The Cardiothoracic Outreach Programme — a pilot project

M. Klein, S. P. Ramoroko, A. G. Jacobs, M. D. Bomela, K. P. Mokhobo, M. L. Mohlala

Objective. To test the practicality, safety and benefits of major cardiothoracic surgery in two rural hospitals.

Design. Analysis of morbidity and mortality outcomes of a random collection of 35 patients, who underwent diverse surgical procedures. At each visit, the cardiothoracic team of Ga-Rankuwa Hospital — one surgeon, three registrars, two medical officers, six nurses, and four perfusionists — moved all equipment for major surgery, including bypass machines, to two small rural hospitals. Ga-Rankuwa Hospital, as a tertiary hospital attached to a medical school (Medical University of Southern Africa), mounted an outreach programme on a trial basis. The exercise was designed to render assistance, offer decentralised services, and test the skills of the cardiothoracic team in an environment where high-technology procedures have never been undertaken by the local health professionals.

Setting. Two rural hospitals, viz. Tintswalo and Mankweng, in the referral area of MEDUNSA, with no conventional ICU facilities. The support services for operative, pre-operative and postoperative care were very basic. The local personnel consisted only of general nurses and medical officers. None had experience of high-technology or complex theatre work.

Participants. Thirty-five randomly selected patients of both sexes with ages ranging from 11 years to 64 years. Pre-operative diagnoses of diverse cardiac and lung conditions were made. The operations performed comprised 35 major procedures, including open heart operations and major lung procedures. The personnel comprised the MEDUNSA cardiothoracic team, who were assisted by local nurses.

Intervention and outcome. Thirty-five patients underwent 35 major procedures, all under general anaesthesia. Twenty cardiopulmonary bypasses were performed. There was 1 intra-operative death, due to low-output state. Intra-operative morbidity occurred in 2 of the 35 operations. These consisted of a cerebrovascular accident (CVA) (air embolism), and a temporary heart block. Late outcomes (after 1 week) were also analysed; the incidence was 1/35 operations. This was a CVA due to a left atrial appendage clot. Staff morale at the local hospital improved remarkably. The process of teaching the local professional nurses was surprisingly easy. Benefits included a decreased referral rate (100%), lower costs (transport, medicines, operations), excellent patient and community confidence in the work of the hospitals (increased hospital outpatient numbers), and political support (new tools, upgraded facilities and new equipment).

Results. The exercise was a resounding success in both measurable and general terms. All operations were successfully performed, with very low adverse outcomes (morbidity, mortality) and good quality of life for all the subjects. The safety and cost-effectiveness of cardiothoracic surgery under primitive conditions were demonstrated. The standard of patient care improved, and local staff acquired good basic skills in patient care. The referral patterns changed for the better and the confidence of the community in the services was enhanced. The risk/benefit ratio of the exercise was commendable. The feasibility of an extended service was encouraging.


Ga-Rankuwa Hospital, the major teaching hospital of the Medical University of Southern Africa, has to date been the main referral centre for 43 peripheral hospitals in the former Northern, Eastern and part of the Western Transvaal, and serves a population in excess of 5 million people. It is a 1 000-bed regional centre with university departments in all the major specialties. For practical reasons, two hospitals were chosen for the Cardiothoracic Outreach Programme, Tintswalo and Mankweng hospitals. Tintswalo Hospital is a rural 400-bed hospital in the Acornhoek region of Mpumalanga, and serves a total population of approximately 300 000 people. Mankweng is a 410-bed community hospital located in the north-east part of Pietersburg.

Although urbanisation and its attendant health problems are increasing, a significant proportion of the black population still lives in rural areas. Specialist medical services in South Africa are concentrated in the urban areas, and primary health care and community hospital services are poorly developed. The majority (77%) of medical practitioners reside in metropolitan areas where the ratio of doctors to members of the population is 1:696; the doctor/population ratio increases to 1:30 449 in some rural areas, e.g. Northern Province. Failure to redress these imbalances will have serious implications for the present and future rendering of an acceptable and equitable health service. Various strategies to attract doctors to peripheral areas are being considered, including financial and other incentives as well as compulsory service, but these proposals have, to date, only been debated (by all stakeholders, including the Medical Association of South Africa), and not implemented.
Health professionals who work in the peripheral hospitals are isolated and have to deal with a wide variety of clinical conditions for which they may have inadequate training or expertise. There is also a large turnover of medical staff in peripheral hospitals (J. Plenaar — personal communication), many of whom are foreigners and may be unfamiliar with local conditions and languages. The referral of patients is often unselected and inappropriate, leading to unnecessary expense and inconvenience. Patients are transferred over long distances to tertiary centres, and are treated in ‘foreign’, usually unfriendly, environments in the major centres in the cities, far away from their homes and families. Their home language may not even be spoken in the referral centre, making effective communication difficult and compromising patient care. Although epidemiological data are insufficient, there is a heavy workload placed on the curative services of secondary and tertiary institutions. There is a high incidence of infectious diseases, e.g. tuberculosis and rheumatic heart disease, in rural areas. Although such patients initially require primary health care, the standard of specialist care in these areas is of ongoing concern. This pilot project was motivated by the need to take effective, practical, cost-effective high-technology service to the rural communities.

**Subjects and methods**

The Cardiac Outreach Programme was initiated in May 1994 by the Department of Cardiothoracic Surgery at MEDUNSA and Ga-Rankuwa Hospital. A preliminary visit to Tintswalo Hospital was undertaken to conduct a clinic and to assess the suitability of local facilities. The team consisted of a consultant thoracic surgeon, an anaesthetist, registrars in both the departments of Thoracic Surgery and Anaesthesiology, thoracic theatre scrub sisters, intensive care unit staff and perfusionists, all from MEDUNSA. All the necessary equipment was transported without incident in a truck supplied by the Ga-Rankuwa Hospital administration. The programme has to date involved five operative excursions to Tintswalo Hospital, where altogether 20 major procedures were undertaken (Table I). Diagnostic procedures under general anaesthesia are not included here. There were no intra-operative deaths. At each visit, a clinic is held where patients are presented by the local doctors. Decisions on management are made and those patients requiring major operations are then formally scheduled.

**Table I. Major operations undertaken at Tintswalo Hospital**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic and mitral valve replacement</td>
<td>2</td>
</tr>
<tr>
<td>Mitral valve replacement</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Mitral valve repair</td>
<td>2</td>
</tr>
<tr>
<td>Atrial septal defect</td>
<td>1</td>
</tr>
<tr>
<td>Aortic valve replacement + VSD repair</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Aortic valve replacement</td>
<td>2</td>
</tr>
<tr>
<td>Decortication</td>
<td>1</td>
</tr>
<tr>
<td>Oesophagotomy</td>
<td>2</td>
</tr>
<tr>
<td>Repair (right-sided) Bochdalek hernia</td>
<td>1</td>
</tr>
<tr>
<td>Excision — pericardial cyst</td>
<td>1</td>
</tr>
<tr>
<td>Left upper lobectomy (inflammatory)</td>
<td>2</td>
</tr>
</tbody>
</table>

Bracketed figures indicate patients who died postoperatively.

The Pietersburg exercise involves a monthly visit to Pietersburg General Hospital where a thoracic clinic is held. Operations, however, are undertaken at nearby Mankweng Hospital. At Mankweng Hospital 15 major operations were performed (Table II), including diagnostic procedures under general anaesthesia. There was 1 early death in this group following a double valve replacement. This patient had a postoperative hypotensive and hypoxic episode resulting in brain damage and subsequent death 2 weeks postoperatively. The rest of the patients had an uneventful postoperative course. The cardiothoracic team supervises the entire postoperative management of cases and also co-opts some of the local doctors into the postoperative management.

**Table II. Major operations performed at Mankweng Hospital**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic valve replacement</td>
<td>3</td>
</tr>
<tr>
<td>Mitral valve replacement</td>
<td>1</td>
</tr>
<tr>
<td>Double valve replacement</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Oesophageal resection (achalasia)</td>
<td>1</td>
</tr>
<tr>
<td>Decortication</td>
<td>1</td>
</tr>
<tr>
<td>Hydatid cyst (bilateral)</td>
<td>1</td>
</tr>
<tr>
<td>Mediastinal tumour (thymoma)</td>
<td>1</td>
</tr>
<tr>
<td>Diaphragmatic hernia (traumatic)</td>
<td>1</td>
</tr>
<tr>
<td>Eventration of the diaphragm (left) (child, 2 yrs)</td>
<td>1</td>
</tr>
<tr>
<td>Decortication (right) — trauma</td>
<td>1</td>
</tr>
</tbody>
</table>

Bracketed figures indicate patients who died postoperatively.

**Discussion**

The outcomes of the exercise can be assessed from a social, political, economic and clinical perspective. There is no doubt that it is preferable to treat patients as close to their homes, families and support structures as possible. We have shown that this can be done safely, despite limited support and infrastructure. This reduces the patient’s expense and inconvenience and is advantageous for the patient’s physical and psychological well-being. It is not easy to assess precisely how cost-effective such a programme is. It is logical, however, that expenses can be reduced by treating patients at their local hospitals, thereby decreasing the number of referrals to distant major centres and, as a result, reducing hospitalisation and transportation costs, as well as the accommodation costs for the relatives. The results of this programme have vindicated this view. In addition, there are benefits that cannot readily be quantified; these include the patient’s physical well-being, and improvement of the morale and continuing education of the staff working in peripheral areas.

Most importantly, there are the benefits of developing the infrastructure of health service in these areas, as has happened in this case. The patients are offered the same high standard of expertise and care at both central and peripheral hospitals.

Our programme achieved this at no cost in terms of morbidity and mortality. The appropriateness of performing certain procedures, especially open-heart surgery, in rural hospitals may be questioned, however, except under special circumstances. There is a strong argument, both economic and clinical, for certain procedures to be performed in centralised regional units only. This pilot project shows that
major thoracic surgery can be performed safely in a rural hospital, provided the necessary facilities, equipment, trained personnel and expertise are available, or can be transplanted with enthusiasm and care. This study suggests that surgery can be performed in other disciplines in rural hospitals.

There are several advantages from the Cardiothoracic Outreach Programme. It supports patients and raises staff morale in rural hospitals, and is welcomed, appreciated and enthusiastically supported. It gives rural doctors the opportunity to discuss clinical problems with specialists at these clinics at regular intervals and also to witness complex procedures and high-technology operations. Continuing medical education augments clinical skills and helps improve clinical evaluation and decision-making. Communication links are established between personnel that assist in further exchanges of information and better patient care. In addition, the medical staff from the referral centre is exposed to problems and conditions in the rural area, and this helps them understand the difficulties faced by both doctors and patients in these areas. The workload placed on the referral hospital may be reduced, to the advantage of patients and health workers. At this stage, the disadvantages of the programme are the transportation of staff and equipment to these areas without mishap, until such time as permanent facilities are established in these hospitals.

Conclusion

South Africa requires a comprehensive and integrated national health service, comprising primary, secondary and tertiary health care facilities. The problem is how to deliver an acceptable, accessible, affordable and equitable health service in the rural areas of South Africa. Primary health care is seen as a panacea for preventing illness and creating a healthy society, but this is an unrealistic expectation. Greater emphasis on primary care is necessary, but it should complement secondary and tertiary care, rather than be a substitute.

What is required is the introduction of innovative and perhaps novel ideas that could well yield substantial improvements to the existing health system. Some solutions include a flying doctor service, and the use of technology such as a computer network and cellular communication to extend capabilities and make medical services more equitable. These proposals, however, have many limiting factors. The standard of health care in the peripheral areas may not be improved any further, the infrastructure of the health services may not be developed; a referral system is only as good as the quality of knowledge of the personnel who work in it and may not be better than it currently is. Some universities currently send out staff members and several medical specialties to rural hospitals and, in this way, make a small contribution by providing some academic stimulation for medical staff, facilitating access of rural patients to tertiary care and providing rural specialist clinics. What is required is a commitment from the universities, the government, the College of Medicine of South Africa, MASA and the Interim National Medical and Dental Council to fulfill their service obligations to rural communities, by incorporating peripheral hospitals into teaching hospital programmes through exchange and rotation of staff and finding solutions to keep doctors in the country and in the public health service, especially in the rural areas. The Cardiothoracic Outreach Programme is the beginning of such an exercise.

Only by the decentralisation of specialist services will the infrastructure of the health service be developed and rural communities' access to the health services improved. Such an undertaking requires the conviction and commitment of the government and the Department of Health to provide the resources and incentives to establish such centres. Accurate demographic and epidemiological information on the health needs and resources in rural areas is required so that rational and appropriate planning and development can be undertaken. This pilot project hopes to motivate for the development of a satellite regional/sub-regional thoracic unit in the Northern Province and Mpumalanga. This will help alleviate the current transportation and communication problems as well as financial problems associated with the transfer of patients to distant major specialist centres.

We would like to acknowledge the support of Drs L. van Heerden, M. E. Moolman and J. Pienaar, the superintendents of Ga-Rankuwa, Pietersburg and Tshingwalo hospitals respectively, who facilitated this pilot project. We would also like to express our sincere gratitude and appreciation for the immense material and financial support offered to us by MEDUNSA and Ga-Rankuwa Hospital.

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