

Reducing Preventable Pediatric Emergency Admissions through Integrated Primary and Community Healthcare in Saudi Arabia

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Abstract: Preventable pediatric emergency admissions signal gaps in access, continuity, caregiver support and chronic-disease management. Emergency departments remain indispensable for severe illness, yet children with low-acuity infections, poorly controlled asthma, medication problems, delayed primary-care access or unresolved post-discharge needs may reach hospital when earlier community intervention could have been safer and more efficient. This integrative review examines how Saudi Arabia can reduce avoidable pediatric emergency use through coordinated primary, community, digital and hospital services. Recent evidence and authoritative frameworks were synthesized across prevention, timely access, chronic-care pathways, tele-triage, discharge transition, family capability, data integration and payment. The paper proposes a whole-pathway model that preserves rapid emergency access while creating reliable alternatives and feedback loops. Priority actions include same-day pediatric assessment, family-held action plans, proactive high-risk registries, school and pharmacy partnerships, virtual consultation, post-emergency follow-up within seventy-two hours and interoperable records. A balanced dashboard should measure safety, equity, experience and utilization rather than treating fewer admissions as the sole goal. Integrated pediatric care can improve outcomes, reduce fragmentation and advance Saudi Vision 2030 objectives for prevention, access, quality and value.

Keywords: Pediatric Emergency Admission, Primary Healthcare, Community Care, Integrated Care, Ambulatory Care-Sensitive Conditions, Digital Health, Saudi Vision 2030.

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1. INTRODUCTION

Pediatric emergency departments protect children with time-critical illness and injury, but rising or poorly distributed demand can produce crowding, delayed assessment and unnecessary exposure to hospital-based testing. Some visits and admissions are potentially preventable when effective vaccination, health literacy, timely primary care, chronic-disease control and early follow-up are available. The word preventable must be used carefully: it should describe a system opportunity identified after clinical review, not blame parents for

seeking help. Families frequently choose emergency care because it is open, trusted and able to provide diagnostics in one location.

Saudi Arabia's Health Sector Transformation Program emphasizes access, prevention, primary care, emergency response and digital transformation. These priorities create an opportunity to reorganize pediatric urgent care around the child rather than around separate facilities. WHO defines primary healthcare as comprehensive care delivered as close as feasible to everyday life, combining integrated

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services, multisectoral action and empowered communities (WHO, 2025). Integrated people-centred care further requires coordination across the continuum, equity, participation, efficiency and resilience (WHO, 2024).

This review asks how integrated primary and community healthcare can reduce preventable pediatric emergency admissions in Saudi Arabia without creating barriers to necessary emergency treatment. Its objectives are to clarify avoidability, identify priority conditions and access gaps, develop an integrated pathway, propose implementation actions and define a balanced evaluation framework.

2. REVIEW METHODOLOGY

An integrative narrative review was conducted using literature published mainly from 2020 to 2025. Search concepts included pediatric emergency utilization, avoidable admission, ambulatory care-sensitive conditions, primary care access, asthma, diabetes, infection, telehealth, discharge transition, caregiver education, integrated care and Saudi health transformation. Evidence from systematic reviews, observational studies, quality-improvement reports, WHO and UNICEF guidance, Saudi Ministry of Health services and Vision 2030 policy was considered. Findings were charted across eight domains: prevention, access, continuity, chronic-disease management, urgent digital support, emergency-to-community transition, family capability, and data or financing. Heterogeneity in definitions prevented meta-analysis; conclusions are therefore implementation-oriented and require local validation.

3. Understanding Preventable Emergency Use

3.1 Avoidability is a Pathway Property

A visit may appear low acuity at discharge but may have been reasonable when symptoms began. Parents do not have laboratory results, clinical training or guaranteed access to same-day alternatives. Classification should examine whether an appropriate service was available, affordable,

geographically accessible, culturally acceptable and capable of meeting the need at the time care was sought. A potentially preventable admission may reflect missed vaccination, delayed recognition, failed medication access, inadequate action planning, absent follow-up, diagnostic uncertainty or inability to observe the child safely at home. Review must therefore reconstruct the pathway rather than judge the final diagnosis alone.

3.2 Priority Clinical Groups

The greatest opportunities often occur in recurrent or predictable pathways. Children with asthma may attend repeatedly because inhaler technique, controller therapy, trigger management or written action plans are inadequate. Diabetes admissions may follow missed early signs, insulin access problems, sick-day confusion or fragmented specialist contact. Seizure-related use can increase when rescue plans and medication supplies are unclear. Gastroenteritis may progress when caregivers lack oral rehydration guidance or cannot obtain timely assessment. Vaccine-preventable disease, dental infection, skin disease and some urinary or respiratory infections may also be reduced through prevention and early treatment. High-risk infants, medically complex children and that recently discharged need proactive follow-up, although their admissions are not necessarily avoidable.

3.3 Social and Geographic Determinants

Emergency use is shaped by work schedules, transport, clinic hours, language, health literacy, digital access and confidence in primary care. Rural families may face long travel or limited pediatric expertise. Urban families may encounter appointment scarcity despite nearby facilities. Migrant or mobile populations can experience discontinuity and incomplete records. Integrated care should measure these differences because an overall decline could conceal worsening access for a subgroup. Equity requires options that function outside normal working hours, support Arabic and other common languages, and remain usable for families with limited digital confidence.

Table 1: Common drivers of pediatric emergency use and integrated responses

Driver of emergency use	Typical pathway gap	Integrated response
Asthma or recurrent wheeze	Poor controller adherence, technique or action planning	Primary-care registry, inhaler review, action plan, school support and rapid advice
Fever and minor infection	No same-day assessment or caregiver uncertainty	Nurse triage, extended-hours clinic, safety-net advice and booked review
Diabetes or epilepsy	Sick-day confusion, missed medicines or fragmented specialist access	Shared care plan, pharmacy continuity, remote specialist support and proactive follow-up
Post-discharge deterioration	Late appointment, unclear warning signs or medication discrepancy	Follow-up within 48-72 hours, reconciliation, teach-back and direct contact route

Driver of emergency use	Typical pathway gap	Integrated response
Remote or mobile family	Distance, language, incomplete records and referral delay	Virtual care, interoperable summary, navigation and defined escalation
Caregiver anxiety	Uncertainty about severity and limited trusted alternatives	Clear red flags, decision support, continuity and respectful reassurance

4. Integrated Primary and Community Care Model

The proposed model treats emergency care as one component of a connected system. It does not redirect children automatically; it offers prevention

and timely alternatives before crisis, then links every emergency encounter back to longitudinal care. Figure 1 illustrates the pathway.

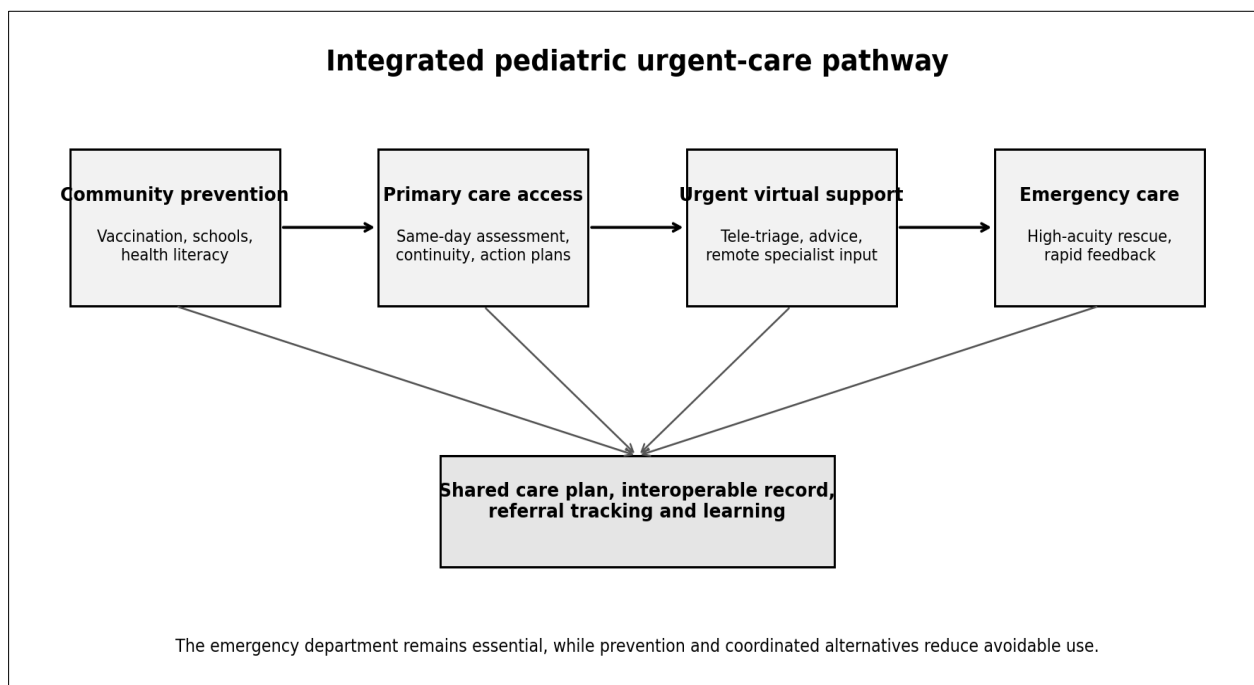


Figure 1: Integrated pediatric urgent-care pathway (author-developed synthesis).

4.1 Prevention and Population Health

Vaccination, injury prevention, nutrition support, newborn follow-up and early identification of developmental or chronic conditions reduce future acute demand. Primary-care teams should use registries to find children with missed immunization, repeated emergency visits, poor asthma control or delayed follow-up. Community outreach can be prioritized by neighborhood risk and delivered with schools, nurseries, pharmacies and local organizations. Prevention messages should be practical: how to use oral rehydration, when fever requires urgent assessment, safe medication dosing, drowning prevention, heat protection and recognition of breathing difficulty. Campaign reach is not enough; understanding and behavior should be evaluated.

4.2 Timely Primary-Care Access

Families require dependable access when a child becomes unwell. Same-day appointments, extended hours, nurse advice and designated urgent

slots can provide alternatives for appropriate cases. Access models must retain clinical triage so infants, respiratory distress, shock, seizures, serious injury or rapidly worsening illness are directed immediately to emergency care. Primary clinics need pediatric observation skills, pulse oximetry, essential medicines, protocols and direct referral contacts. Continuity also matters: clinicians who know the child's history can distinguish expected symptoms from significant change and reinforce previously agreed plans.

4.3 Chronic-Disease Pathways

Integrated chronic care combines planned review with rapid support during deterioration. Asthma pathways should include severity assessment, controller optimization, spacer technique, trigger reduction, school plans and scheduled follow-up after every acute event. Diabetes pathways need reliable insulin and supply access, sick-day rules, ketone testing, nutrition advice and a twenty-four-hour escalation route. Epilepsy care

should provide rescue medication plans, school training and review of adherence or triggers. Children with medical complexity require named care coordinators, concise emergency summaries and anticipatory plans agreed with specialists. These interventions reduce fragmentation while ensuring that severe exacerbations reach hospital promptly.

4.4 Tele-Triage and Virtual Pediatric Support

Saudi digital platforms create a foundation for immediate consultation, remote appointments and family services. Tele-triage can clarify symptoms, provide safety-netting, book timely review or activate emergency response. Video may improve assessment of breathing, rash, interaction or hydration, but it cannot replace examination when risk is uncertain. Protocols should define age-specific red flags, documentation, privacy, consent and escalation. Digital services must connect to physical care rather than ending with advice: families need a booked appointment, referral or clear return plan. Telephone alternatives remain necessary for households with limited broadband or digital literacy.

4.5 Schools, Pharmacies and Community Partners

Children spend substantial time outside healthcare facilities. School nurses and trained staff can support asthma, diabetes, allergy and seizure plans, identify worsening symptoms and communicate with families. Pharmacies can reinforce dosing, adherence, device technique and medication continuity while referring red flags. Community partners can help families navigate appointments, vaccination and health information. Roles must be governed: partners should not diagnose beyond competence, and information sharing requires consent and privacy protection. When integrated with primary care, these settings extend prevention and early support without constructing a parallel health system.

5. Closing the Emergency-to-Community Loop

5.1 Risk-Stratified Discharge

Every emergency encounter should end with a transition plan matched to risk. Low-risk children

need clear diagnosis, expected course, dosing and red flags. Children with uncertainty, repeated attendance, chronic disease, young age or social vulnerability need booked follow-up rather than generic advice. Medication reconciliation should identify duplication, access problems and technique errors. Teach-back asks caregivers to explain the plan in their own words, revealing misunderstanding before discharge. Written information should be concise, multilingual and consistent with verbal advice.

5.2 Follow-up within Seventy-Two Hours

A structured contact within forty-eight to seventy-two hours can confirm improvement, review test results, correct medication problems and arrange further assessment. Timing should be earlier for high-risk infants, abnormal investigations or uncertain diagnosis. Responsibility must be explicit: emergency staff should send a structured summary, primary care should acknowledge receipt, and unresolved referrals should be tracked. Automated messages may support simple cases, but concerning responses require clinical review. Follow-up data can reveal patterns such as repeated respiratory events, missed prescriptions or inability to secure appointments.

5.3 Learning from Recurrent Use

Repeated emergency attendance should trigger supportive review rather than a label of inappropriate use. A multidisciplinary team can examine diagnosis, primary-care attachment, medication access, family understanding, social needs and prior follow-up. The output should be a shared plan with named responsibilities. Aggregated emergency data can identify neighborhoods, times and conditions associated with avoidable demand, guiding extended hours, outreach or seasonal campaigns. Diagnostic safety must remain central: efforts to reduce use must not create delayed recognition of serious disease.

6. Implementation Roadmap for Saudi Arabia

Table 2: Phased implementation roadmap

Phase	Priority actions	Key outputs
0-3 months: define	Agree avoidability criteria; map pediatric demand, access and recurrent-use patterns	Baseline profile, equity analysis and priority pathways
3-6 months: connect	Create shared summaries, referral standards, same-day access and emergency feedback	Operational pathway, named owners and tested communication
6-12 months: pilot	Launch asthma, post-discharge and virtual-triage pilots in selected clusters	Process compliance, safety review and family feedback
12-24 months: scale	Extend registries, school and pharmacy partnerships, interoperability and navigation	Regional integrated networks and standardized dashboard
Continuous: learn	Review adverse events, repeated use, missed follow-up and inequity	Corrective actions, benchmarking and annual pathway improvement

Implementation should begin with health clusters because they can link primary clinics, hospitals, virtual care and community partners around a defined population. Each cluster should appoint pediatric clinical, nursing, digital and quality leads. Early pilots should focus on conditions with clear evidence and measurable processes, such as asthma action planning and post-emergency follow-up. Families should participate in pathway design to identify inconvenient hours, confusing messages and trust barriers. Staff education must emphasize that admission reduction is never a reason to deny assessment.

Interoperable information is essential. Primary clinicians need access to emergency diagnoses, investigations and treatment; emergency teams need current medicines, chronic plans and specialist contacts. A concise shared pediatric summary should include allergies, conditions, baseline status, devices, medicines, action plans, safeguarding alerts and preferred contacts. Data governance should control access, consent, retention and audit. Downtime procedures and reconciliation are required when systems fail or records conflict.

Financing should reward access, continuity and outcomes rather than isolated activity. Payment models can support same-day primary care, care coordination, virtual follow-up and community prevention. Incentives must avoid discouraging necessary referrals or penalizing providers serving high-risk populations. Risk adjustment should consider age, complexity, geography and socioeconomic vulnerability. Investment decisions should compare program cost with emergency utilization, hospital days, caregiver time, transport and preventable harm.

6.1 Caregiver Capability and Shared Decision-Making

Caregiver capability is a central component of pediatric safety because most early assessment and treatment occur at home. Education should be tailored to the condition, language, prior knowledge and practical resources available to the family. For asthma, caregivers should demonstrate inhaler and spacer technique and explain how treatment changes across green, amber and red zones. For fever or gastroenteritis, they should understand hydration, dosing and signs that require immediate review. Shared decisions should consider transport, work responsibilities and confidence with home observation. Teach-back is more reliable than asking whether instructions are understood. Digital videos and reminders can reinforce learning, but they should complement direct clinical communication. Services should record barriers such as medicine

cost, refrigeration, literacy or inability to attend follow-up, then connect families with navigation or social support. Measuring confidence and plan comprehension provides an earlier indicator of risk than waiting for another emergency attendance.

6.2 Pediatric Workforce and Scope of Practice

Integrated care requires a workforce able to assess children safely across settings. Family physicians, general practitioners and nurses need age-specific skills in respiratory assessment, hydration, fever, safeguarding, medication dosing and recognition of serious illness. Community pharmacists and school personnel require narrower, clearly defined competencies and escalation rules. Pediatricians can support protocol development, case review, virtual consultation and continuing education across a health cluster. Workforce planning should examine evening and weekend capacity because urgent demand does not follow office hours. Training should combine guidelines with case-based learning and simulation of borderline presentations where the safe destination is uncertain. Competency assessment is preferable to attendance certificates alone. Staff also need time for care coordination, follow-up and registry work; adding these responsibilities without workload redesign will produce incomplete implementation. Remote regions may benefit from rotating pediatric outreach and stable teleconsultation links backed by formal service agreements.

6.3 Medication Access and Pharmacy Integration

Medication access can determine whether a manageable condition becomes an emergency. Prescriptions may fail when products are unavailable, dosing is confusing, devices are not supplied or caregivers cannot obtain refills outside working hours. Integrated pathways should identify high-risk medicines and devices, including asthma controllers, spacers, adrenaline auto-injectors where appropriate, insulin, glucose and ketone supplies, anticonvulsant rescue therapy and oral rehydration products. Pharmacists can verify weight-based dosing, demonstrate devices, identify duplicate therapies and notify primary care when adherence problems recur. Electronic prescribing should display allergies, current weight and prior dispensing to reduce error. Children leaving emergency care need confirmation that the intended medicine can actually be obtained. Cluster dashboards can monitor failed dispensing, refill gaps and repeated emergency use associated with medication access. Pharmacy integration therefore contributes to prevention, continuity and patient safety rather than functioning only as a supply transaction.

6.4 Seasonal Planning and Predictive Population Management

Pediatric urgent-care demand changes with respiratory seasons, school terms, extreme heat, travel and local outbreaks. Health clusters should combine historical emergency data with primary-care activity, pharmacy dispensing, weather and public-health surveillance to anticipate pressure. Before predictable respiratory peaks, teams can extend same-day capacity, review high-risk asthma patients, ensure inhaler availability and distribute targeted advice. Heat periods require hydration messaging, safe outdoor activity guidance and rapid access for infants or children with chronic disease. Predictive planning must remain transparent and should not restrict care based on algorithmic risk. Its purpose is resource preparation and proactive outreach. Models should be validated across regions because urban, rural and tourism populations differ. Performance can be judged by forecast accuracy, appointment availability, emergency crowding, high-risk outreach completion and unintended disparities. Human review remains necessary when data quality is incomplete or unusual events change demand.

6.5 Governance, Accountability and Cross-Sector Coordination

Integration fails when every organization supports the concept but no one owns the interfaces. Each health cluster should establish a pediatric integrated-care committee with authority over access, referral, digital standards, community partnerships and safety review. Responsibilities must be assigned for booking follow-up, acknowledging emergency summaries, tracking missed referrals and contacting high-risk families. Service-level agreements should define response times between primary care, virtual services, specialty clinics and hospitals. Schools, pharmacies

and community partners need governance proportionate to their role, including training, consent, confidentiality and incident reporting. Families should participate in oversight and review performance information in understandable form. A single accountable executive sponsor can remove financing or technology barriers, while clinical leaders protect quality. Governance should investigate both overuse and under-access; a fall in admissions is not success if children face delayed treatment. Transparent review supports trust and continuous improvement.

6.6 Economic Evaluation and Sustainable Scale-Up

Sustainable scale-up requires evidence that integrated care creates value across the whole system. Evaluation should include extended-hours, training, digital and coordination costs alongside hospital days, duplication, disease control, transport and caregiver burden. Funding should favor models that remain effective after pilot support ends, protect equity and demonstrate clinically meaningful benefits for children and families over time.

7. Measurement, Safety and Equity

The primary objective is safer, more appropriate care, not simply fewer emergency visits. Outcome measures should include potentially preventable admissions, repeated attendance, hospital length of stay, severe deterioration after redirection and chronic-disease control. Process measures include same-day access, action-plan completion, follow-up within seventy-two hours, vaccination closure, medication reconciliation and successful referral. Experience measures should examine caregiver confidence, clarity and convenience. Equity measures should compare performance by region, language, age, complexity and digital access.

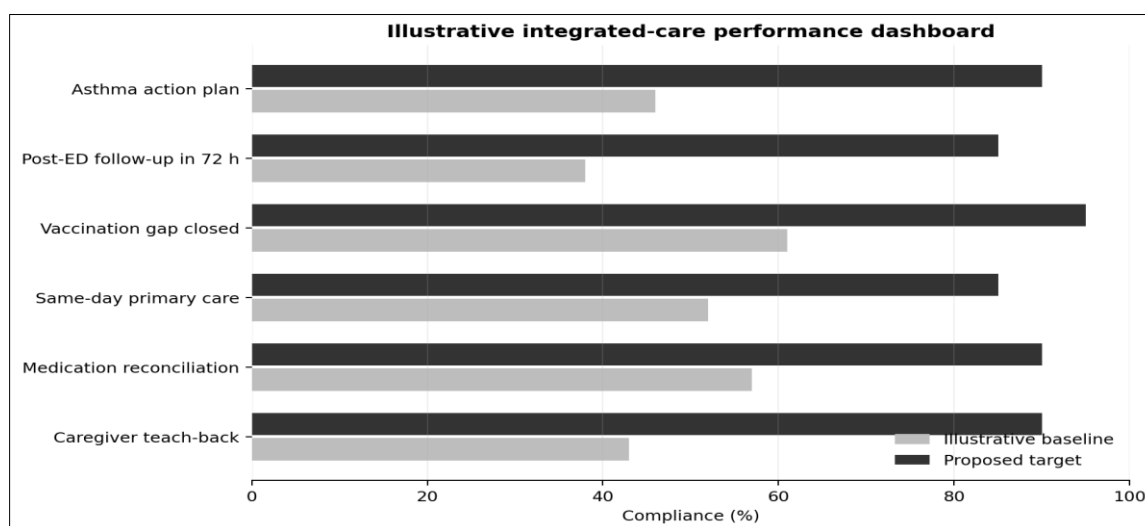


Figure 2: Illustrative performance dashboard; values are examples and not observed patient data

Balancing measures are essential. These include delayed emergency presentation, return with higher acuity, missed serious diagnosis, primary-care workload, alert burden and family complaints. A reduction accompanied by increased intensive-care admission would represent failure. Cases involving deterioration after advice or redirection require rapid review. Dashboards should be reviewed across services so that emergency, primary and community teams share accountability.

8. DISCUSSION

Integrated care can reduce preventable pediatric emergency admissions by addressing the reasons families reach crisis: delayed access, fragmented information, poor chronic control, uncertainty and weak transition. The emergency department should remain an open safety net. The system's responsibility is to make other routes sufficiently accessible, competent and trusted that families can use them appropriately. This requires investment in primary-care capability, not messaging that asks families to avoid hospital.

Saudi Arabia has enabling assets, including health-cluster reform, national digital platforms, expanding virtual care and a strategic commitment to prevention. The main challenge is operational integration. Separate appointment, record, referral and payment systems can leave families coordinating their own care. A shared pathway with explicit ownership converts multiple services into a functioning network. Pediatricians can provide protocol leadership and specialist support, while family physicians, nurses, pharmacists, schools and caregivers deliver continuity close to home.

Trust is a clinical resource. Families will use primary or virtual care when they receive timely assessment, clear safety-netting and reliable escalation. Repeated redirection, unavailable appointments or inconsistent advice pushes demand back to emergency departments. Quality improvement should therefore study the caregiver journey from first symptom to recovery. Interventions that save hospital activity but transfer excessive burden to families are not genuinely efficient.

9. Research Priorities and Limitations

Saudi research should develop a validated classification of potentially preventable pediatric admissions using diagnosis, severity, prior access and expert review. Linked data can identify patterns across primary, emergency and inpatient care while protecting privacy. Cluster trials or stepped-wedge designs could evaluate asthma pathways, extended hours, tele-triage and post-discharge follow-up.

Qualitative work should examine caregiver decisions across regions and languages. Economic evaluation should include system and family costs. Predictive tools require external validation and monitoring for bias before influencing access.

This review is limited by heterogeneous definitions, health-system differences and scarce Saudi pediatric integration studies. Observational associations cannot prove that every emergency event would have been prevented by primary care. Some apparently low-acuity presentations require hospital evaluation to exclude serious disease. The proposed framework should therefore be piloted with explicit safety monitoring and adapted to local workforce, geography and digital maturity.

10. CONCLUSION

Reducing preventable pediatric emergency admissions requires a coordinated system that acts before, during and after acute illness. Saudi Arabia should combine prevention, same-day primary care, chronic-disease pathways, virtual support, community partnerships, risk-stratified discharge, rapid follow-up and shared data. Success should be judged through safety, equity, experience and value, not admission volume alone. With strong health-cluster governance and family partnership, integrated pediatric care can preserve emergency access while preventing avoidable deterioration and advancing Vision 2030.

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