Impact of urgent care centers on emergency department visits in Al Madina Al Munawara

A pre-post study

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ABSTRACT

الأهداف: تقييم تأثير تفعيل عيادات الرعاية العاجلة على تقليل زيارات قسم الطوارئ غير العاجلة وتحسين تدفق المرضى في مستشفى الملك فهد بالمدينة المنورة، مع التركيز على مقاييس مثل الوقت من الباب إلى الطبيب، والوقت من الطبيب إلى القرار، والتصرف العام للمريض.

المنهجية: قامت هذه الدراسة الرصدية ما قبل وبعد الدراسة بتحليل البيانات من 198،050 زيارة لقسم الطوارئ في مستشفى الملك فهد بالمدينة المنورة بين يونيو 2021م ومايو 2023م، ومقارنة أنماط الزيارات قبل وبعد تنفيذ عيادات الرعاية العاجلة

النتائج: بعد تنفيذ ما بعد تفعيل الرعاية العاجلة Post–UCC، انخفاض متوسط الوقت من الباب إلى الطبيب ولكن لم يكن ذات دلالة إحصائية. وقد لوحظت انخفاضات كبيرة في أوقات الاتصال من الطبيب إلى القرار ومن الباب إلى التصرف لمرضى CTAS 3. ومع ذلك، لم تتحقق التحسينات الشاملة في تدفق المرضى بشكل كامل، مما يسلط الضوء على الحاجة إلى تعزيز الوعي العام ودمج مراكز الرعاية الصحية الأولية مع أقسام الطوارئ.

الخلاصة: أظهرت الدراسة أنه على الرغم من أن مراكز الرعاية العاجلة بالمدينة المنورة قد حسنت كفاءة بعض فئات المرضى، إلا أنها لا تحقق الانخفاض المتوقع في أوقات الانتظار وتدفق المرضى بشكل كامل. كما تؤثر الاختلافات الموسمية، ومحدودية وعي المرضى بخدمات الرعاية العاجلة و محدودية البيانات على نتائج الدراسة.

Objectives: To evaluate the impact of UCCs on reducing non-urgent Emergency Department (ED) visits and improving patient flow, focusing on metrics such as door-to-doctor time, doctor-to-decision time, and overall patient disposition.

Methods: This observational cohort pre-post study analyzed data from 198,050 ED visits to King Fahad Hospital, Al Madina Al Munawara between June 2021 and May 2023 and compared visit patterns before and after UCC implementation.

Results: Post-UCC implementation, the average door-to-doctor time decreased but was not statistically significant. Significant reductions were observed in doctor-to-decision and door-to-disposition times for CTAS 3 patients. However, overall patient flow improvements were not fully realized, highlighting the need for enhanced public awareness and integration of UCCs with EDs.

Conclusion: The study shows that while urgent care centers in Al Madina Al Munawara have improved efficiency for some patient categories, they don't fully achieve expected reductions in waiting times and patient flow. Seasonal variations, limited patient awareness, and data constraints affect outcomes.

Keywords: Emergency department, overcrowding, urgent care centers, patient flow, Canadian Triage and Acuity Scale, healthcare efficiency.

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The emergency department (ED) is a critical part of the healthcare system, providing 24/7 care to patients with conditions from mild to life-threatening. Staffed by specialized professionals and equipped with various resources, it often serves as the first point of contact for healthcare. Beyond immediate care, EDs play a vital role during public health crises, managing patient surges and coordinating emergency responses.[1,2]

The Canadian Triage and Acuity Scale (CTAS) is a standardized tool used in EDs to prioritize patients based on the severity of their condition. It categorizes patients into 5 levels: Level 1 (resuscitation) requires immediate intervention, Level 2 (emergent) involves rapid treatment, Level 3 (urgent) needs attention within 30 minutes to 2 hours, Level 4 (less urgent) can wait up to an hour, and Level 5 (non-urgent) includes minor issues that can wait hours. Canadian Triage and Acuity Scale enhances patient outcomes, optimizes ED resources, and ensures consistent triage practices across settings.[3,4]

A study at King Abdullah Bin Abdulaziz University Hospital in Saudi Arabia found that 61.4% of ED visits were for less urgent or non-urgent issues, such as routine exams, medication refills, and upper respiratory symptoms. Analyzing records of 18,880 patients with CTAS levels 4 or 5, the study revealed that most visits occurred on weekdays, often resulting in prescriptions (94.2%), lab tests (62.8%), and referrals to primary healthcare clinics (3.6%). These findings underscore the strain of non-urgent visits on EDs and suggest the need for improved management through primary healthcare centers.[5]

A study in Saudi Arabia surveyed 350 patients with CTAS levels 4 or 5 at a tertiary ED in Riyadh, revealing that over half typically used the ED for healthcare due to the lack of a regular provider (63%), same-day care (62%), and 24/7 (62%) access. Additionally, many patients perceived their conditions as more urgent than assessed by triage nurses, with this perception held by two-thirds of CTAS level 5 patients and one-third of level 4 patients.[6]

Increased patient volume in EDs is one of the factors resulting in overcrowding. A major reason for overcrowding during normal times is the influx of patients presenting with nonemergency conditions. This trend is prevalent worldwide.[7,8] Overcrowding of EDs has significant consequences, such as prolonged wait times for all patients, which can delay critical care for those with emergencies and potentially worsen their outcomes. It can also increase the burden on healthcare providers and cause strain, leading to burnout and compromised quality of care. Furthermore, inefficient resource allocation driven by non-emergent cases occupying the ED space and attention escalates healthcare costs, resulting in higher operational expenses and increased healthcare expenditure.[9,10]

Urgent care centers (UCCs) have emerged as a key solution to overcrowding in EDs by providing accessible and timely care for non-emergent medical conditions.[11] These centers are typically walk-in clinics designed to receive patients presenting with illnesses and injuries that require immediate attention but are not sufficiently severe for an ED visit. Urgent care centers are typically staffed by physicians, nurses, and other healthcare professionals and offer services such as diagnostic testing, treatment for minor medical and surgical conditions, including suturing for lacerations, and management of common infections.[12]

Studies have shown that UCCs help reduce ED overcrowding by diverting low-acuity cases. One study in the Annals of Emergency Medicine found that areas with high UCC density had fewer non-emergent ED visits. Patients within 1 mile of a UCC were less likely to visit the ED for low-acuity issues, with an adjusted odds ratio of 0.87 (95% CI: 0.78–0.98). Additionally, each month a UCC was open reduced low-acuity ED visits by 1% (OR: 0.99; 95% CI: 0.985–0.997).[13,14] Another study using data from 6 states showed a 17.2% reduction in ED visits within ZIP codes that had an open UCC, particularly for less emergent cases and those with the longest wait times.[15] These findings highlight UCCs' effectiveness in alleviating ED burden by providing alternative care for non-emergent conditions.

Recent research suggests that a significant portion of ED visits could be managed in UCCs, potentially reducing ED overcrowding and healthcare costs. Studies estimate that 13%–27% of the 137 million annual ED visits in the U.S. could be treated at UCCs or retail clinics, potentially redirecting up to 36 million visits to these less costly facilities.[15,16] This redirection would alleviate ED strain, reduce wait times, and ensure emergency resources are available for more severe cases. Integrating UCCs into healthcare strategies can enhance efficiency, lower costs, and improve patient care. This study examines the impact of UCCs on reducing non-urgent ED visits in Al Madinah Al Munawwarah by analyzing data before and after the opening of 4 UCCs in 2022 to inform decision-makers on managing ED overload and improving services.

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Methods. This observational cohort study utilized a pre-post design to evaluate the impact of 4 UCCs in Al Madinah Al Munawwarah on non-urgent ED visits. The UCCs, became fully operational in May 2022 including

ALDaithah UCC, AlHigrah UCC, ALAzhari PHC, and Albadrani PHC were included in the study and all other primary healthcare centers (PHC) were excluded. These centers are geographically distributed across Al Madinah Al Munawwarah City and are responsible for managing non-urgent cases (CTAS levels 4 and 5). Data were collected from health records of the main ED at the King Fahad Hospital (KFH) ER between June 2021 to May 2023. Healthcare visit data were obtained from the Statistical Department of the Madinah Health Directorate, Ministry of Health, following standardized reporting guidelines and quality assurance processes. This study compared ED visit patterns before and after UCC establishment to assess their impact on reducing non-urgent ED visits.

The Institutional Review Board of the General Directorate of Health Affairs, Al Madinah Al Munawwarah, Saudi Arabia, granted ethical approval for the study in accordance with the Declaration of Helsinki's principles.

The variables collected for comparison included the average door-to-doctor time—the time from patient arrival to the first interaction with a physician—and the average doctor-to-decision time—the time from the first physician interaction to the clinical decision regarding patient care. Furthermore, the average door-to-disposition time was measured, which represents the total time from patient arrival to final disposition, such as discharge or admission. Other critical metrics included the number of patients waiting for more than 4 hours in the ER, the type of ER urgency, and the CTAS levels of patients visiting the ED. This structured approach enabled a comprehensive evaluation of the effectiveness of UCCs in reducing non-urgent ED visits and improving overall patient flow and resource utilization within EDs.

Statistical analysis. The Statistical Package for Social Sciences for Windows, version 25 (IBM Corp., Armonk, N.Y., USA), was used for data entry and analysis. Descriptive statistics were used to summarize the sample's characteristics, where continuous variables were reported as means and standard deviations (SD), and categorical variables were presented as frequencies and percentages. The dataset was carefully examined for outliers and input errors to ensure data accuracy. Two-sample t-tests were conducted to test the association between the intervention variables (before and after the implementation of UCCs) and all other variables. Statistical significance was set at $p<0.05$.

Results. Between June 2021 and May 2023, 198,050 patients presented to the emergency room of King Fahad Hospital, Al Madinah Al Munawwarah. The overall average door-to-doctor time was 21.9 ± 27 minutes. After the implementation of UCCs, the average door-to-doctor time reduced to nearly half, although this reduction was not statistically significant (15.4 ± 3.3 minutes versus [vs.] 28.4 ± 37.7 minutes, $p=0.245$).

Among all patients, 112,409 waited more than 4 hours in the ER. After UCC implementations, a higher percentage of these patients experienced extended wait times (59.5%) compared with the pre-implementation period (40.5%), which was statistically significant ($p=0.043$). This indicates an increased burden on the ER despite the introduction of UCCs. Moreover, the urgency of cases changed significantly, and the number of urgent cases increased significantly from 43.9% to 56.1% after UCC implementation ($p<0.001$). Analysis of the CTAS scores showed significant changes in the CTAS 2 and CTAS 3 categories. Specifically, CTAS 2 visits increased from 42.7% to 57.3% ($p=0.006$), and CTAS 3 visits increased from 43.9% to 56.1% ($p<0.001$). However, no significant changes were observed for CTAS 1, CTAS 4, and CTAS 5 (**Table 1**).

The average doctor-to-decision time showed a slight increase from 852.4 minutes (SD=189.0) to 893.3 minutes (SD=897.7), and the average door-to-disposition time remained relatively stable (972.6 minutes before vs. 961.4 minutes after, $p=0.968$).

Urgent care centers implementation has varied effects on patient flow and waiting times across different CTAS levels. The average door-to-doctor time for CTAS 2 patients slightly increased after UCC implementation (17.1 ± 5.6 minutes) compared to before (12.7 ± 2.6 minutes), which was statistically significant ($p=0.024$). Conversely, the average doctor-to-decision time for CTAS 3 patients significantly decreased post-implementation (437.3 ± 111.2 minutes) compared to pre-implementation (734.7 ± 175.4 minutes, $p<0.001$). Similarly, the average door-to-disposition time for CTAS 3 patients also showed a significant reduction after UCC implementation (503.6 ± 134.0 minutes) compared to before (840.2 ± 234.0 minutes, $p<0.001$).

For CTAS 1 patients, although there was an observed increase in average door-to-doctor time post-implementation (17.3 ± 4.6 minutes) compared to pre-implementation (15.1 ± 2.8 minutes), this change was not statistically significant ($p=0.163$). The CTAS 4 and CTAS 5 categories did not show significant changes in door-to-doctor time. The average doctor-to-decision and door-to-disposition times for CTAS 1, 2, 4, and 5 did not show significant differences between the periods before and after UCC implementation, except for a significant decrease in CTAS 3.

Table 1 - Patient characteristics in emergency room (ER) (N=198,050).

Variable	Total	Impact of urgent care centers (UCCs)		*P*-value
		Before UCC implementation	After UCC implementation	
Patients, n (%)	198,050 (100)	85,839 (43.3)	112,211 (56.7)	0.074
Average door-to-doctor time in minutes (mean ± SD)	21.9 (27.0)	28.4 (37.7)	15.4 (3.3)	0.245
Average doctor-to-decision time in minutes (mean ± SD)	872.82 (634.8)	852.4 (189.0)	893.3 (897.7)	0.880
Average door-to-disposition time in minutes (mean ± SD)	967.0 (646.8)	972.6 (238.6)	961.4 (904.3)	0.968
Patients waiting more than 4 hours in ER, n (%)	112,409 (100)	45,612 (40.5)	66,797 (59.5)	0.043*
Type of ER urgency				
Urgent	154,790 (100)	67,976 (43.9)	86,814 (56.1)	<0.001*
Non-urgent	43,260 (100)	17,863 (41.3)	25,397 (58.7)	0.534
Type of emergency, n (%)				
CTAS 1	4875 (100)	2283 (46.8)	2592 (53.2)	0.180
CTAS 2	4482 (100)	1912 (42.7)	2570 (57.3)	0.006*
CTAS 3	145433 (100)	63781 (43.9)	81652 (56.1)	<0.001*
CTAS 4	36363 (100)	14321 (39.4)	22042 (60.6)	0.456
CTAS 5	6897 (100)	3542 (51.4)	3355 (48.6)	0.918

ER: emergency room, CTAS: Canadian Triage and Acuity Scale, SD: standard deviation

Furthermore, the proportion of patients waiting for more than 4 hours in the ER showed a significant increase for CTAS 1 patients post-implementation (58.1%) compared to pre-implementation (41.9%, p=0.022) and CTAS 3 patients (56.9% post-implementation vs. 43.1% pre-implementation, p=0.002). No significant changes were observed for CTAS categories 2, 4, and 5 (Table 2).

From June 2022 to May 2023, 17,226 patients categorized as CTAS 4 or 5 visited UCCs in Al Madinah Al Munawwarah. The total number of CTAS 4 patients was 317 and CTAS 5 were 16,909. Among the UCCs, the Al-Badrani PHCC had the highest number of visitors, with 254 CTAS 4 patients and 11,545 CTAS 5 patients. Conversely, Al-Azhari PHCC had the lowest number of visitors, with only 5 CTAS 4 patients and 18 CTAS 5 patients (Table 3).

Discussion. This study evaluated the effect of UCCs on reducing non-urgent ED visits in Al Madinah Al Munawwarah. Although the average door-to-doctor time decreased after UCC implementation, this reduction was not statistically significant. Moreover, the number of patients waiting for more than 4 hours in the ER increased after UCCs were introduced—the anticipated reduction in ER burden was not fully achieved. The proportion of urgent cases in the ER increased significantly, with notable increases in the CTAS 2 and CTAS 3 categories and no significant changes in CTAS 1, 4, and 5.

These findings align with previous studies, including that of Weinick et al,[17] who estimated that a significant proportion of ED visits could be managed at UCCs or retail clinics, potentially reducing ED overcrowding. Nevertheless, the study noted that the actual reductions in ED visits may not be as significant because of operational and systemic challenges.

Furthermore, the presence of UCCs was associated with a decrease in low-acuity ED visits; nonetheless, this effect was limited by factors such as UCC operational hours and patient awareness. This study highlights the importance of integrating UCCs within the broader healthcare system to reduce ED visits.[16,18]

The implications of our study suggest that while UCCs can reduce certain metrics, such as door-to-doctor time, their overall impact on alleviating ED overcrowding is limited without broader systemic changes. Enhancing the public awareness of UCCs, extending their operational hours, and integrating them into primary care and ED systems are crucial steps. Further research is necessary to understand the increase in urgent cases and develop targeted interventions to better manage patient flow and resource utilization in emergency settings.

The implementation of UCCs in Al Madinah Al Munawwarah led to improved efficiency for CTAS 3 patients, with significant reductions in doctor-to-decision and door-to-disposition times, but did not fully achieve the anticipated reductions in waiting times for other categories. Thus, while UCCs have enhanced efficiency for certain patients, further strategies are required to optimize their role in managing non-urgent ED visits and addressing increased waiting times for some categories. Poon et al,[19] found that UCCs reduced low-acuity ED visits but highlighted the need for systemic integration and public awareness to maximize their impact.

Table 2 - Patient characteristics in emergency room (ER) according to CTAS (N=198,050).

Variable	Total	Impact of urgent care centers		*P*-value
		Before the implementation of urgent care centers	After the implementation of urgent care centers	
Average door-to-doctor time in minutes (mean ± SD)				
CTAS 1	16.2 (3.9)	15.1 (2.8)	17.3 (4.6)	0.163
CTAS 2	15.0 (4.9)	12.7 (2.6)	17.1 (5.6)	0.024*
CTAS 3	15.0 (3.5)	16.0 (4.1)	13.8 (2.5)	0.133
CTAS 4	56.2 (173.3)	89.3 (245.6)	23.0 (7.0)	0.370
CTAS 5	41.4 (49.6)	32.3 (35.8)	50.6 (60.7)	0.378
Average doctor-to-decision time in minutes (mean ± SD)				
CTAS 1	1137.2 (361.7)	1416.6 (432.6)	1258.0 (269.6)	0.293
CTAS 2	1165.6 (360.6)	1264.0 (435.9)	1067.2 (246.5)	0.187
CTAS 3	586.0 (209.0)	734.7 (175.4)	437.3 (111.2)	<0.001*
CTAS 4	1563.8 (1544.2)	1250.0 (211.0)	1877.7 (2174.1)	0.340
CTAS 5	2071.0 (1872.2)	1711.8 (474.4)	2430.0 (2612.0)	0.368
Average door-to-disposition time in minutes (mean ± SD)				
CTAS 1	1657.7 (510.6)	1791.9 (570.0)	1523.5 (425.5)	0.205
CTAS 2	1390.0 (472.1)	1570.3 (578.8)	1209.0 (245.0)	0.066
CTAS 3	671.8 (253.6)	840.2 (234.0)	503.6 (134.0)	<0.001*
CTAS 4	1678.2 (1542.6)	1423.1 (351.2)	1933.3 (2170.4)	0.438
CTAS 5	2170.3 (1863.8)	1807.8 (473.5)	2532.8 (2598.6)	0.361
Patients waiting more than 4 hours in ER, n (%)				
CTAS 1	878 (100)	368 (41.9)	510 (58.1)	0.022*
CTAS 2	985 (100)	453 (46.0)	532 (54.0)	0.383
CTAS 3	86208 (100)	37195 (43.1)	49013 (56.9)	0.002*
CTAS 4	22745 (100)	6672 (29.3)	16073 (70.7)	0.240
CTAS 5	2776 (100)	924 (33.3)	1852 (66.7)	0.262

**P*-value <0.05 CTAS: Canadian Triage and Acuity Scale, SD: standard deviation

Table 3 - Number of patients visited urgent care centers from June 2022 to May 2023 (N=17,226).

Urgent care center	Total number of CTAS 4 patients	Total number of CTAS 5 patients
Al-Daietha PHCC	23	5002
Al-Hijra PHCC	35	344
Al-Azhari PHCC	5	18
Al-Badrani PHCC	254	11545

UCC: urgent care center, CTAS: Canadian Triage and Acuity Scale, PHCC: primary healthcare center

Our results indicate that UCC implementation has led to improved efficiency for certain patient categories, particularly those classified under CTAS 3. Nevertheless, in some areas, the anticipated reductions in waiting times and improvements in patient flow have not been fully realized. Further strategies are necessary to optimize the role of UCCs in managing non-urgent ED visits and address the increased waiting times observed in some patient categories. Poon et al,[19] found that UCCs reduced low-acuity ED visits but highlighted the need for systemic integration and public awareness to maximize their impact.

Strengths and limitations. Our study has several strengths. First, it provides a comprehensive evaluation of the impact of UCCs on ED usage, highlighting the need for increased public awareness and integration of UCCs to fully realize their benefits. This study can serve as a model for future research and policymaking, emphasizing the importance of optimizing UCC implementation to manage non-urgent ED visits effectively. Additionally, the assignment of a dedicated data auditor for weekly data collection ensured the accuracy and reliability of the data used in our analysis.

However, our study also has several limitations. The number of patient visits could have been influenced by seasonal variations such as the flu season and Umrah season, which may have led to increased patient utilization of the ER. Another limitation is that only one ER was included in the study, and data from another hospital were excluded due to unavailability,

which could have provided a more comprehensive picture. Additionally, patient awareness about the appropriate use of UCCs was limited, potentially affecting the study outcomes. Lastly, cost-effectiveness data were not available for analysis, which would have been valuable in assessing the economic impact of UCC implementation.

Overall, while our study sheds light on the potential benefits and areas for improvement in the use of UCCs, these limitations highlight the need for more comprehensive, multi-center studies with enhanced data collection methods and patient education efforts to optimize the use of UCCs in managing non-urgent ED visits.

In conclusion, this cohort pre-post study demonstrates that while the implementation of urgent UCCs in Al Madinah Al Munawwarah has improved efficiency for certain patient categories, particularly those classified under CTAS 3, it did not fully achieve the anticipated reductions in waiting times and improvements in patient flow for all categories. Seasonal variations, limited patient awareness, and data constraints were significant factors affecting the outcomes. These findings underscore the necessity for increased public awareness, improved integration of UCCs with EDs, and studying the design and effectiveness of freestanding UCCs located outside of healthcare facilities. Additionally, further research is essential to optimize the role of UCCs in effectively managing non-urgent ED visits.

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