reaction time and arrival time to be significantly low.

Ibsen et al. [9], who studied the reasons for 112 calls, found that the most frequent five reasons for calls were chest pain, unknown issues, accidents, possible stroke, and shortness of breath. Lo et al. [10], who reviewed classified (valid) ambulance calls, stated that traumatic injuries and general medical issues made up a large portion of the calls. Traffic accident-related trauma is the primary reason for ambulance service calls. The second and third reasons are injury or bleeding and syncope with loss of consciousness, respectively [10]. Similar results to the literature were found as well. Although the number of medical calls was high, the command reaction time and arrival time in trauma-related calls were significantly shorter than in medical calls. Stojek et al. [11], who discussed trauma triage in the pre-hospital process, stated that, based on the severity of the injury, triage can be challenging in the pre-hospital care for patients who have been seriously injured. Poorly defined triage algorithms can lead to the trauma team intervening unnecessarily (over-triage), causing ineffective consumption of financial and human resources. A pre-hospital triage algorithm must be able to reliably identify patients who have experienced bleeding or severe brain injuries. Trauma is still one of the most frequent reasons for mortality across the world. Pre-hospital bleeding control and early intervention are crucial parts of providing care [11].

Considering the triage codes of the collected complaints, the highest number of red codes was observed in trauma patients. Additionally, the highest number of complaints about late arrival of the ambulance was once again seen in patients diagnosed with trauma. The authors think that such results were obtained because trauma cases are unexpected, can affect all age groups, and have a possible poor outcome. Mohta et al. [12] stated in their research that in order to finalize the treatment process positively, it is necessary to provide psychological care in addition to physical treatment for patients who are treated in hospitals due to trauma.

CONCLUSIONS

In the present study, important data were obtained about the active and effective use of 112 ambulance services. Schedules should be drawn up taking into consideration the weekends and times when the number of patients is higher. Strategic arrangements can be made to utilize resources by reviewing previous data and complaints about ambulance systems. Such evaluations can be important sources for improving emergency healthcare services. Conducting these evaluations and tasks regularly will shed light on future developments.

Article information and declarations Data availability statement

Data regarding our study can be accessed from Ankara Provincial Health Directorate, Emergency Health Services, Türkiye.

Ethics statement

Ethical approval was granted by the Scientific and Ethics Evaluation Committee for Medical Research No. 1 with TABED-1-24-284 number on 22.05.2024 at Ankara Bilkent City Hospital.

Author contributions

Study conception and design: Ramiz Yazıcı; data collection: Ramiz Yazıcı, Murat Genç; analysis and interpretation of results: Ramiz Yazıcı, Murat Genç; draft manuscript preparation: Murat Genç. All authors reviewed the results and approved the final version of the manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgements

Not applicable.

Conflict of interest

No conflict of interest to declare.

Supplementary material

None.

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