



A New Dialysis Machine

Author(s)

Sara E. Wilson

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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.

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Case Study / Scenario

Topics

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Responsible Innovation

Risk

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