

# Improving emergency care through a dedicated redesigned obstetrics and gynecology emergency unit at the Women's Hospital, Doha, Qatar



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**BACKGROUND:** Emergencies in obstetrics and gynecology are important causes of morbidity and mortality. Consequently, the World Health Organization introduced the concept of emergency obstetrical and newborn care aimed at reducing maternal mortality by 75%. Worldwide, 15% of all births result in life-threatening complications during pregnancy. The Women's Hospital in Doha, Qatar, experienced a steady increase in births from approximately 13,000 in 2013 to more than 17,000 in 2016. This was accompanied by a rapid increase in the number of visits to the emergency unit—the main provider of emergency obstetrics and gynecology care to approximately 70,000 patients a year—overstretching the services and affecting the quality of care. To address this rapid increase, a redesign of the emergency services was undertaken and implemented in 2012.

**OBJECTIVE:** This study aimed to present a 5-year audit of the emergency department's structural process redesign.

**STUDY DESIGN:** We redesigned the emergency department into one of consultant-led teams of trained obstetrics and gynecology physicians, residents, and specialized nurses with immediate support from ancillary services and direct access to operating and labor rooms and wards. The Canadian Triage and Acuity Scale (levels I–V) was used to triage patients and determine the rapidity with which they were seen. An electronic medical record was introduced as part of the redesign, and different matrices were used to measure outcomes regularly.

**RESULTS:** During the 5-year study period, an average of 70,000 patients were seen annually. The obstetrics-to-gynecology ratio of cases was 3:1. Using the Canadian Triage and Acuity Scale, most patients (63.4%) had acuity level IV. Moreover, 97% of women were seen and triaged scored within 15 minutes of presentation; furthermore, all patients with acuity level I and 95% of patients with acuity level II were seen within 15 minutes by a physician, and 89% of patients with acuity level III were seen within 60 minutes. Approximately 2.5% of patients returned to the emergency department within 48 hours of discharge, and 0.5% of patients who had been seen and discharged returned to the emergency department. Key performance indicators were exceeded in all domains, with 90% of patients rating the care they received as either excellent or good.

**CONCLUSION:** The growing population in Qatar required improvements and innovation in services. Our results showed that innovating how emergency services can be provided results in considerable improvements in outcomes and satisfaction. Considering the peculiarities of the environments, it should be possible to adopt this approach in other settings.

**Key words:** emergency care, obstetrics and gynecology, quality improvement

## Introduction

Emergency obstetrical care (EmOC), which is crucial in reducing maternal mortality, should be available and accessible to all women.<sup>1</sup> In addition, there is an inverse correlation between availability of EmOC and maternal-to-mortality

ratio.<sup>2,3</sup> Globally, it is estimated that the World Health Organization (WHO) criteria for EmOC are met in only 45% (28%–57%) of countries, with considerable disparity among low-, middle-, and high-income countries. Consequently, there are approximately 11.4 million

patients with untreated pregnancy complications yearly and 951 million (645–1174 million) women without access to EmOC.<sup>1</sup>

The concept of a women's emergency department (ED) is new in some parts of the world; for example, most

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## AJOG Global Reports at a Glance

**Why was this study conducted?**

This study was a review of a 5-year outcome of a process redesign in response to pressures from a rapid increase in demand for emergency care (>70,000 emergency visits per year and with an annual delivery rate of >17,000) and at the same time improve quality of care.

**Key findings**

Specially designed emergency units for both obstetrics and gynecology, properly staffed and with the necessary supporting services, considerably reduced waiting times and overcrowding in emergencies, improved patient satisfaction, and reduced representation and admission for emergencies.

**What does this add to what is known?**

Dedicated emergency units covering both obstetrics and gynecology can have a major impact on care outcomes and allow for better use of resources. Our model can be applied to most units based on need and resources.

maternity units in the United Kingdom have a day assessment unit, maternity triage unit, gynecology emergency triage unit, and early pregnancy assessment unit, all functioning as separate entities and not as combined units in an ED.

In 2006, Dr Chris Swain in Kissimmee, Florida, pioneered the concept of the obstetrical ED. His primary objective was to elevate the standard of women's healthcare by ensuring that expectant mothers are evaluated by an experienced, board-certified obstetrics and gynecology physician round the clock.<sup>4</sup> That same year, a labor and delivery triage unit with minor modifications was the first obstetrical ED to be opened.<sup>5</sup> During the past decade, this concept has revolutionized women's healthcare.

In the United States, in 2016, the American College of Obstetricians and Gynecologists (ACOG) released a committee opinion article where it urged hospital-based obstetrical units to collaborate with EDs and hospital ancillary services and emergency response systems outside of the hospital to establish guidelines for the triaging of pregnant women.<sup>6</sup>

Obstetrics and gynecology services in Qatar are provided at the Women's Hospital (which became the Women's Wellness and Research Centre in 2019), which was opened in 1988. It is the only tertiary referral center in the country and receives patients from both private

and public hospitals. For more than 3 decades, the hospital has played a central role in improving the health and well-being of women in Qatar. It is the busiest of the Hamad Medical Corporation's network of 8 hospitals delivering more than 17,000 women each year. There is an outpatient department with a throughput of more than 120,000 women annually, 16 labor and delivery rooms, and more than 70,000 ED visits per year. There are 330 inpatient beds, 3 operating theaters, and a large ED. The delivery rate has steadily increased from 13,000 births in 2013 to more than 17,000 births in 2016, making it one of the largest maternity units in a high-income country worldwide.

Although there had always been a women's ED in the Women's Hospital and in conformity with cultural and religious norms in Qatar (men and women are seen separately), the facility was deficient in many aspects, including not meeting international standards and failing to cope with an increasing birth rate.

To improve EmOC in Qatar, a service redesign was undertaken in 2012 using a unique and innovative approach for the delivery of emergency care strictly for women and tailored to the needs of the local population and aiming to meet one of the then Millennium Development Goals,<sup>7</sup> the WHO EmOC charter,<sup>1</sup> and the Qatar National Health Strategy (NHS).<sup>8</sup> The state of Qatar, which lies on the northeastern coast of the Arabian Peninsula in

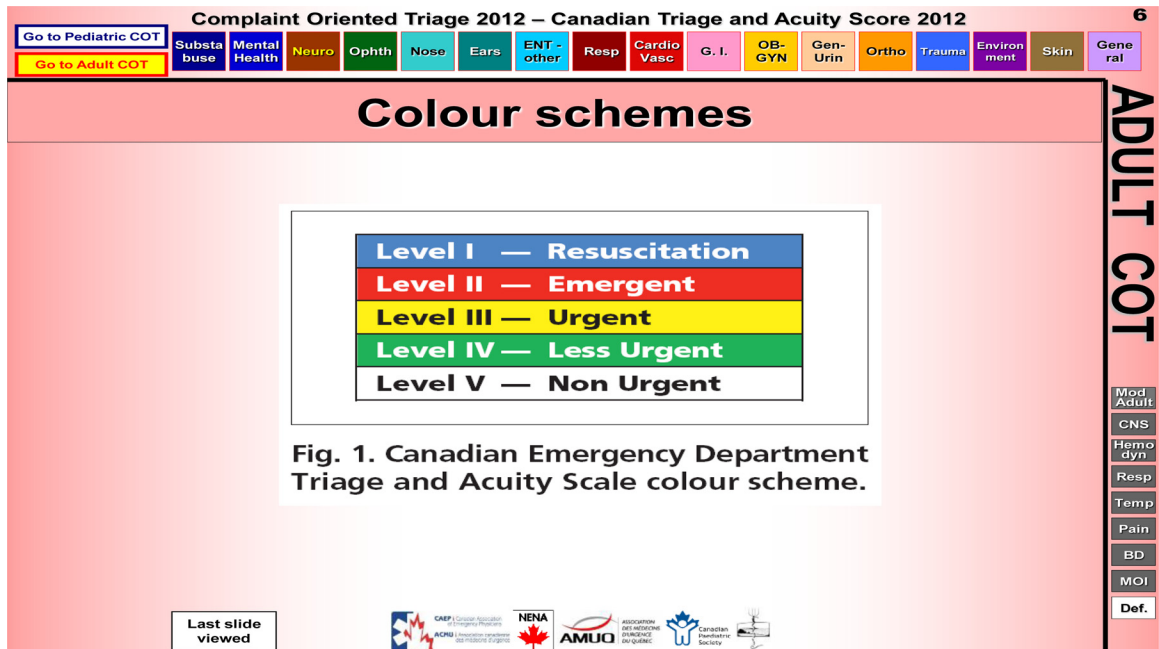
the Gulf of Arabia, has a population of 2.7 million. Here, we present the results of an audit after 5 years of implementing the project. Institutional review board approval was not required as this was an audit and therefore exempt.

**Methods**

In 2004, the Qatar NHS was published with key initiatives: one of the initiatives was to improve emergency care. A redesign of emergency maternal care was undertaken using a unique and innovative approach to deliver emergency care strictly for women and tailored to the local needs of the population. We used the Canadian Triage and Acuity Scale (CTAS) for the initial assessment and triaging of patients (Figure 1). Such a scoring system has been validated in obstetrics.<sup>9</sup> Patients were categorized on a 5-tier level based on the severity of their condition. The new service included the following: (1) coverage for both gynecology and obstetrics emergencies; (2) triage done by physician<sup>10</sup>; (3) availability of an on-site senior attending physician (consultant) 24 hours per day; (4) availability of 4 obstetrics and gynecology physicians per shift each with a minimum of 5 years training in an Accreditation Council for Graduate Medical Education—accredited residency program in obstetrics and gynecology and all of whom are able to initiate or perform initial critical evaluation, management, and treatment of patients in emergency<sup>11</sup>; (5) charge nurse and nurses trained in the management of obstetrics, gynecology, and general medical emergencies; (6) direct and rapid access to obstetrics and gynecology emergency theaters, labor room, radiology department, laboratory investigations, and inpatient wards; and (7) rapid access to consultation from other specialties, including internal medicine, surgery, neurology, and intensive care, with multidisciplinary discussions with these specialties when required Figure 2. shows the patient pathway in the redesigned unit.

Several quality and safety measures and key performance matrices were embedded within the design and operation of the service. The operation of the

**FIGURE 1**  
Canadian Emergency Department Triage and Acuity Scale scoring system



**Fig. 1.** Canadian Emergency Department Triage and Acuity Scale colour scheme.

<b>Level I</b>	<b>Resuscitation</b>	<b>see patient immediately</b>
<b>Level II</b>	<b>Emergency</b>	<b>within 15 minutes</b>
<b>Level III</b>	<b>Urgency</b>	<b>within 30 minutes</b>
<b>Level IV</b>	<b>Less Urgency</b>	<b>within 60 minutes</b>
<b>Level V</b>	<b>Non Urgency</b>	<b>within 120 minutes</b>

BD, base deficit; CNS, central nervous system; COT, complaint-oriented triage; ENT, ear, nose, and throat; GI, gastrointestinal; MOI, mechanism of injury. Saleh. Outcome of a redesigned emergency obstetrics and gynecology service. *Am J Obstet Glob Rep* 2022.

services was specifically aimed at (1) reducing patient waiting and transfer times, (2) reducing ED overcrowding, (3) reducing unplanned or readmission to the ED within 48 hours after discharge, (4) improving patient satisfaction with the service, and (5) reducing complications arising from emergency presentations. For each matrix, several targets were defined based on international and national standards. These outcome matrices were compared with those for the 2 years

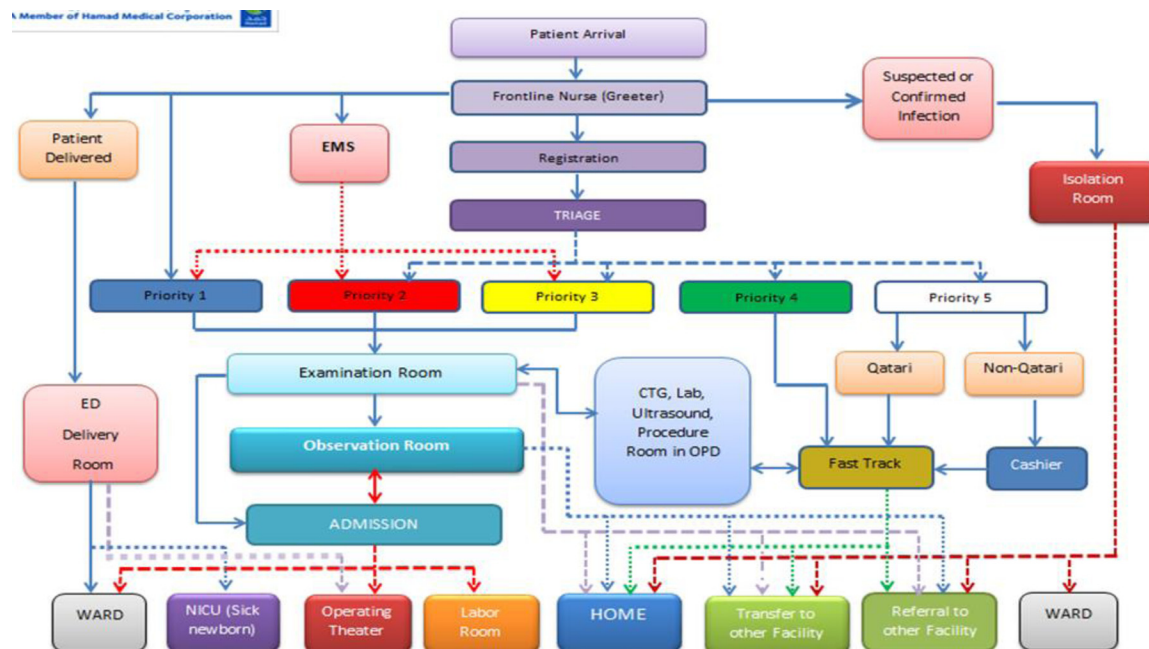
before the changes and intrastudy comparisons were made (ie, year-to-year comparisons).

A senior physician (H.S.) was empowered to lead the change. Patient flow was redesigned, multiple safety rounds (at frequent intervals of 2–4 hours) were introduced, an electronic patient medical record (Cerner, North Kansas City, MO) was introduced, and a validated acuity triaging system for the initial rapid evaluation of patients was adopted.

**Results**

During the 5-year study period (2012–2016), there was a continuing increase in the number of visits to the ED (64,991 in 2012 to 73,269 in 2016). Obstetrical emergencies contributed to 75% of the visits. On average, 6000 patients were seen monthly (range, 4889–6762) with a discharge home rate of approximately 60%. Moreover, 97% of all patients seen, assessed and awarded a triage score within 15 minutes of presentation. The [Table](#)

**FIGURE 2**  
**Pathway illustrating patient movements in the redesigned ED**



CTG, cardiocotography; ED, emergency department; EMS, emergency medical service; NICU, neonatal intensive care unit; OPD, outpatient department.

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shows examples of some of the presentations that were triaged under each acuity scale.

Most obstetrical cases presented with several symptoms, including labor pains, abdominal pains, complications related to diabetes mellitus in pregnancy, raised blood pressure, preeclampsia, and antepartum hemorrhage. In gynecology, the most common presentations were associated with early pregnancy complications (such as threatened miscarriage or hyperemesis gravidarum), abdominal pain, and abnormal uterine bleeding.

Concerning CTAS scoring, of the overall cases, 63.4% were categorized as level IV or patients with nonurgent clinical needs, 24.3% were categorized as level III, 7% were categorized as level II, 5% were categorized as level V, and 0.3% were categorized as level I. All patients with acuity level I were seen immediately by the obstetrics physician. On average, 95% of patients with acuity level II or patients with emergent clinical needs were seen within 15 minutes of presentation (range, 86%–98%)

(within the predetermined target of 95%), and 89% of patients with acuity level III or patients with urgent clinical needs were seen within 30 minutes by a physician (this fell just short of the target of 90%).

During this 5-year study period, 85% of patients (range, 73%–99%) with acuity level III or patients with less urgent clinical needs were seen by physicians within 60 minutes (achieving the predefined target). Most patients with acuity level V or patients with nonurgent clinical needs were seen within 2 hours by the physicians. Overall, of the patients, 73% spent <2 hours in the ED, 23% spent 2 to 4 hours (these times included the waits for investigations, such as ultrasound scan and blood test results, and waits for bed availability for admission) in the ED, 3% spent 4 to 6 hours in the ED, and 1% spent >6 hours in the ED. Moreover, 3% of patients left without being seen. It took approximately 6 months from inception (ie, from introducing the changes) to achieve these figures, which remained unchanged overall during the study

period and have remained the same since the changes, as evidenced by regular reviews every 6 months from the dedicated leadership and routine yearly audits, ensuring that standards continue to improve.

Nearly 99% of patients seen stated that the doctors had listened to them carefully; overall, 99% of patients stated that the care provided was satisfactory, 94% of patients felt that they had received an adequate explanation of the new medications, 97% of patients stated that they were informed about the symptoms to consider after discharge, and 99% of patients said that they had been treated with respect and dignity.

The return rate to the ED after 48 hours of discharge was approximately 2.5% during the 5-year study period (less than the predefined 3% target). The number of patients who needed admission after revisiting the ED was 0.5% (less than the 1% target). On patient satisfaction (from surveys), 60% of patients rated the service as excellent, and 30% of patients rated the service as good (ie, 90% of patients rated

TABLE

## Examples of presentations triaged into different Canadian Triage and Acuity Scale categories

Variable	Level I Resuscitation	Level II Emergent	Level III Urgent	Level IV Less urgent	Level V Nonurgent
Obstetrical complaints	<ul style="list-style-type: none"> <li>• Cord prolapse</li> <li>• Fitting (having seizures)</li> <li>• Altered level of consciousness</li> <li>• Imminent birth</li> <li>• Constant abdominal pain (uterine) with or without bleeding</li> <li>• Active bleeding</li> </ul>	<ul style="list-style-type: none"> <li>• Suspected sepsis</li> <li>• Severe hypertension (BP&gt;160/110 mm Hg)</li> <li>• Headaches with visual disturbances and hypertension</li> <li>• Major trauma</li> <li>• Shortness of breath or chest pain</li> <li>• Bleeding with or without cramping pains at &lt;37 wk of gestation</li> <li>• Ruptured or suspected rupture of membranes at &lt;37 wk of gestation</li> </ul>	<ul style="list-style-type: none"> <li>• Hypertension (BP&gt;140/90 to &lt;160/110 mm Hg)</li> <li>• Signs of active labor</li> <li>• Cramping abdominal pain associated with or without bleeding at &gt;37 wk of gestation</li> <li>• More than normal pregnancy backache or pain</li> <li>• Flank pains</li> <li>• Hematuria</li> <li>• Absent fetal movements</li> </ul>	<ul style="list-style-type: none"> <li>• Early labor or rupture of membranes at &gt;37 wk of gestation</li> <li>• Vaginal spotting</li> <li>• Minor trauma (eg, domestic fall)</li> <li>• Gastrointestinal symptoms (nausea, vomiting, and/or diarrhea) not enough to cause dehydration</li> <li>• Symptoms of infection (eg, fever, dysuria, chest pain, and cough)</li> <li>• Reduced fetal movements</li> </ul>	<ul style="list-style-type: none"> <li>• Any other presentation that does not put the mother or fetus at any risk</li> </ul>
Gynecologic complaints	<ul style="list-style-type: none"> <li>• Shock from bleeding or suspected sepsis of other causes</li> <li>• Genital sepsis (eg, after abortion)</li> <li>• Collapsed with ruptured ectopic pregnancy with signs</li> <li>• Critical OHSS</li> </ul>	<ul style="list-style-type: none"> <li>• Symptoms of adnexal torsion</li> <li>• Ruptured ectopic pregnancy but no collapse</li> <li>• Pain from protruding fibroid polyp</li> <li>• Shock from products in the cervix (bleeding in early pregnancy with sudden shock disproportion to severity of bleeding)</li> </ul>	<ul style="list-style-type: none"> <li>• Unruptured ectopic pregnancy requiring surgery</li> <li>• Other grades of OHSS</li> <li>• Significant bleeding with miscarriage (threatened or incomplete)</li> <li>• Acute abdomen from ruptured ovarian cyst</li> <li>• Trauma from falling aside with vulva or paravaginal hematomas</li> <li>• Acute urinary retention (from genital sepsis prolapse, uterine fibroids)</li> <li>• Lower abdominal pain and fever</li> </ul>	<ul style="list-style-type: none"> <li>• Threatened miscarriage</li> <li>• Heavy periods with flooding (more than usual)</li> <li>• Painful fibroids</li> <li>• Swollen vulva (Bartholin cyst—not infected) with. No associated discharge or fever</li> <li>• Vaginal discharge</li> <li>• Bleeding after or during sexual intercourse</li> </ul>	<ul style="list-style-type: none"> <li>• Any other gynecologic presentation</li> </ul>

BP, blood pressure; OHSS, ovarian hyperstimulation syndrome.

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the service as either excellent or good), with the lowest ratings coming from those who waited the longest to be seen. Of 60% of patients with acuity level III who spoke to a nurse within 4 minutes of arrival, 85% felt that the nurse had listened to their complaints and rated this highly.

### Discussion

On average, 70,000 patients were seen in our ED per year. This high volume was not surprising because of the limited availability of skilled obstetrics and gynecology care providers in Qatar. Worldwide, visits to EDs are increasing<sup>12</sup>; for example, the US National Statistics in 2014 revealed that females, overall, had a 20% higher rate of ED visits than males.<sup>13</sup>

During the 5-year study period, 97% of all patients were seen and assessed within 15 minutes of presentation and awarded a triage score. This percentage was far more than the National Center for Health Emergency Department 2014 statistics where the percentage of patients seen in <5 minutes was 32.2%.<sup>15</sup> Benchmarking the performance matrices was difficult because of the unavailability of data on EDs dedicated solely to obstetrics and gynecology; hence, we used standards from EDs in general. The literature on obstetrical emergencies is limited, and most comparisons have had to be made with general EDs. However, as most obstetrical EDs are modeled on general EDs, our quality and efficiency measures were based on them. In the Qatar National Hospital Ambulatory Medical Care Survey 2014, Emergency Department Summary, the average time spent in the ED was <1 hour by only 11.1% of visitors, 1 to 2 hours by 24.1% of visitors, 2 to 4 hours by 33.2% of visitors, and 4 to 6 hours by 13.6% of visitors.<sup>13</sup> Therefore, our performance was considerably better despite the high volumes seen.

In 2016, the American College of Emergency Physicians published an article on high-impact solutions on emergency department crowding and reported that more than 90% of EDs routinely reported overcrowded

conditions.<sup>14</sup> They suggested several measures on how to address this issue. In our redesign, we used some of these. These were discussed under these 3 measures: decreasing input, improving throughput, and process improvement strategies.

### Decreasing input

A service that allows telephone appointments to be made by the patient herself or primary care physician is an opportunity to triage and redirect nonurgent cases. By adopting this approach, we could redirect some of the cases. A considerable number of women were triaged to other areas of healthcare, including antenatal and gynecology clinics, early pregnancy clinics, and other specialist clinics, or a primary care provider if more appropriate. This was especially the case for acuity level IV or patients with less urgent cases who formed a considerable number of possible visits to the ED.

### Improving throughput

The ACOG recommended that pregnant women, especially those in their late first trimester of pregnancy and up to the second trimester of pregnancy, should have early consultations with obstetrical care providers, especially during triage and management in obstetrical EDs.<sup>6</sup> In our system, patients were met by frontline nurses who walked them through the registration process located separately outside of the emergency areas. The availability of a healthcare provider, in this case a nurse and physician in both the triage and ED areas, was one of the keys to the success of our ED as patients could be triaged and some assessed, managed, and discharged without going through the ED.<sup>15</sup> Furthermore, this has been shown to be successful in other projects.<sup>16</sup> A complete evaluation, investigation, and treatment of the patient by an obstetrics physician could be undertaken.

Overcrowding of EDs is known to lead to delays in seeing even high acuity cases<sup>17</sup>; therefore, one of the major aims of the transformation project was to prevent overcrowding. Streaming, split flow, and fast-tracking are some of the

recommendations from the ACOG that were employed. The fast track area (FTA) is the key to the successful management of patients with acuity level IV (63.4% of visits) and acuity level V who have less urgent clinical needs. In our redesign, all patients entering the ED were seen by triage nurses and categorized according to the CTAS.<sup>18</sup> Patients with low acuity (CTAS levels IV and V) were seen, assessed, treated, referred, or discharged by the physician in the FTA. Patients with urgent clinical needs (CTAS levels II and III) were seen in the main ED.<sup>19</sup> This had a positive impact on the length of stay (LOS), waiting time, number of patients who left without being seen, and overall patient satisfaction.

The triage systems aimed to reduce time to treatment, LOS, and use of resources. The CTAS was introduced as a means of triaging patients in the redesign. It is a tool that is used internationally in the assessment and prioritization of patients and is a well-recognized and validated triage system used in EDs worldwide.<sup>20–22</sup> Our ED performed consistently well across all 4 quality parameters using the CTAS guidelines—(1) time to triage, (2) triage duration, (3) proportion of patients who left without being seen by a physician, and (4) waiting time to see the nurse and physician.<sup>23</sup>

The use of specially trained nurses has been shown to improve efficiency and reduce LOS and time in screening and evaluation.<sup>24</sup> Although Qatar does not have nurse practitioners and physician assistants, our ED frontline nurses were specially trained and acted as advanced practice providers. Courses, such as advanced training in life support, advanced life support in obstetrics, neonatal resuscitation program, advanced midwifery and gynecology courses, and management of obstetrical emergencies, are regularly undertaken. Midwives could perform an initial assessment of pregnancies after the second trimester of pregnancy and implement nurse-initiated orders for minor investigations and diagnostic studies, increasing throughput and aiding in the efficient management of EDs.<sup>4</sup>

In our redesign model, patients were rotationally assigned to providers and physicians, a measure that has been shown to reduce LOS, waiting times, and complaints in large studies.<sup>25</sup>

A paperless electronic health record system was introduced at the beginning of this project.<sup>26</sup> After an initial slow start, when healthcare providers went through a learning curve, this quickly revolutionized the care of our patients in the ED.<sup>26</sup> Many of the country's general practitioners use the same system, ensuring seamless health information sharing, especially when seeing new patients with no previous record. This positive impact was observed from availability of history, ordering investigations and review of results, drug ordering, admission, inpatient care to discharge. Furthermore, there was an improved turnaround time for all investigations and results as these could be ordered and reviewed on the electronic system with priority given to emergency cases.<sup>27</sup>

### Process improvement strategies. Increased staffing, emergency department expansion—lean thinking

The improvement project started in 2012 transformed the quality of the services provided. Many of the strategies and tools included those from lean thinking.<sup>28</sup>

Part of the project redesign was reviewing and changing the staffing levels; it was increased considerably from 1 consultant and 2 residents (junior trainees) to 1 consultant, 4 specialists, and 4 residents. Furthermore, a leadership structure was established with the whole team mandated to take ownership of the change process and empowered to iterate changes. Having a senior obstetrics provider or consultant available 24 hours a day and performing regular safety ward rounds led by the consultant on duty reduced unnecessary delays in patient assessment and discharge or transfer to the wards.

Important aspects of the new ED were involvement of active bed management (a bed manager was part of the team), care coordinators' observation bay, and reverse triage. These were

some of the other strategies implemented in the improvement program that ensured better outcomes.<sup>29</sup>

## Conclusion

The ED at the Women's Hospital in Doha, Qatar, has been a unique purpose-built service tailored to the local needs of the women of Qatar. Furthermore, the ED aimed at fulfilling the Qatar National Health Vision, Qatar NHS Maternal and Newborn Health Project, and Emergency Care Project and meeting the WHO EmOC charter. It has been a unique concept that has revolutionized the care of pregnant and nonpregnant women in the country. In one of the busiest EDs in Qatar, with more than 70,000 visits a year, we have shown that a redesign of an ED to a model that is internationally recognized can result in considerably improved outcomes for patients with associated staff satisfaction. We feel that this approach is feasible in other countries and hospitals.

It should be pointed out that this unique setup has advantages and disadvantages compared with the setup of other units where the obstetrical triage and emergency gynecology units are separated (such as the early pregnancy assessment units in the United Kingdom). An obvious advantage is the provision of holistic care from early pregnancy to the postpartum period, as the staff providing care for early pregnancy complications have a greater appreciation of the implications of bleeding in pregnancy and are involved in pregnancy as a continuum. Another major advantage of this setup is the harnessing and developing of the skills of staff who can continuously cater to the needs of the women.

However, providing a combined service poses considerable challenges to managing women who present with complications, such as miscarriages, ectopic pregnancies, or complications of treatment for infertility. These patients may be affected psychologically when sharing services with those with ongoing pregnancies. To overcome this, the

design was such that those with gynecologic complaints and those with early pregnancy complications were seen in a designated area that, in most cases, avoided contact with pregnant women. ■

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