Systems Analysis of a Clinical Error

Anne Denison and J. Rush Pierce, Jr.

Systems analysis is an approach used in situations requiring high reliability. In the past, the investigation and prevention of clinical error focused on the actions of individuals. A systems analysis approach to medical errors can identify and correct multiple contributing factors resulting in safer patient care systems. Recent analysis of a clinical error that occurred in public health practice identified multiple factors contributing to its occurrence. The use of the systems analysis approach resulted in high staff satisfaction and creative suggestions for operating a safer clinic and providing better patient care.

Key words: medical error, public health, systems approach

Introduction

As health care and the system that delivers it become more complex, the opportunities for errors abound. Correcting this will require a concerted effort by the professions, health care organizations, purchasers, consumers, regulators and policy-makers. Traditional clinical boundaries and a culture of blame must be broken down. But most importantly, we must systematically design safety into processes of care.

In 1999, the Institute of Medicine (IOM) released a report calling for a comprehensive approach to improving patient safety and reducing medical errors. The report's authors believed that much could be learned from the analysis of medical errors if the focus was shifted from blaming individuals to preventing future errors by designing safety into the system. Other industries have used a systems analysis approach for many years where an extremely high degree of accuracy is demanded, such as the airline and nuclear power industries. Humans are seen as fallible and errors as expected consequences of factors "upstream" of the actual error event. The goal of a systems analysis approach is to identify, correct, and control as many of these factors as possible in order to prevent future errors. The process involves a thorough analysis of any sentinel event, obtaining every bit of useful information possible from a step-by-step investigation. Recently, a clinical error occurred that provided an opportunity to apply a systems approach to the analysis and investigation of a sentinel event in a public health setting.

Background

The City of Amarillo Department of Public Health (DPH) provides screening examinations for all

Anne Denison, RN, BSN, is a Communicable Disease Coordinator, City of Amarillo (Texas), Department of Public Health, Amarillo, Texas.

J. Rush Pierce, Jr, MD, is a Health Authority, Amarillo Bi-City-County Health District, Amarillo, Texas.

refugees settling in Amarillo. The Office of Refugee Resettlement requires these examinations. The cost of the examination is assumed by DPH and subsidized by the Texas Department of Health (TDH). The screening examination consists of a detailed health history, review of overseas health records and X-rays, a general physical examination, vision and hearing examinations, stool examination for parasites, tuberculin skin test, blood test for hepatitis B surface antigen and complete blood count, and other tests as indicated by age or country of origin. These screening examinations are performed for groups of refugees about once per month during a four-hour clinic involving most DPH personnel. In 2000, a total of 234 refugees were screened during 14 clinics. Transportation for refugees to and from the clinic is arranged by a nonprofit organization (NPO), which also arranges for appropriate translators for each clinic. Refugees identified with immunization deficiencies are routinely vaccinated during that clinic. Refugees with medical problems identified during the clinic are referred to appropriate local providers. The DPH provides treatment of parasitic diseases and tuberculosis. DPH has developed written protocols pertaining to the operation of these clinics.

2. Initiate the established investigation procedure using trained personnel.
3. Complete an initial summary outlining a timeline of events and listing obvious patient care problems.
4. Interview staff to verify the information in step 3, elicit additional information, and identify care problems not apparent in the initial summary.
5. Update the initial summary with new care problems and information identified in step 4.
6. Assemble a composite analysis, identifying both specific and general contributing factors.
7. Compile a formal report listing root causes of care management problems and recommendations to prevent recurrence.
8. Disseminate the report to staff for discussion.
9. Implement actions recommended as a result of the investigation.

Using this approach, the patient’s progression through the clinic was analyzed. This allowed identification of system problems or “upstream” factors that ultimately contributed to the commission of the error. They included the following nine events:

1. The clinic flow sheet on the front of the chart indicated that the client was unmarried.
2. The client’s native language was Burmese, and she spoke almost no English.
3. The only Burmese/English translator in Amarillo was poorly qualified and unable to arrive until two hours after the clinic began.
4. The caseworker requested that the refugee be put through the clinic quickly because of conflicting work schedules.
5. The clinic was overbooked with 28 refugees scheduled for evaluation in a period of time reserved for 16 to 18 refugee clients.
6. At initial registration, it was discovered that the refugee was in fact married with a young child, but the information was not corrected on the flow sheet.
7. The pre-clinic medical history forms did not indicate any abnormal health concerns, as pregnancy is not one of the listed health conditions routinely asked about.
8. During the physical examination, the client’s abdomen had a gravid appearance and fetal heart tones were heard with Doppler. These findings were documented in the chart, but no
notation was made on the refugee's flow sheet. The finding of pregnancy was verbalized to the clinic coordinator, but again no notation was made on the flow sheet, and the information was not relayed to the nurse doing immunizations.

9. The immunization nurse did not ask the patient if she was pregnant. While direct conversation with the refugee was difficult due to the language barrier, nonverbal communication also was not attempted. No Vaccine Information Statement (VIS) is available in Burmese.

Discussion

It is all too easy to view errors as isolated incidents. In truth, few errors occur as a result of the actions of a single individual. James Reason² uses a Swiss cheese model to describe how errors occur. In this model, multiple defenses and safeguards exist in every system like slices of Swiss cheese in a stack. Within each system are points of weakness analogous to the holes in the cheese. Most of the time, the random arrangement of these "holes" precludes penetration of an error event. It is only when the holes are aligned that error occurs. Both active failures and latent conditions can cause these weaknesses in the system, and most error events are a result of a combination of both.

Active failures include the "people mistakes." Not following established protocols is one example. In the past, these "people mistakes" were the focus of error investigation within this agency. A responsible employee was identified and counseled, and a report was filed and soon forgotten. There was no systematic effort to identify or correct other contributing factors. The individual singled out for corrective action often suffered considerable emotional distress.

Reasoner emphasized the need to examine the second source of "holes" in the Swiss cheese model (i.e., latent conditions within the system that help to precipitate an event). These include factors such as understaffing, inadequate or malfunctioning equipment, inexperienced or untrained personnel, and workplace design deficiencies that exist independent of individual employees. These factors can create longlasting weaknesses that may lie hidden within the system until analysis of an error brings them to light. Latent conditions that contributed to this error included inaccurate pre-clinic interagency communication, poor internal communication, an overcrowded clinic, inadequate availability of qualified translators, and an unrealistic time frame to complete the medical screening. The analysis disclosed that at least four different people could have prevented the error. These factors became the focus of corrective actions, thus helping to defuse the emotional aspect of individual blame. DPH staff reviewed the analysis and developed several recommendations, which have now been implemented. They included the following six recommendations:

1. Document the date of last menstrual period on clinic flow sheet before administering live virus vaccines to menstruating women.
2. Communicate to the nonprofit agency providing case management services for refugees that clients will be seen subject to the availability of appropriate translators.
3. Arrange with a national translation service to provide back-up translation by phone when in-clinic translators are unavailable.
4. Review pregnancy counseling and vaccine administration during pregnancy by clinic staff.
5. Impose stricter limitation of clinic size to 20 refugees.
6. Analyze on an ongoing basis the appropriateness of varicella antibody testing before varicella vaccine administration.

The staff approached the review of this error with enthusiasm and creativity. They saw it as an opportunity to improve clinic operations and patient care instead of an anxiety-ridden, fault-finding exercise. No subsequent refugee clinic-related vaccine errors have been recognized since these changes were implemented.

Errors rarely occur as a result of a single flaw but as a result of multiple system weaknesses. The use of
a systems analysis approach to identify these weaknesses is increasingly popular since the publication of the IOM report on error in medicine. Various models exist for the analysis of medical error. This error analysis used the Swiss cheese model of James Reason, which was easily adapted to the public health workplace. The incident was used as a learning tool for the staff as well as a basis for changing clinic operations. Hopefully, this experience will result in a safer refugee clinic within this DPH.

Human beings are, and will continue to be, fallible. The goal is to make the system stronger by identifying and correcting weaknesses. Building safeguards into the system will help prevent the random unsafe acts of individuals from becoming medical errors.

REFERENCES
