



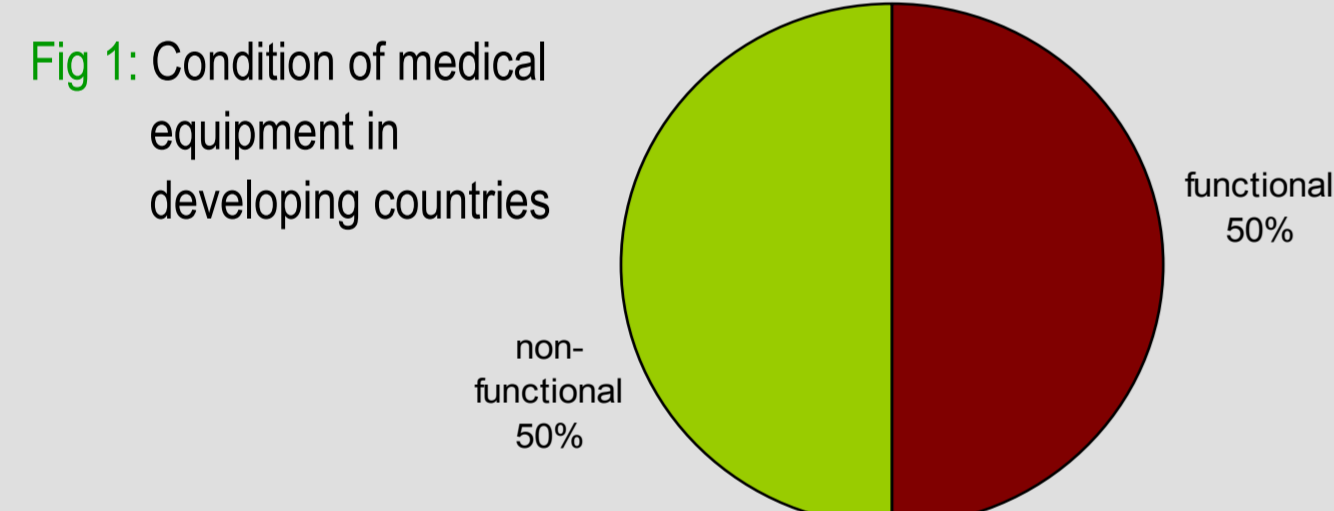
Ismael Cordero, Joao Carlos Langanke Pedroso
ORBIS International

Background

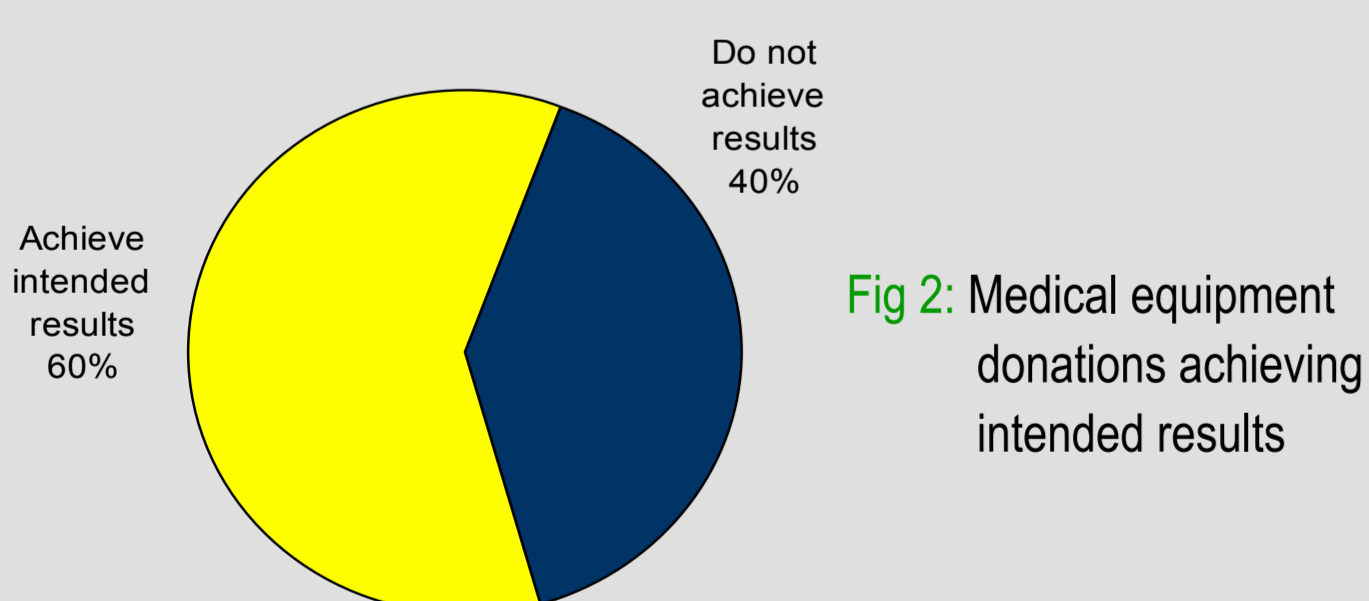
Healthcare technology (HT) includes drugs, devices, and medical procedures used in the prevention, diagnosis, and treatment of diseases, and for their rehabilitation, including traditional medical technologies; the knowledge associated with these; and the organizational and supportive systems within which the care is provided including facilities that house both patients and products; as well as environmental, food and information technologies; and technologies used in health promotion.

Eye care depends heavily on equipment technology, ranging from the very basic, such as an ophthalmoscope, to the very complex, such as a laser system. Regardless of the complexity, this technology needs to be chosen, managed, and supported properly in order to effectively prevent and treat blindness.

Proliferation of technology in many countries has far outpaced the development of their capacity to effectively select, deploy, support, manage and utilize it. A look at of how medical equipment technology is utilized in eye care institutions of developing countries reveals numerous problems that pose severe obstacles on their ability to prevent and treat blindness. According to the WHO, 50% of medical equipment in developing countries is non-functional.



Similarly, the American College of Clinical Engineering (ACCE) estimates that 40% of the equipment donated to developing countries do not achieve the intended results.



Without the correct kind and quantity of properly working equipment, patients either have to forego treatment, wait until the equipment becomes available, or travel to another city, province or country that has the required equipment. This undoubtedly has an effect on the efficiency and effectiveness of eye care providers since equipment downtime translates into decreased patient flow, loss of patient confidence in the health system, and a loss of revenue. Furthermore, unsuitable or poorly maintained equipment exposes patients to elevated risks of safety hazards and negative clinical outcomes.

Analysis of Problem

Challenges of Transferring Technology

Most of the world's health technology is produced in a small number of developed countries. The rest of the countries depend on technology transfer. This process may require changes in the technology, changes in the context to which it is moved, or both. Ophthalmic devices made in developed countries are not always designed for optimal use in developing economies (Fig 3). This problem is compounded by donations of inappropriate equipment which seldom take into account the healthcare needs of the recipients and often pose an additional burden.

Deficiencies in the Management of Technology

Many eye care providers in developing countries do not exercise Healthcare Technology Management (HTM) which is defined as an accountable, systematic approach to ensure that cost-effective, appropriate and safe equipment is available to meet the demands of quality health care. HTM includes: technology assessment, planning and evaluation, procurement, inventory management, equipment maintenance (Fig 4), management of vendors and external service providers, training equipment maintenance personnel and users, and reducing technology-related incidents.

Lack of Stewardship

Even though governmental policies for some constituent elements of HT may be well established, e.g. drug policies, others remain neglected, e.g. infrastructure and equipment. These neglected elements often result in no accountability for effective management (Fig 5) and use of technology assets which leads to inadequate eye care.

Economic Impact is Usually Overlooked

If we were to assume that only 15% of medical equipment in the world is non-functional, the financial loss could be estimated as high as US\$ 12.8 billion globally. However, this problem goes unrecognized and under-reported. As an example, in an African country, a public outcry occurred when in one year drugs worth US\$3 million had to be destroyed because they had expired. At the same time, the stock of unused equipment was around US\$90 million which was generally unnoticed. Failure to take into account the life cycle costs (Fig 6) of owning medical equipment is also a common problem.

Lack of Trained Maintenance Personnel

Developing countries find it difficult to train and retain specialist maintenance technicians. Salaries in the private sector are usually much higher than in the public sector, therefore skilled technicians are lured away from the national health service to work for private enterprises. Rarely are there training and career development programs designed to retain technical maintenance personnel. The training of equipment users (Fig 7) is also an extremely important and neglected area. A study in Switzerland estimated that 60% of equipment failures can be attributed to the misuse of the item by the operator.

Procurement Roadblocks

Highly bureaucratic and centralized procurement departments often do not consult with the users and maintainers of equipment about their needs. This routinely results in inadequate purchases. Additionally, the long wait to obtain spare parts and replacement equipment results in equipment downtime and interruption of service to patients.



Fig 3: Many modern ophthalmic devices made in developed countries, such as phacoemulsification and vitrectomy machines, require expensive single use consumables and specialized factory service



Fig 4: This medical equipment workshop at an African hospital illustrates the low priority given to the upkeep of medical technology assets in many developing countries

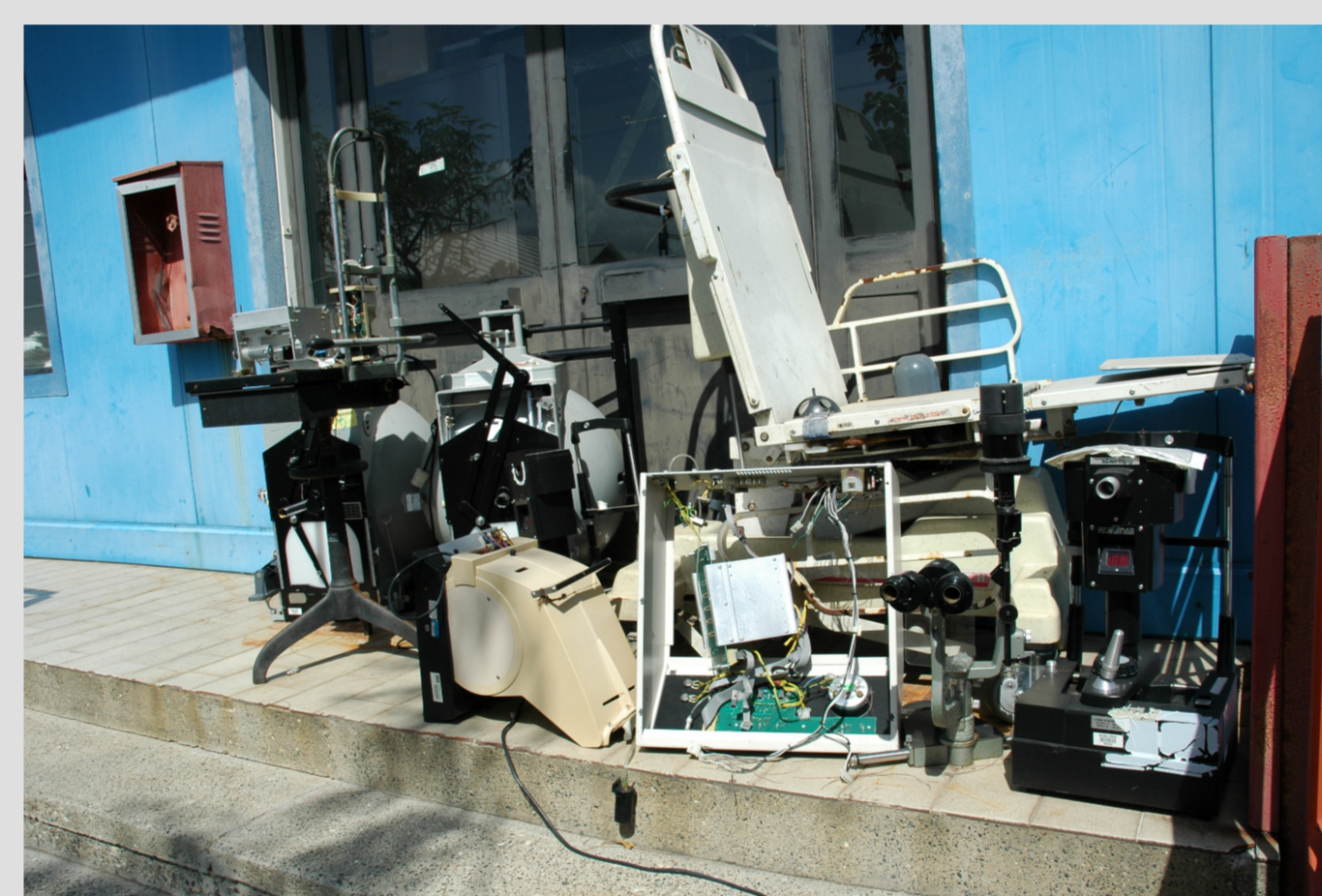


Fig 5: Non-repairable ophthalmic equipment stacking up outside a hospital in the Caribbean because of a lack of a policy and a decision-making process for equipment retirement

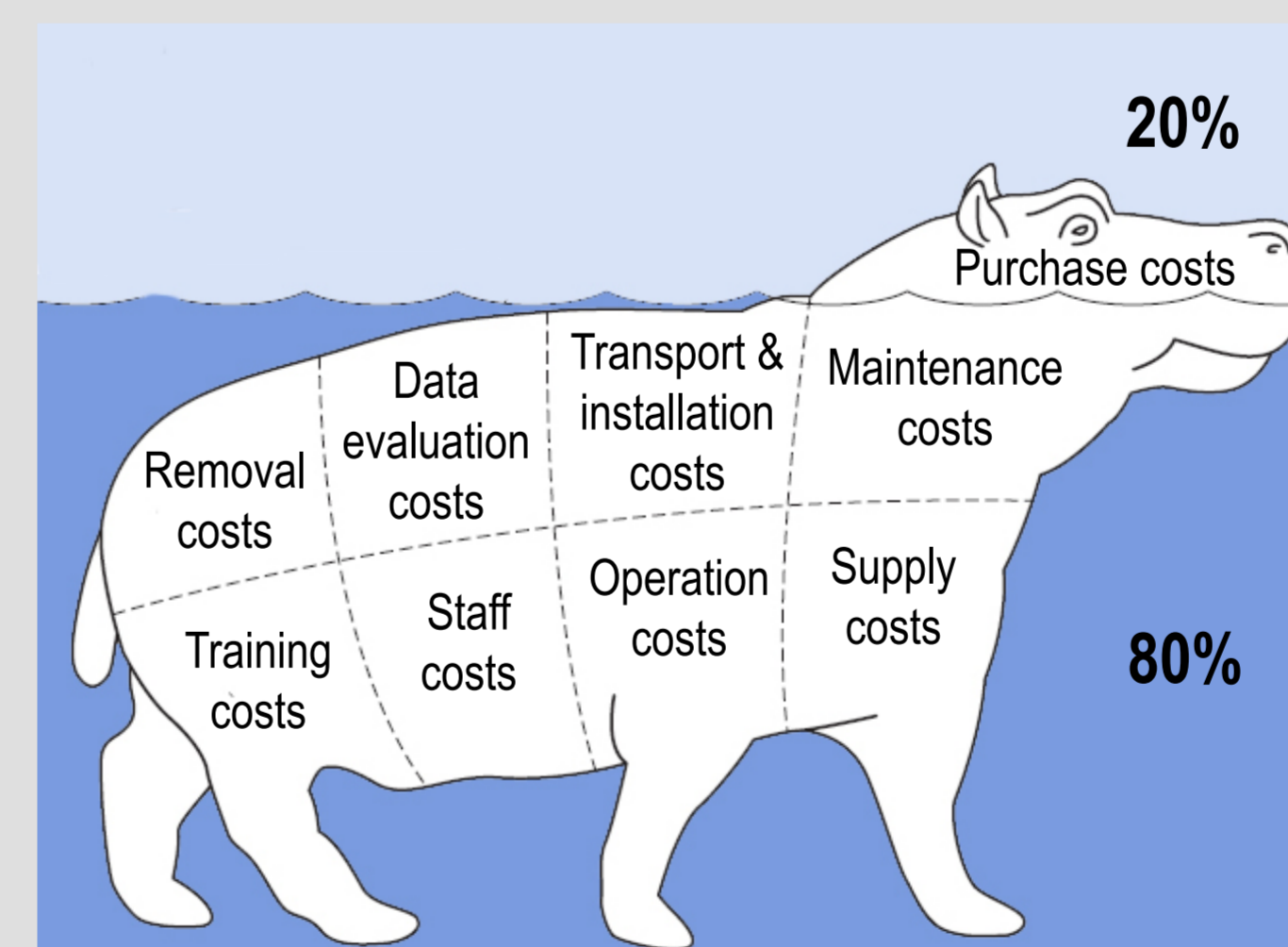


Fig 6: Many health providers do not take into account that the purchase price of medical equipment is only 20 per cent of the life cycle cost of ownership.



Fig 7: ORBIS biomedical engineer Joao Carlos Pedroso provides ophthalmic equipment end-user training for nurses and ophthalmologists

Conclusions

ORBIS, a non-profit, humanitarian organization dedicated to the prevention and treatment of blindness worldwide, believes that building capacity in the area of healthcare technology management is essential to the success of any eye care program.

The lack of properly functioning medical equipment required to diagnose and treat eye problems poses a severe obstacle to the provision of effective eye care services. Eye care providers need to adopt clear strategies and management systems for selecting, procuring, and maintaining eye care technology. This requires multidisciplinary input and participation from policy makers, health administrators, procurement personnel, ophthalmologists, nurses, clinical engineers, and biomedical equipment technicians.

The following are some of the interventions required to improve the poor equipment situation in eye care programs:

- Develop and implement national and institutional healthcare technology policies, guidelines and regulations
- Improve or create formal training programs for technology managers, clinical engineers, biomedical equipment technicians, and end users of all levels
- Design and implement policies, procedures, systems, and guidelines for equipment selection, standardization, procurement and management
- Develop systems for strategically integrating human, facilities, supplies and equipment inputs in a way that improves the outcomes of eye care services in the most cost-effective manner possible
- Establish realistic technology budgets that take into account the life cycle costs of equipment
- Establish and follow clear guidelines for evaluation and acceptance of equipment donations

References

- David Y, and T Judd, 1993, "Medical technology management", BioPhysical Measurement Series, SpaceLabs Medical Inc., Washington, USA, ISBN: 0 9627449 6 4
- Kwankam Y et al, 2001, "Health care technology policy framework", WHO Regional Publications, Eastern Mediterranean Series 24: Health care technology management, No.1, ISBN: 92 9021 280 2
- Remmelzwaal B, 1997, "The effective management of medical equipment in developing countries: A series of five papers", FAKT, Stuttgart, Germany
- Temple-Bird C L, 2000, "Practical steps for developing health care technology policy", Institute of Development Studies, University of Sussex/Ziken International Consultants Ltd, Lewes, UK, ISBN: 1 85864 291 4
- WHO, 2000, "Guidelines for healthcare equipment donations", WHO, Geneva, Switzerland, WHO/ARA/97.3
- WHO, 2000, "The world health report 2000: Health systems - Improving performance", WHO, Geneva, Switzerland, ISBN: 92 4 156198 X

Further Information

Ismael Cordero
Healthcare Technology Specialist
ORBIS
520 8th Avenue
New York, New York 10018
USA
Tel: 646-674-5511
Fax: 646-674-5598
Email: ismael.cordero@orbis.org
Web: www.orbis.org