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Adverse Events in the ICU: Are We Aiming at the Wrong Target?

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Several studies the last decade have revealed that errors and adverse events are common in the ICU. Errors have become the norm rather than the exception in most ICUs—for physicians as well as nurses. Efforts have been made to prevent errors and adverse events from occurring, but evidence showing that preventive measures are effective is scarce.

Experiences from our own ICU have also affirmed that adverse events are common occurrences. Approximately 400 events are reported annually in our 10-bed ICU, with no reduction in incidences during the 10 years we have run our anonymous reporting system for adverse events (Hevroy 1999). The accumulated rate of adverse events is nearly linear in its increase over the years. In spite of targeted efforts from all ICU personnel to reduce errors, this has not occurred. At monthly intervals, we have met to analyse the events, categorise them and made data available for ward personnel as well as for the administration. Recurrent and severe events are regularly discussed in staff meetings, and suggestions for improvement have been implemented. Still the rate of adverse events is nearly unchanged!

"To err is human", a book published by the Institute of Medicine in 2000, triggered a renewed interest in medical error. The title is very accurate; humans are prone to error, not only in medical care, but also in every aspect of life. One needs to look no further than at the statistics for traffic accidents in most countries to exemplify this. It stands to reason that as long as humans care for other humans, errors or unwanted events will occur with regularity and the more complex the environment, the more often errors will occur. We must learn to concede these sad, but nevertheless inevitable facts.

Since human nature is difficult to change (at least within the time available for us) we have to accept the existence of medical errors and adverse events. This does not imply that we should acquire a fatalistic attitude to this problem. In order to achieve improvements we just have to re-focus and approach other goals. We must change the conditions, and the environment where we work, in order to produce an atmosphere of safety. This is not an easy task, since to date, there has been little hard evidence to point to specific actions that really make a difference.

If we cannot beat human nature, what can we do? There are two options: one is to design systems that make us less prone to error, and another important aim is to reduce the consequence of errors. If we cannot prevent an error from occurring in the first place, we may be able to reduce its impact on patients. Before an error reaches a patient and causes harm, there is a chain of events where several defence mechanisms are overwhelmed; often called the "Swiss cheese" model (Ranson 1990). It could also be best illustrated as a chain of domino bricks falling, one causing the next brick to fall if it is unstable or within reach. If we can design more effective defence mechanisms, this might be one important strategy in our struggle against adverse events (or preventing the next domino brick from falling).

Many errors and adverse events are related to drugs and infusion therapy (Valentin 2006). In the age of computerised ICU environments (clinical information systems), it should be possible to design very robust defence mechanisms with the aim of reducing the consequences of drug errors. Drugs prescribed in an incorrect dose could be automatically flagged (if, for example, an inappropriate dose is given according to age or body weight). Nurses could be given warnings by the system about the correct timing of doses and interactions between drugs could be automatically checked. Errors of omissions could also be detected using such a system. For example, if thromboembolic prophylaxis is routine in the ICU, physicians could be warned about an omission after a predefined time (ex. 24 hours). Algorithms for predefined treatment protocols could be incorporated into clinical information systems, and guidance could be offered in order to follow best clinical practice, like use of the sepsis guidelines in the treatment of severe sepsis. In addition, double control (by two independent nurses) of all medications (at least those to be administered intravenously) will decrease the likelihood that the wrong medication or dose is accidentally given to a patient.

By simply focussing more efforts on designing safer systems, we can hope to detect more errors at a stage where they do little harm, or can be counteracted in an efficient way.

ICUs by definition are the ideal environments to develop this concept. Close monitoring of all patients put us in an optimal position where we are able to detect deviations in vital functions at an early stage. Increased use of clinical information systems will further enhance our abilities to improve safety.

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