

Willingness to use and pay for a virtual urgent care service among emergency department patients in Singapore: a cross-sectional study

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Abstract

Background

Emergency department (ED) overcrowding and increasing presentations for low-acuity conditions have renewed interest in virtual urgent care. Although these models may improve access and direct patients to appropriate services, little is known about patients' willingness to use and pay for them. This study examined willingness to use (WTU) and willingness to pay (WTP) for virtual urgent care among ED patients and caregivers in Singapore.

Methods

We conducted an exploratory mixed-methods cross-sectional study among 168 adult walk-in ED patients and caregivers at a tertiary hospital in Singapore between September and October 2025. Using interviewer-administered surveys, participants were presented with three hypothetical urgent-care scenarios of increasing severity: (1) specialist video consultation for a mild-condition, (2) nurse home visit with virtual specialist support for a moderate-condition, and (3) expedited ED access for a severe-condition. Quantitative analyses included descriptive statistics, logistic regression for WTU, and linear regression for WTP. Open-ended responses were analysed inductively using content analysis to identify determinants of perceived value.

Results

WTU for the virtual urgent care service increased across scenarios of increasing perceived clinical urgency, from 75.6% in the mild-condition scenario to 82.7% in the moderate-condition scenario and 85.7% in the severe-condition scenario. WTP also increased with perceived urgency: most participants were unwilling to pay above the ED fee in the mild-condition scenario, whereas 60.4% of participants willing to use the service in the severe-condition scenario were willing to pay above the ED fee for earlier ED access. Qualitative findings showed that perceived value differed across scenarios, with convenience and reduced travel prioritised for mild conditions, comfort and home-based care for moderate conditions, and timely assessment, reassurance, and escalation for severe conditions. Trust in virtual healthcare, digital confidence, age, income, and housing type were associated with selected WTU and WTP outcomes across scenarios.

Conclusions

Acceptance of virtual urgent care varied according to the perceived urgency and service configuration presented. Patients valued different service attributes across clinical scenarios, suggesting that implementation should combine clear communication about appropriate use, transparent escalation

pathways, accessible telephone and caregiver-supported options, and equitable pricing. Further evaluation is needed to determine real-world uptake and impacts on ED utilisation.

Background

Emergency department (ED) overcrowding is a growing global challenge that is expected to worsen with population ageing, increasing multimorbidity, and rising expectations for timely access to acute care services[1]. A substantial proportion of ED attendances are for urgent but lower-acuity conditions that do not require the full resources of an ED[2]. Despite ongoing efforts to redirect these patients to more appropriate settings such as primary or community care, many continue to seek treatment in the ED. This contributes to inefficient resource use, prolonged waiting times, and downstream pressure on inpatient services, thereby threatening the quality and sustainability of healthcare delivery[3, 4].

Virtual urgent care has emerged as a promising strategy to transform unscheduled urgent care by providing a virtual front door before patients present to the ED. Through telehealth-enabled assessment and triage, virtual urgent care enables clinicians to direct patients to self-care, primary care, or emergency care according to the urgency of their condition[5, 6]. Existing evidence suggests that virtual urgent care may improve access to timely care, reduce patients' travel and waiting burden, and safely manage low-acuity presentations without requiring immediate in-person assessment [7, 8].

Singapore has implemented several virtual urgent care initiatives with encouraging results. The National University Health System Virtual Care Centre (VCC, est 2020), is a clinician-led teleconsultation service that provides urgent medical assessment for residents in western Singapore. Evaluation of the service demonstrated 63.7% of medical calls were resolved virtually, while only 13.8% required referral to the ED[9]. Despite demonstrating clinical feasibility and safety, utilisation remains modest, averaging approximately 284 medical consultations per month. In contrast, the EDs serving the same catchment population receive approximately 21,820 attendances monthly. This substantial disparity illustrates both the potential of virtual urgent care to reduce unnecessary ED utilisation and the considerable scale of adoption required to achieve meaningful system-level impact.

Realising this potential will require widespread public adoption supported by a sustainable implementation and financing model. While clinical effectiveness and technical feasibility are necessary, they are insufficient to ensure successful implementation. Patient adoption depends on trust in the service, understanding of its role within the healthcare system, confidence in telehealth technologies, and perceived value relative to conventional in-person care. Although many patients regard virtual care as comparable to in-person care, concerns remain regarding the lack of physical examination, the quality of patient–clinician relationships, and the reliability of telehealth systems[10, 11]. Digital confidence and age may also shape willingness to use and pay for digital health services[12].

Despite growing evidence supporting the clinical safety and operational feasibility of virtual urgent care, little is known about patients' willingness to use or pay for these services, particularly in healthcare systems where long-term sustainability may depend on patient co-payment. Existing evaluations of

virtual urgent care have focused primarily on safety, utilisation and patient satisfaction. Few studies have examined patients' behavioural acceptance before or during implementation, particularly willingness to use and willingness to pay across different urgent-care models. Understanding these preferences is important because patient adoption ultimately determines whether virtual urgent care can reduce unnecessary ED utilisation.

This study aimed to examine ED patients' willingness to use (WTU) and willingness to pay (WTP) for a virtual urgent care service in Singapore. Specifically, we examined WTU and WTP across varying levels of clinical severity, identify demographic and psychosocial factors associated with these outcomes, and explore determinants of perceived value among participants willing to pay for the service. By evaluating patient WTU and WTP for a chargeable virtual urgent care service, this study provides evidence to inform service design, implementation, pricing, and communication strategies for virtual urgent care.

Methods

Study design and setting

An exploratory cross-sectional study was conducted between September and October 2025 in the ED of the National University Hospital (NUH) in Singapore. The study was approved by the National Healthcare Group Domain Specific Review Board, which granted a waiver of informed consent (Ref 2026-0083).

NUH is one of three tertiary hospitals serving western Singapore. Its 24-hour ED manages more than 100,000 patient attendances annually, the majority of which are walk-in presentations. Patients are triaged using the nationally standardised Patient Acuity Category Scale which classifies patients from Priority 1 (life-threatening emergencies) to Priority 4 (non-emergency)[13]. This study included Priority 2 and Priority 3 patients, representing patients requiring critical or ambulatory emergency care. Priority 1 patients were excluded because their clinical condition precluded participation, while Priority 4 patients were excluded because the proposed service was intended for urgent rather than non-emergency presentations. NUH ED visits are billed under an out-of-pocket, flat service fee structure of \$163 which covers standard investigations, services and medications.

Participants and sampling

Participants were recruited using convenience sampling from walk-in ED attendees. Eligible participants were walk-in patients or accompanying caregivers who met the following criteria: (1) Singapore citizens or permanent residents; (2) aged 21 years or older; and (3) Priority 2 and Priority 3 patients. Eligible participants were approached during weekdays and across different time periods to improve variation in respondent characteristics. Patients or their caregivers were not approached if participation would interfere with clinical care or if they were unable to provide informed responses.

Survey instrument

The survey instrument was developed from existing literature on virtual-care adoption, WTU, WTP, and patient-perceived value, and was adapted to the Singapore urgent-care context. The instrument included: (1) a description of the virtual urgent care service, presented in lay language as an urgent medical helpline that patients could contact before attending the ED; (2) scenario-based WTU and WTP questions; (3) items evaluating prior experience and future intentions to utilise virtual healthcare services; (4) demographic characteristics; and (5) open-ended questions eliciting reasons for choices.

Each participant was presented with three hypothetical scenarios of increasing clinical severity:

1. Mild condition: rash for two days; the helpline offers video consultation with a specialist doctor.
2. Moderate condition: diarrhoea and vomiting for 24 hours; the helpline offers a nurse home visit with virtual support from a specialist doctor.
3. Severe condition: dizziness and unsteadiness for 24 hours; the helpline offers earlier ED access and shorter waiting time.

These scenarios were developed in collaboration with the virtual urgent care clinical team to reflect realistic care pathways according to perceived acuity and operational feasibility. The complete survey instrument is provided in the Appendix.

Two rounds of pretesting were conducted before data collection. The first involved six respondents and focused on readability and digital compatibility. The second involved 24 ED patients and assessed comprehension, feasibility of QR-code survey completion, and response quality. After pretesting, the survey was revised to simplify wording, improve explanation of the scenarios, and add illustrative images describing each care option, expected waiting time, and price point. As some pretest respondents misunderstood key questions when completing the survey independently, the final survey used an interviewer-led approach for the scenario-based section.

Survey administration

The survey was hosted on FormSG, a secure government tool that allows public officers to create secure digital forms for data collection. It consisted of two linked sections matched by a unique serial number. The interviewer-administered section included the service description, scenario-based WTU and WTP questions, and virtual-service-use questions. The participant-completed section collected demographic characteristics.

A trained interviewer guided participants through the service description and clinical scenarios, confirmed comprehension, and recorded responses to the scenario-based questions. Participants then completed the demographic section independently where feasible. For each scenario, participants were asked whether they would use the virtual urgent care service at the specified price points instead of walking directly into the ED. WTU was treated as present if a participant indicated willingness to use the virtual urgent care at any presented price point. WTP was measured as the highest selected amount the participant was willing to pay for the scenario-specific service.

To reduce anchoring bias, participants were randomly assigned to one of two price-sequence conditions. The bottom-up group was presented with the lowest price point first, followed by progressively higher prices. The top-down group was presented with the highest price point first, followed by progressively lower prices. Participants were also randomly assigned to one of three message-framing conditions: neutral, gain-framed, or loss-framed messaging. This exploratory framing component was included to inform future public communication strategies but was not the primary focus of the analysis. Framing was informed by evidence on gain-loss framing and health decision-making [14, 15].

After indicating their WTP, participants were asked whether they would pay an additional amount if preferred conditions were met, and if so, how much more they would pay. Open-ended responses captured reasons for WTU, WTP, non-use, or additional payment.

Outcomes

The main outcomes of interest were WTU and WTP for each scenario. WTU was collected as a binary variable. WTP was a continuous variable among those willing to use the scenario-specific service. Demographic variables included age, gender, number of ED visits in the past 12 months, education level, housing type, and monthly income. Psychosocial variables included perceived digital savviness and trust in virtual healthcare services, each measured on a five-point Likert scale, with higher scores indicating greater confidence or trust.

Data analysis

Descriptive statistics were used to summarize participant characteristics, WTU, WTP, and incremental WTP. Proportions were reported for categorical variables, and means, medians, and modes were reported where appropriate for WTP outcomes.

Associations between categorical variables were examined using chi-square tests, while Kruskal-Wallis tests were used for comparisons involving non-normally distributed continuous variables. Binary logistic regression was used to identify factors associated with WTU, and multiple linear regression was used to examine factors associated with WTP. Candidate predictors included age, gender, ED visits in the past 12 months, education, housing type, monthly income, perceived digital savviness, and trust in virtual healthcare services. Demographic and psychosocial variables were coded ordinally where applicable. Statistical analyses were performed using Microsoft Excel and IBM SPSS Statistics. Statistical significance was assessed using a two-sided p-value threshold of 0.05.

Open-ended responses were analysed using inductive content analysis. Responses were reviewed to identify recurring meaning units, which were grouped into subthemes and then broader themes. Theme frequencies were reported to describe the relative prominence of identified themes across scenarios. Representative quotations were selected to illustrate key themes and were shortened for readability without changing their meaning.

Results

Participant characteristics

A total of 168 participants completed the survey (Table 1). Most respondents were patients (154/168, 91.7%), while 14 (8.3%) were caregivers. Most participants were triaged as Priority 3 (160/168, 95.2%), with eight (4.8%) triaged as Priority 2.

Table 1
Participant characteristics (N = 168). Data presented as n (%). Education level, housing type and income are categorised according to national standards in Singapore.

	n	%
Role		
Patients	154	91.7
Caregivers	14	8.3
Triage level		
Priority 2	8	4.8
Priority 3	160	95.2
Age		
21–29	38	22.6
30–39	56	33.3
40–49	37	22.0
50–59	22	13.1
60–69	8	4.8
70–79	5	3.0
≥ 80	2	1.2
Female	81	48.2
ED visits in the past 12 months		
1	105	62.5
2	49	29.2
≥ 3	14	8.3
Referral source		
Self-decided	135	80.4
GP/Polyclinic referral	28	16.7
SOC referral	5	3.0
Presenting complaints		
Gastrointestinal	30	17.9

	n	%
Role		
Musculoskeletal	46	27.4
Neurological	19	11.3
Respiratory / Cardiac	31	18.5
Eye / ENT	10	6.0
General / Systemic	9	5.4
Others	23	13.7
Education level		
Primary / Secondary	19	11.3
Post-Secondary	25	14.9
Diploma & Professional	47	28.0
University-educated	76	45.2
No formal education	1	0.6
Housing type		
HDB 1- and 2-Room Flats	3	1.8
HDB 3-Room Flat	28	16.7
HDB 4-Room Flat	58	34.5
HDB 5-Room / Executive Flat	49	29.2
Condominium / Other Apartments	27	16.1
Landed Property	3	1.8
Monthly Income		
<\$2,000	12	7.1
\$2,000 - \$3,999	42	25.0
\$4,000 - \$5,999	30	17.9
\$6,000 - \$7,999	30	17.9
\$8,000 - \$9,999	15	8.9
≥\$10,000	15	8.9
No income	24	14.3

	n	%
Role		
Perceived digital savviness		
1 (Not confident at all)	3	1.8
2	5	3.0
3	18	10.7
4	48	28.6
5 (Extremely confident)	94	56.0
Trust in virtual healthcare services		
1 (No trust at all)	4	2.4
2	17	10.1
3	54	32.1
4	60	35.7
5 (Completely trust)	33	19.6

Participants were predominantly young to middle-aged, with more than three-quarters aged 21–49 years. Gender distribution was balanced (48.2% female). Most participants had not attended the ED in the preceding 12 months (62.5%), and had self-referred to the ED (80.4%). Musculoskeletal (27.4%), respiratory or cardiac (18.5%), and gastrointestinal (17.9%) complaints were the most common presenting conditions. Most participants had diploma-level education or above (73.2%), and resided in public housing (82.1%). Perceived digital savviness was high, with 94 participants (56.0%) selecting the highest confidence score. Trust in virtual healthcare services was more moderate, with 93 participants (55.3%) selecting a score of 4 or 5.

WTU and WTP

WTU was high across all scenarios and was descriptively higher for scenarios representing greater perceived clinical severity (Table 2). WTU was 75.6% (95% CI 69.1–82.1%) for the mild-video consultation scenario, 82.7% (95% CI 77.0–88.5%) for the moderate-home visit scenario, and 85.7% (95% CI 80.4–91.0%) for the severe-earlier ED access scenario.

Table 2

WTU and WTP for virtual urgent care by scenario Data presented as n (%). WTP was compared with ED fee of \$150 for all scenarios.

Scenario	WTU, n(%)	WTP < ED fee, n (%)	WTP = ED fee, n (%)	WTP > ED fee, n (%)
Mild-condition (video consultation)	127 (75.6)	71 (55.9)	22 (17.3)	34 (26.8)
Moderate-condition (home visit)	139 (82.7)	56 (40.3)	27 (19.4)	56 (40.3)
Severe-condition (earlier ED access)	144 (85.7)	8 (5.6)	49 (34.0)	87 (60.4)

Among participants willing to use the service, WTP was descriptively higher for scenarios representing greater perceived clinical severity (Fig. 1; Appendix Table 1). In the mild-video consultation scenario, 55.9% were willing to pay below the ED fee of S\$150, whereas only 26.8% were willing to pay above it. In contrast, WTP above the ED fee increased to 40.3% for moderate-home visit scenario and 60.4% for severe-earlier ED access scenario (Table 2).

Most participants were not willing to pay an additional amount even if preferred service conditions were met. Among those willing to pay more, the median incremental WTP was S\$20 for mild-video consultation and S\$30 for both moderate-home visit and severe-earlier ED access (Appendix Table 2).

Factors associated with willingness to use and willingness to pay

Regression analyses identified different predictors across scenarios (Appendix Tables 3 and 4). Higher trust in virtual healthcare services was associated with greater WTU video consultation in the mild-condition scenario (OR 2.56, $p < 0.001$). Likewise, higher income was also associated with lower WTU (OR 0.72, $p = 0.043$). For severe-condition, increasing age was associated with lower WTU the service for earlier ED access (OR 0.53, $p = 0.010$). No other variables were significantly associated with WTU.

Higher perceived digital savviness ($B = 20.727$, $p = 0.008$) and higher housing category ($B = 12.672$, $p = 0.019$) were significantly associated with greater WTP for video consultation in the mild-condition scenario. In the severe-condition earlier-access scenario, older age was associated with lower WTP ($B = -12.832$, $p = 0.005$), while higher income was associated with higher WTP ($B = 8.172$, $p = 0.018$). No significant predictors of WTP were identified for the moderate-condition home-visit scenario.

Determinants of perceived value

Qualitative analysis of open-ended responses identified three overarching determinants of perceived value: quality of care, access, and perceived severity of condition (Table 3). The relative importance of these determinants shifted across scenarios. Perceived value for mild conditions was driven primarily by convenience and access, for moderate conditions by comfort and appropriateness of home-based care, and for severe conditions by timeliness, expedited assessment, and reassurance.

Table 3

Qualitative themes influencing WTP. Themes were derived using inductive content analysis across the three clinical scenarios.

Scenario	Main Theme	Subtheme	Representative Quotations	Frequency
Mild-condition (video consultation)	Quality of care	Speed of service	"Easy access to specialist opinion" "Efficiency of doctor"	23
	Access	Convenience	"Avoid ED crowd" "Wait at home, fuss-free"	53
		Travel and cost savings	"Price justifiable" "Reduce travel time"	26
	Severity of condition	Perceived minor condition	"Condition specific" "Suitable for simple condition"	25
Moderate-condition (home visit)	Quality of care	Appropriateness of home care	"Manageable by nurse at home", "Personalised care"	31
	Access	Comfort level	"More comfortable in own home", "Convenience"	62
		Accessibility and cost	"Save time, money, travel"	10
	Severity of condition	Travelling difficulty	"Not travelling down when sick", "Older people with mobility issues"	36
Severe-condition (earlier ED access)	Quality of care	Speed of service	"Expedited visit" "Appreciate faster ED process"	68
		Communication and earlier assessment	"More awareness of urgency of condition" "Primary assessment"	16
	Severity of condition	Perceived severe condition	"Depends on severity" "Dizziness is serious"	34
	Others	Perceived value of service	"Price must match waiting time"	26
			"A bit expensive but if really need to"	

In the mild-condition video-consultation scenario, access was the most prominent determinant. Participants emphasized convenience, avoiding ED crowds, waiting at home, and reducing travel time. Some participants also described the condition as minor and therefore suitable for virtual consultation. Quality-of-care comments focused on timely access to medical advice and specialist input.

In the moderate-condition home-visit scenario, participants most often valued comfort and convenience, particularly the ability to remain at home while unwell. Some participants perceived the service as personalized and appropriate for a condition that could potentially be managed at home. Travelling difficulty was also salient, especially in comments referring to older people or those with mobility limitations.

In the severe-condition earlier-access scenario, quality of care was the dominant theme. Participants emphasized shorter waiting time, faster assessment, expedited ED processes, and earlier recognition of urgency. Severity of condition was also important, with several participants indicating that dizziness and unsteadiness were serious enough to justify paying for faster access. Cost considerations remained present, particularly whether the price matched the expected reduction in waiting time.

Effect of message framing

Message framing showed limited evidence of association with WTU or WTP (Appendix Tables 5, 6 and 7). Neutral, gain-framed, and loss-framed messages were not significantly associated with WTU in the video-consultation or earlier-access scenarios. Framing was significantly associated with WTU in the home-visit scenario ($\chi^2=7.585$, $p = 0.023$), but this association did not persist for WTP. No significant associations with WTP were observed across any scenario.

Discussion

Principal findings

This exploratory mixed-methods study examined ED patients' and caregivers' WTU, WTP, and perceived value of a virtual urgent care service. WTU was high across all three hypothetical scenarios, ranging from 75.6% for video consultation in the mild-condition scenario to 85.7% for earlier ED access in the severe-condition scenario. WTP was also descriptively higher in scenarios representing greater perceived urgency: the proportion WTP above the usual ED fee ranged from 26.8% for video consultation to 60.4% for earlier ED access. These findings suggest that participants did not view the virtual urgent care as a single uniform service. Rather, their acceptance depended on the perceived urgency of the condition, the type of care offered, and the expected benefit of using the service.

The qualitative findings provide important context for these patterns. In the mild-condition scenario, perceived value centred primarily on convenience, avoidance of ED waiting, and reduced travel. In the moderate-condition scenario, participants placed greater emphasis on comfort, remaining at home while unwell, and the perceived appropriateness of home-based assessment. In the severe-condition scenario,

perceived value shifted towards timeliness, reassurance, earlier clinical assessment, and appropriate escalation. Taken together, the findings suggest that patients value fundamentally different service attributes across levels of perceived urgency.

As the scenarios were hypothetical, these findings should be interpreted as evidence of perceived acceptability and value rather than as predictions of actual service uptake, purchasing behaviour, or implementation effectiveness. In particular, WTP for earlier ED access should not be interpreted as support for preferential access based on ability to pay. Instead, it reflects the value participants attached to timely assessment, reassurance, and escalation when symptoms were perceived as potentially serious.

Comparison with existing literature

Our findings are consistent with previous research showing that decisions to seek ED care for lower-acuity conditions are influenced by perceived severity, convenience, and beliefs about the quality and comprehensiveness of available care options[16, 17]. The high WTU in this study is also consistent with local preference research indicating public interest in pre-ED triage services and information about ED waiting times[18]. However, the present findings extend this evidence by showing that acceptance of virtual urgent care is not determined by convenience alone; it varies according to the clinical scenario and the type of service offered.

In the mild-condition scenario, many participants regarded video consultation as appropriate when the condition appeared simple and suitable for remote assessment. This is consistent with evidence that telemedicine is feasible for selected low-acuity acute presentations[19] and may achieve outcomes comparable to face-to-face consultation for some conditions[20, 21]. Nevertheless, WTP above the ED fee was lowest in this scenario. This suggests that patients may perceive video consultation as an acceptable and convenient alternative to ED attendance without necessarily viewing it as a premium service warranting a higher charge [22, 23].

The moderate-condition scenario involved a nurse home visit with virtual physician support. Participants valued the convenience and comfort of remaining at home while retaining an element of in-person clinical assessment. This is consistent with emerging evidence that patients and caregivers may value hybrid virtual care models when they preserve access, responsiveness, and perceived clinical support[21]. However, some participants continued to favour ED attendance because of access to investigations, equipment, and diagnostic certainty. This reflects evidence that patients may choose ED even for lower acuity conditions because it is perceived as comprehensive and reliable[16]. The acceptability of hybrid urgent-care models may therefore depend not only on convenience but also on confidence that the service can assess, manage, and escalate the condition safely.

In the severe-condition scenario, participants placed greater value on earlier ED access and shorter waiting time. The majority of participants willing to use this service were willing to pay above the usual ED fee. This finding should be interpreted cautiously. The result does not establish support for a paid

expedited-access model, nor does it justify deviation from acuity-based prioritisation. Rather, it indicates that perceived value increases when a service is understood to provide timely clinical assessment, reassurance, and appropriate escalation for symptoms considered potentially serious.

Factors associated with WTU and WTP

The regression analyses identified several scenario-specific associations, but no predictor was consistently associated with acceptance across all pathways. Trust in virtual healthcare services was associated with greater WTU virtual urgent care for video consultation, while perceived digital savviness was associated with greater WTP for this service. These findings are consistent with the broader telehealth literature which identifies trust, perceived quality, usability, and confidence in digital systems as important influences on adoption[11, 24]. Patients may be more willing to use a virtual front-door service when they understand who is providing the assessment, how clinical risk is evaluated, and how escalation to in-person care will occur.

Income and housing type were associated with selected outcomes in specific scenarios. These findings should not be interpreted as stable or causal socioeconomic gradients. Rather, they suggest that WTU and WTP may capture different considerations. WTU may reflect service preference, perceived convenience, trust, and available alternatives, whereas WTP may additionally reflect affordability and perceived value.

The findings relating to age warrant particular attention. Older participants reported lower willingness to use and pay for the virtual urgent care service, even when it offered a pathway for earlier ED access. This contrasts with the retrospective evaluation of the NUHS VCC, which found that older adults constituted an important group of actual virtual urgent care users[9]. The apparent difference may reflect the distinction between stated preferences in hypothetical scenarios and real-world health-seeking behaviour when urgent symptoms arise. Nevertheless, the present findings are consistent with evidence that older adults may face barriers to digital health adoption and may be less willing to use or pay for digital health technologies[12, 25]. Together, these findings highlight the importance of caregiver involvement, clear verbal communication, and reassurance about escalation for older adults and patients with lower digital confidence.

Implications for service design and implementation

These findings have several implications for the design and communication of a virtual urgent care service.

First, communication should reflect the different ways in which virtual urgent care can support patients across mild, moderate, and more serious urgent presentations. Unlike a post-triage service, virtual urgent care is typically accessed by patients before the nature and severity of their condition have been clinically established. Patients therefore need a general understanding of what the service can offer across varying levels of perceived urgency, rather than associating it with a single condition or pathway.

For lower-acuity presentations, communication may emphasise convenient access to timely medical advice, reduced travel, and avoidance of unnecessary ED waiting. For moderately urgent presentations, it should explain the role, safety, and limitations of home-based assessment supported by virtual medical input. For potentially serious symptoms, communication should emphasise prompt clinical assessment, safety-netting, and appropriate escalation to emergency care. It should not imply guaranteed queue bypass, preferential treatment, or priority based on payment.

Second, trust-building should be central to implementation. Information provided to patients or their caregivers should clearly describe the qualifications of clinicians involved, the scope and limitations of virtual assessment, expected waiting times, and the process for escalation to in-person or emergency care as required. Clear communication about clinical governance and continuity between virtual and physical services may help address concerns about the absence of physical examination and uncertainty regarding diagnostic capability.

Third, pricing should be approached carefully. Although WTP was descriptively higher for scenarios perceived as more urgent, most participants were unwilling to pay additional amounts beyond their initial stated WTP, even when preferred service conditions were met. This suggests that perceived value may have a ceiling and that adoption may be sensitive to price. Any financing model should therefore consider affordability, subsidies, and safeguards against inequitable access.

The severe-scenario findings are particularly important in this respect. They should not be interpreted as support for a pay-for-priority ED model. Emergency care prioritisation must remain based on clinical acuity. The finding instead suggests that patients place considerable value on timely assessment, reassurance, and a clear route to escalation when symptoms appear serious. Future service models should preserve this clinical principle and avoid creating the perception that payment determines access to urgent care.

Strengths and limitations

A strength of this study is that participants were recruited in the ED, where decisions about urgent care were directly relevant. The scenario-based design enabled examination of acceptance across different levels of perceived urgency and different virtual care pathways. The mixed-methods approach also allowed quantitative estimates of WTU and WTP to be interpreted alongside participants' explanations of perceived value.

Several limitations should be considered. First, convenience sampling from a single tertiary ED limits generalisability to the wider Singapore population. The sample was relatively young and digitally confident, which may have led to higher estimated acceptance of virtual urgent care.

Second, the hypothetical scenarios may not fully reflect real-world decision-making during acute illness. Actual behaviour may be influenced by symptom progression, anxiety, previous healthcare experiences, clinician advice, and caregiver involvement. Caregiver and next-of-kin decision-making were not

examined in depth. Although caregivers could respond on behalf of patients, they represented only a small proportion of the sample, and the survey did not specifically examine circumstances in which caregivers or next of kin initiate contact with urgent-care services on a patient's behalf. This may be especially relevant for older adults, patients with reduced capacity, and those with limited digital confidence.

Third, WTP estimates may have been influenced by the presented price ranges, sequence of price presentation, and comparison with the prevailing ED fee. Stated WTP in a hypothetical survey may also differ from actual payment behaviour.

Fourth, the regression analyses were exploratory and may have been underpowered to identify modest associations. Multiple statistical comparisons were conducted without adjustment for multiple testing; therefore, statistically significant findings should be interpreted as hypothesis-generating rather than confirmatory.

Fifth, the qualitative findings were derived from brief open-ended survey responses rather than in-depth interviews. Although these responses identified recurring patterns in perceived value, they did not provide the depth achievable through dedicated qualitative interviews.

Finally, the message-framing component was exploratory and secondary to the main study objectives. The isolated association observed for the home-visit scenario may have arisen by chance and should not be interpreted as evidence of a consistent framing effect.

Future research should evaluate actual use and implementation of virtual urgent care services, including patient experience, clinical safety, ED attendance and reattendance patterns, downstream healthcare utilisation, and equity of access. Larger multi-site or population-based studies could examine whether WTU and WTP differ by age, socioeconomic status, language, digital confidence, prior virtual-care experience, and clinical presentation. Qualitative interviews with older adults, caregivers, frequent ED users, and individuals who decline virtual care would help clarify barriers to adoption and how patients interpret the role of a pre-presentation virtual urgent care service.

Conclusions

In this exploratory mixed-methods study of ED patients and caregivers in Singapore, WTU virtual urgent care was high across three hypothetical urgent-care pathways, while WTP was descriptively higher in scenarios representing greater perceived clinical urgency. Participants valued different service attributes depending on the scenario, with convenience, home-based care, and timely assessment emerging as the principal drivers of perceived value.

These findings suggest that acceptance of virtual urgent care depends not only on cost, but also on perceived urgency, trust, affordability, and patients' understanding of how the service connects to in-person emergency care. Implementation should therefore emphasise clear communication about the

service, transparent escalation pathways, accessible telephone and caregiver-supported options, and equitable pricing. Further research is needed to evaluate real-world uptake, patient experience, safety, and impacts on ED utilisation.

Abbreviations

ED
Emergency department
HDB
Housing and Development Board
NUH
National University Hospital
NUHS
National University Health System
PACS
Patient Acuity Category Scale
VCC
Virtual Care Centre
WTP
Willingness to pay
WTU
Willingness to use

Declarations

Ethics approval and consent to participate

The need for consent to participate was deemed unnecessary according to national regulations. Under the 'Declaration of Use of Anonymised Data and/or Samples for Research', the NHG Health Domain Specific Review Board (DSRB) determined that the study did not constitute human subject research and therefore did not require formal DSRB review [Ref 2026-0083], as the study involved anonymised data. The study was conducted in compliance with applicable institutional policies, regulations, and guidelines.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual person's data.

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Author Contribution

All authors contributed to the conception of the study and design of the survey. K.C. collected the data. K.C. and J.L. analysed the data with all authors involved in interpreting the analysed results. K.C. and SY.L. drafted the manuscript. All authors critically reviewed and revised the manuscript, approved the final version, and agree to be accountable for all aspects of the work.

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Data Availability

The datasets generated and/or analysed during the current study are not publicly available because they contain patient survey responses collected in an ED setting and may be subject to institutional governance restrictions, but de-identified data may be available from the corresponding author on reasonable request and with institutional approval.

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Figures

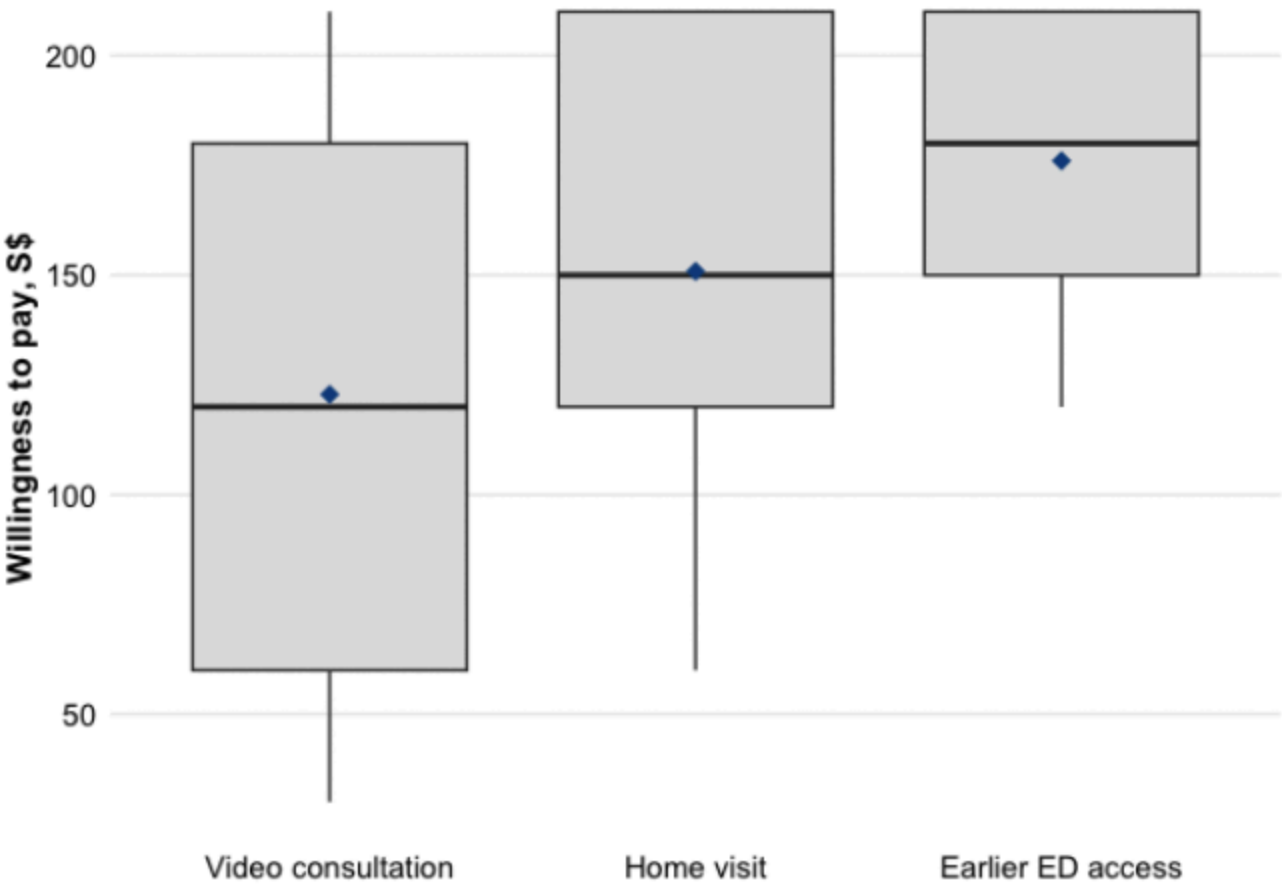


Figure 1

Distribution of WTP amounts by scenario

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