Online Ethics Center
FOR ENGINEERING AND SCIENCE

A New Dialysis Machine

Author(s)

Sara E. Wilson

Year

2010

Description

An engineer faces trade-offs in the design of new equipment that could greatly affect the final product.

Body

You are an engineer working for a company designing dialysis equipment for worldwide use. You are interested in designing both for economically-developed countries and third-world countries. In economically-developed countries there are working dialysis systems, but your design would be an improvement. In the third-world, access to dialysis equipment is limited.

Choice #1: You have two choices in the design:

- A design using disposable filters that would be replaced with each patient
- A design involving a 100 times more expensive reusable filter that could be cleaned, autoclaved and reused with each patient

Issues:

- Purchase of disposables in the third world is difficult and not typically funded by charitable organizations and government entities that might be willing to purchase or donate the equipment
- The reusable filter would require much more training, autoclaves, and would be more expensive initially (although cheaper in the long-term (after 100 patients))
- The second design, in the hands of untrained personnel, could be more dangerous
- The first design would be more profitable for your company in economically developed countries as hospitals would continue to buy disposable filters
- Manufacturing and FDA approval costs are such that your company can only move forward on one design

Choice #2: Secondary infection is a risk in dialysis. Such an infection in a patient with kidney disease could result in long-term injury and increased risk of death. You have a choice between three designs:

- The first design will have a secondary infection rate of 1 in 1,000
- The second design will have a secondary infection rate of 1 in 1,000,000 and cost 10 times the first design
- The third design will have a secondary infection rate of 1 in 5,000,000 and cost 100 times the first design

Which design will you choose?

Would it make a difference if the design was primarily for the economically-developed countries or for the third-world countries?

Notes

This case is based on issues presented by Dr. Robert Malkin of Engineering World Health at the 2007 ASME Summer Bioengineering Conference, Vail, CO.

Rights

Resource Type

Case Study / Scenario

Topics

Cultural Awareness and Sensitivity
Responsible Innovation
Risk
Social Justice
Sustainability

Publisher

Online Ethics Center