

## Lessons from the Field

# Improved triage and emergency care for children reduces inpatient mortality in a resource-constrained setting

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**Problem** Early assessment, prioritization for treatment and management of sick children attending a health service are critical to achieving good outcomes. Many hospitals in developing countries see large numbers of patients and have few staff, so patients often have to wait before being assessed and treated.

**Approach** We present the example of a busy Under-Fives Clinic that provided outpatient services, immunizations and treatment for medical emergencies. The clinic was providing an inadequate service resulting in some inappropriate admissions and a high case–fatality rate. We assessed the deficiencies and sought resources to improve services.

**Local setting** A busy paediatric outpatient clinic in a public tertiary care hospital in Blantyre, Malawi.

**Relevant changes** The main changes we made were to train staff in emergency care and triage, improve patient flow through the department and to develop close cooperation between inpatient and outpatient services. Training coincided with a restructuring of the physical layout of the department. The changes were put in place when the department reopened in January 2001.

**Lessons learned** Improvements in the process and delivery of care and the ability to prioritize clinical management are essential to good practice. Making the changes described above has streamlined the delivery of care and led to a reduction in inpatient mortality from 10–18% before the changes were made (before 2001) to 6–8% after.

**Keywords** Child health services/organization and administration; Triage; Emergency medical services/organization and administration; Ambulatory care; Malawi; Developing countries (*source: MeSH, NLM*).

**Mots clés** Service santé infantile/organisation et administration; Orientation patients; Service médical urgence/organisation et administration; Soins ambulatoires; Malawi; Pays en développement (*source: MeSH, INSERM*).

**Palabras clave** Servicios de salud infantil/organización y administración; Triage; Servicios médicos de urgencia/organización y administración; Cuidados ambulatorios; Malawi; Países en desarrollo (*fuentes: DeCS, BIREME*).

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Voir page 318 le résumé en français. En la página 318 figura un resumen en español.

يمكن الاطلاع على الملخص بالعربية في صفحة 319.

## Introduction

Hospitals in developing countries often provide both preventive and curative care together. A model combining an immunization clinic, antenatal clinic and a children's outpatient clinic is common. This allows for opportunistic immunization of children who attend when their mothers are seeking antenatal care, and fewer staff are required to run three clinics together than each clinic separately. But this model fails to address the needs of the critically ill child because triage is difficult. This model also puts infants at

risk of cross-infection from sick children. It may also make it difficult for staff to know where to focus their efforts and attention.

The Queen Elizabeth Central Hospital is a 1100-bed government teaching and referral hospital in Blantyre, southern Malawi. It serves the local district and receives referrals from the southern region of the country. There are 180 paediatric beds. Prior to the changes described in this article, the children's unit treated about 90 000 patients a year, of whom 12 000 were admitted. The

department had a walk-in outpatient and emergency unit called the Under-Fives Clinic, which was housed in an old building that had been converted from garages. The staff consisted of two or three medical assistants, the same number of nurses, one patient attendant, one "home craft worker" (who helped with feeding malnourished children, and counselling) one receptionist and cleaners. Children attended for routine immunizations or for care of acute or chronic medical problems. Trauma was managed in a separate adult casualty

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unit. Most of the children attending the emergency department live within the Blantyre area; 10% of patients are referred from other health units. Inpatient mortality was seasonal and ranged from 11–18% during malaria season to 9–12% during the dry season (Paediatric Department, Queen Elizabeth Central Hospital, unpublished data from routine weekly audits held since 1991). A third of patients who died did so within 24 hours of admission (Paediatric Department, Queen Elizabeth Central Hospital, unpublished data from weekly audits).

## The problems

The Under-Fives Clinic was providing an inadequate service. We analysed the situation and listed several deficiencies. These are summarized below.

- Acute medical services, outpatient services and immunization services were offered in one place. This made it difficult to assess and prioritize children by need.
- Injured children were managed elsewhere.
- Staff in the Under-Fives Clinic were not trained in emergency care or in triage.
- There was no senior supervision in the clinic.
- There were no written protocols or wall charts to help in managing care, and emergency equipment was inadequate.
- Laboratory services, which were based in another building, were slow to provide results.
- There was little space for resuscitation or to offer privacy.
- There were delays in transferring children to the wards and in initiating care.
- There was no observation area and, as a consequence, some admissions were made inappropriately.
- Cooperation between the inpatient and outpatient services was lacking.
- Morale among staff was low.

## Addressing the problems

No funds were available for new buildings or for more staff, so we reviewed our resources and defined our needs. It took 4 years to identify funding to allow us to make changes to the building. The training took 2 weeks initially but is continually updated. Introducing the new scheme for patient flow through the department took 2–3 months.

## Training in triage and emergency care

A senior paediatrician who had management experience in an accident and emergency service reviewed the functions of the department, the training needs of staff and the need for space and equipment. Senior paediatric staff were assigned to provide emergency care and training to other members of staff. The WHO manual *Management of the child with a serious infection or severe malnutrition* served as a standard of care for common emergencies.<sup>1</sup> A training course on emergency triage assessment and treatment (known as ETAT) was developed from this book and taught in our department by doctors with experience in emergency care and in training others to provide emergency care and management.<sup>1</sup> Triage skills were emphasized. The course was held over several afternoons in a modular format so that all staff could attend. Before the intervention, staff were used to working in one assigned area of care; the training covered the need to rotate between duties, to be flexible and to cover for other staff when necessary. Wall charts provided help with decision-making.

## Changes in the physical environment

The head of the paediatric department applied for external grants. Plans for a new unit and a list of required equipment were drawn up. We hoped to include an observation ward, a separate outpatient clinic area and an accident and emergency department that would allow patients to move in one direction through the department without creating any bottlenecks. We also planned to move the admissions unit from near the inpatient wards into the accident and emergency department in order to reduce treatment delays. The European Union and a local charity (the Children's Fund) granted money for the project.

Our new department has a square floor plan. There is a central waiting area (where patients can be observed), and rooms off this central area are used for consultations, investigations, admissions and resuscitation. This design suits a department with a heavy workload and limited human resources. Benches have been used to divide the central waiting area into several sections. These sections serve as waiting areas for subsections of the unit, such as the pharmacy, the

laboratory and the admissions area. Consultation rooms provide privacy for patients. The availability of an oral rehydration room, a theatre for minor operations, storeroom and pharmacy have improved our efficiency. The staff tea room is a centre for communication and for developing team spirit. By having a classroom close to the patients' areas, we are able to offer teaching without losing touch with what is happening in the department. The short-stay (observation) ward prevents many unnecessary admissions. A small laboratory capable of rapidly reporting on the results of malaria thick blood films and haematocrits was opened in the department. The toilets are near the exit, and a storeroom separates them from the working area of the department.

## Patient flow

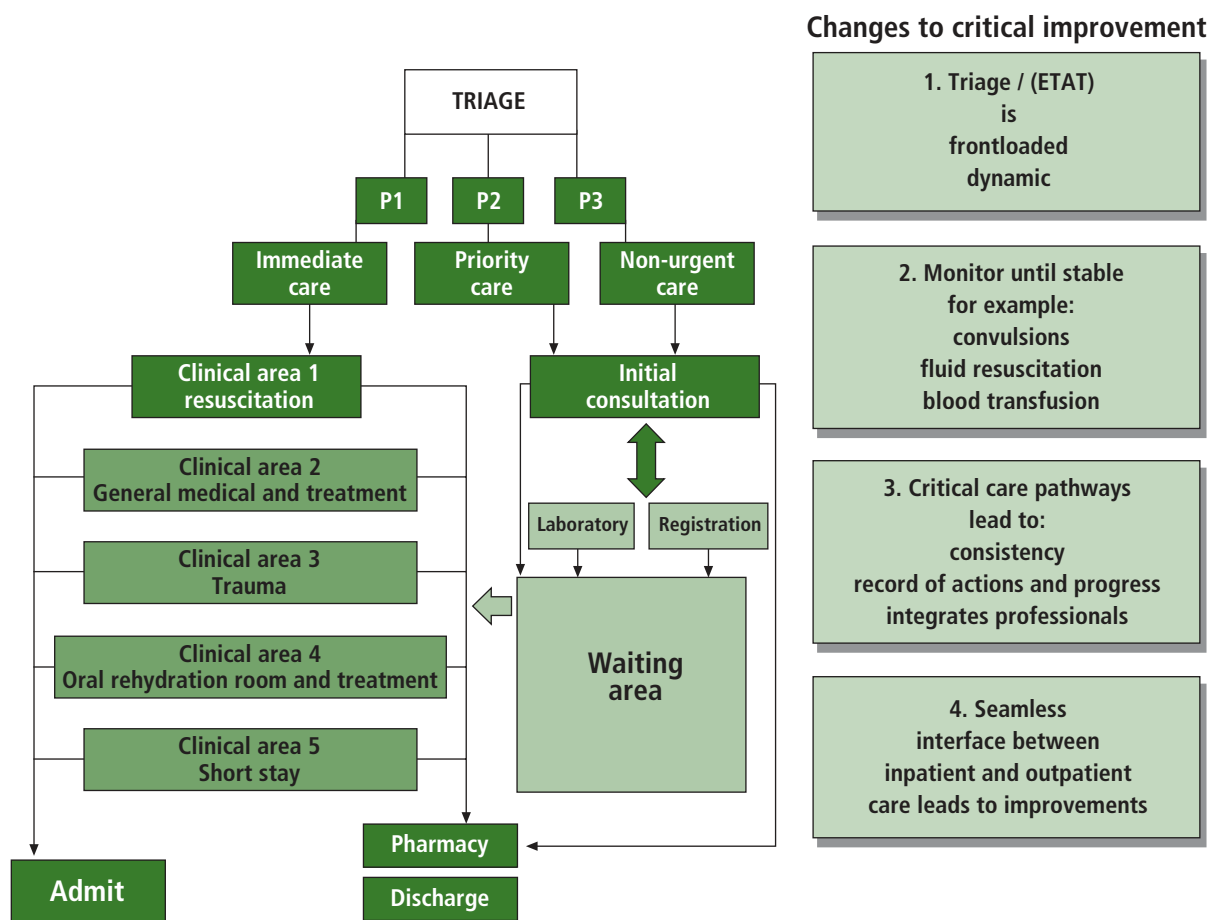
Clear signs within the hospital grounds direct the public to the entrance. On arrival, patients are triaged at the desk near the entrance. The resuscitation room is close to the front door, which is wide enough to allow trolleys and wheelchairs to pass. We try to ensure that experienced staff are on hand at all times for triage. Three triage categories (as described in ETAT)<sup>1</sup> are used:

- P1 – for patients requiring immediate life saving care;
- P2 – for patients requiring urgent care (within about 20–30 minutes);
- P3 – for patients whose needs are not urgent.

All initial investigations and treatments are carried out before the child is referred to a ward for definitive care. Treatments are problem-based, focusing on the severity of illness and not necessarily on a system or diagnosis. When necessary, referral to other specialties is made before the child is transferred to a ward. This speeds up clinical decision-making. If a child's condition is unstable every effort is made to stabilize his or her condition before the child is transferred to a ward. All malnourished children receive rehydration solution for malnutrition while awaiting transfer to the nutrition unit. In cases of life-threatening anaemia, blood transfusions are given in the accident and emergency department. Transfers are not made during the lunch hour because then the number of ward staff is low.

The flow of patients has been designed to allow all attendees to move in a single direction throughout their time

Fig. 1. Flow of patients (P) through the redesigned clinic treating children aged less than 14 years in Malawi



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within the unit (Fig. 1). We have used large differently coloured numbers as signs on doors to enable those who cannot read to follow directions by number or colour.

Patients with minor complaints are assessed by a senior nurse at triage and redirected to their nearest clinic. Many are assessed, treated and discharged at the triage desk. Those who require admission are referred through to the admissions room after routine thick blood film and haematocrit tests. In the admissions room, patients are examined; all documentation is written on a critical-care pathway, and initial treatment is given. Patients then wait in the waiting room to be batch-transferred to the wards. Those who are very sick are taken to the resuscitation room where they are assessed, treated and stabilized; they are transferred only when these steps have been completed. Because patients wait in a central area, staff can keep track of the “floor status” and get an overview of who is waiting and how many patients are waiting in the various sections of

the department. This helps to identify bottlenecks quickly.

We use both management and diagnostic protocols because we have a rapid turnover of both patients and staff.

### Staffing levels and allocation

Before we restructured the department we had too few staff at all levels, so we raised charitable funds to increase their number. The number of nurses was increased from two to five. Nursing staff were made responsible for particular work stations, such as triage and the oral rehydration room, but they are moved elsewhere as the workload dictates. The person in charge of an area checks the stock, whether the equipment functions, and whether the area is clean and staff are available. An experienced emergency clinician supervises the department. On-call ward staff run the admissions room. All senior staff were willing to expand their responsibilities to include supervision of the admissions area and teaching acute care management. Routine immunizations are now provided by local health centres.

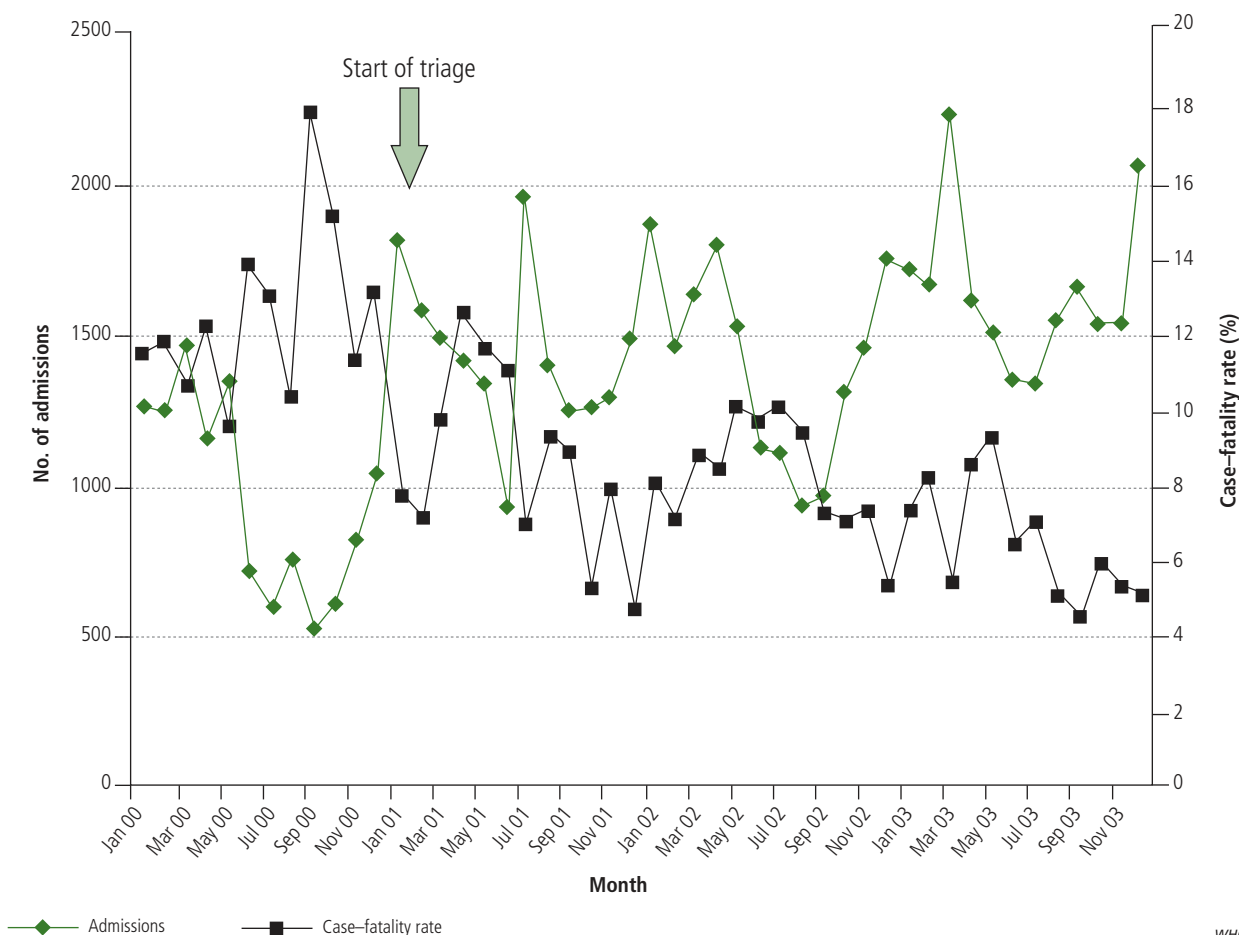
### Monitoring

The workload is reviewed regularly. We record the total number of children seen, and the number of patients who pass through the resuscitation room, theatre for minor operations, the observation ward and the number admitted. At weekly meetings, the whole paediatric department reviews deaths looking at the time since admission, the age of the child and the cause of death.

### Results

Before triage was introduced in the department in January 2001, patients were informally watched by the nurses. In an audit of the department before introducing triage (J Robson et al., unpublished data, 1999), we found that of 250 children seen on one day, 20% were admitted but only 18 had been triaged. The nurses had identified 4 cases of respiratory distress (in young infants), and 12 mothers had sought help for very sick or convulsing children. After the nurses were trained in triage, all children were triaged. All children classified as P1 were

Fig. 2. Monthly admissions and case-fatality rates for children aged less than 5 years, Queen Elizabeth Hospital, Blantyre, Malawi, 2000–03. Triage introduced in 2001



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admitted; 60% of those classified as P2 and 1% of those classified as P3 were also admitted.<sup>2</sup>

Inpatient mortality has reduced from 10–18% per week before the accident and emergency department was opened in January 2001 to 6–8% afterwards, despite a rise in the number of admissions (Paediatric Department, Queen Elizabeth Central Hospital, unpublished data) (Fig. 2) An audit at the hospital has shown that the proportion of deaths occurring within 24 hours of arrival has fallen from 36% before the accident and emergency department opened to 12.6% afterwards. Criteria for admission have not changed.

## Discussion

The principles of our service are applicable to any hospital. These principles are to:

- keep the inpatient and outpatient teams united;
- use a system of triage effectively; and

- keep the flow of patients moving under continuous supervision.

The aim is to treat problems as they are identified and stabilize patients as quickly as possible under the best available conditions. In our large tertiary referral hospital, resuscitation, initial diagnosis and treatment are carried out in the emergency department. In a small hospital it may be that the resuscitation area is best sited in a reserved part of the ward close to the ward sister's office. In this case all resuscitation equipment and

medicines must be ready for use there (Box 1).

We were able to mobilize external resources. The running costs of the department, which include all accident and emergency staff, but exclude the staff costs for the research laboratory, are US\$ 1.75 per patient. Attendances have been reduced from about 90 000 a year to 59 000 a year. This is the result of patients being referred to health centres for non-urgent problems and routine immunizations. Use of the short-stay ward prevents about 800 admissions a year.

### Box 1. Lessons learned

**Triage:** Prioritizing patients by need is vital to providing good emergency care.

**Patient flow:** Timely care and adequate supervision can only be provided if careful thought is given to how patients will move through the department without causing bottlenecks in services.

**Coordination between inpatient and outpatient services:** Ensuring that there is coordination between these two services will allow for provision of a quicker, more efficient and seamless response to sick children.

The use of the oral rehydration room prevents about 850 admissions each year. Having a senior clinician working in the admission area ensures that junior staff make the correct decisions about whom to admit. Thus, we believe there are considerable savings that offset the initial investment. In many hospitals it will be necessary to train staff in emergency care and reorganize patient flow but it should be possible with local resources. WHO has developed training materials for this.

A new building will only be necessary if disjointed services are provided in

crowded and dilapidated conditions, but a new building does allow for a purpose-built reorganization of the system. A simple critical-care pathway helps with quick documentation of clinical notes, serves as a reminder of best treatment, and provides a record by which care and outcomes can be monitored.<sup>3</sup> A critical-care pathway can be modified to take into account a hospital's resources and needs.<sup>4</sup>

### Constraints and further needs

Staffing constraints in our accident and emergency department mean that it

is open only during daytime working hours. At other times children are seen in the adult outpatient department and referred to a ward directly. Staff, as in many government hospitals, are moved annually and so their expertise is lost; constant retraining is required.

Making changes requires commitment and determination. Enthusiastic leadership makes all the difference to initiating and sustaining change. A team spirit must be fostered to help make change sustainable. ■

**Competing interests:** none declared.

## Résumé

### Une amélioration du tri médical et des soins d'urgence lors de l'accueil des enfants a permis de réduire la mortalité hospitalière dans un pays à ressources limitées

**Problème** L'évaluation précoce et la définition de priorités pour le traitement et la prise en charge des enfants malades accueillis par les services de santé jouent un rôle essentiel dans la qualité des résultats obtenus. Dans les pays en développement, nombre d'hôpitaux voient énormément de patients et manquent de personnel, de sorte que ces patients doivent souvent attendre avant d'être évalués et traités.

**Démarche adoptée** L'exemple présenté est celui d'un service pour enfants de moins de cinq ans, surchargé et assurant des consultations externes, des vaccinations et la prise en charge des urgences médicales. Le service fourni par cette unité était insuffisant en raison d'un certain nombre d'admissions injustifiées et d'un taux de létalité élevé. Les carences de ce service ont été évaluées et des moyens ont été recherchés pour l'améliorer.

**Cadre local** Un service de consultations pédiatriques externes surchargé d'un hôpital public de soins tertiaires à Blantyre, au Malawi.

**Changements pertinents** Les principaux changements ont consisté à former le personnel aux soins d'urgence et au tri médical, à améliorer la gestion des flux de malades à travers le département et à développer une collaboration étroite entre les services de soins hospitaliers et ambulatoires. Cette formation a été dispensée en même temps que la restructuration de l'aménagement physique du département. Les changements ont été mis en place lors de la réouverture de celui-ci en janvier 2001.

**Enseignements tirés** Pour parvenir à de bonnes pratiques hospitalières, il est essentiel d'améliorer l'exécution et la dispensation des soins et la capacité à fixer des priorités pour la prise en charge clinique. L'instauration des changements précédemment décrits a permis de rationaliser la délivrance des soins et de réduire la mortalité hospitalière de 10-18 % avant l'introduction de ces changements (soit avant 2001) à un niveau de 6-8 %.

## Resumen

### La mejora del triaje y la atención de urgencias reduce la mortalidad de los niños ingresados en un entorno con pocos recursos

**Problema** La evaluación temprana, priorización para tratamiento y gestión de los niños enfermos que acuden a un servicio de salud son fundamentales para conseguir buenos resultados. Muchos hospitales de los países en desarrollo atienden a un gran número de pacientes y tienen poco personal, de modo que a menudo los enfermos tienen que esperar antes de ser evaluados y tratados.

**Enfoque** Presentamos el ejemplo de un consultorio muy concurrido para menores de cinco años que proporcionaba servicios ambulatorios, de inmunización y de tratamiento para urgencias médicas. El consultorio estaba prestando un servicio inadecuado que se traducía en algunos ingresos inapropiados y una alta tasa de letalidad. Evaluamos las carencias y buscamos recursos para mejorar los servicios.

**Entorno local** Un consultorio de atención ambulatoria pediátrica concurrido de un hospital terciario público de Blantyre, Malawi.

**Cambios relevantes** Los principales cambios introducidos consistieron en formar al personal de atención de urgencias y triaje, mejorar el flujo de pacientes por el departamento y fomentar una estrecha colaboración entre los servicios de enfermos hospitalizados y los servicios ambulatorios. La capacitación coincidió con una reestructuración física del departamento. Los cambios se implantaron al volver a abrir el departamento en enero de 2001.

**Lecciones aprendidas** Las mejoras en el proceso y prestación de atención médica y la capacidad para priorizar el tratamiento clínico son fundamentales para garantizar unas prácticas adecuadas. La introducción de los cambios arriba descritos ha permitido racionalizar la dispensación de atención y conducido a una reducción de la mortalidad de los enfermos ingresados, del 10% - 18% antes de los cambios (antes de 2001) al 6% - 8% observado posteriormente.

## ملخص

تحسين الفرز ورعاية الطوارئ للأطفال ينقص معدلات الوفيات  
بين المرضى الداخليين في المستشفيات في المواقع المحدودة الموارد

التغييرات الملائمة: إن أول التغييرات التي قمنا بها هي تدريب العاملين في تقديم رعاية الطوارئ وفي فرز المرضى، وتحسين تدفق المرضى عبر الأقسام وإنشاء تعاون وثيق بين خدمات المرضى الخارجيين والمرضى الداخليين. وترافق التدريب مع إعادة هيكلة البنية التنظيمية للقسم، ونفذنا التغييرات عند إعادة افتتاح القسم في كانون الثاني/يناير من عام 2001.

الدروس المستفادة: يُعدُّ إدخال التحسينات على العمل وعلى إيتاء الرعاية وعلى التعرف على الأولويات للتدبير السريري من الممارسات الجيدة. إن القيام بالتغييرات المذكورة أعلاه أدت إلى توجيه إيتاء الرعاية في اتجاه موحد وإنقاص معدلات الوفيات بين المرضى الداخليين من 10% - 18% قبل إدخال هذه التغييرات عام 2001 إلى 6% - 8% بعد إدخال التغييرات.

المشكلة: يعد التقييم الباكر والتعرف على الأولويات من الأمور البالغة الأهمية لمعالجة وتدبير الأطفال الذين يقصدون مرافق الخدمات الصحية للحصول على حصائل جيدة. إذ تضطلع الكثير من المستشفيات في البلدان النامية برعاية أعداد كبيرة من المرضى رغم النقص الشديد في العاملين فيها، مما يضطر المرضى للانتظار قبل التقييم والتدبير.

الأسلوب: عرضنا مثالاً لإحدى العيادات المكتظة بالأطفال دون سن الخامسة التي تقدم خدماتها للمرضى الخارجيين والتمنيع كما تقدم معالجة الطوارئ الطبية، ولم تكن العيادات تقدم خدمات تبعث على الرضى مما أدى إلى أن بعض الحالات تدخل إلى المستشفى بشكل غير ملائم مع ازدياد في معدلات وفيات الحالات. وقد قيّمنا مواطن القصور وبجئنا عن الموارد لتحسين الخدمات. الموقع المحلي: عيادات مكتظة للأطفال الخارجيين، في مستشفى رعاية تتبع القطاع العام في إحدى مناطق بلانير في مالواي.

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