Support Services

Evaluation of rural ambulance services
Jane Doherty & Max Price

The evaluation of ambulance services in a rural area of South Africa is described. The approach is affordable and could be applied in other countries. As well as providing valuable information it involves health workers in planning, motivates them to improve service delivery, and lends support to their requests for increased resources.

Referral and transport systems are vital for the functioning of primary care services in remote communities of developing countries. Rural ambulance services should be carefully planned on the basis of sound information obtained in such a way as to avoid placing an undue burden on the health system.

In South Africa an evaluation of ambulance services was conducted during 1990 as part of a wider review of health services in a region of south-east Transvaal, now Mpumalanga Province, with a population of 950000 (1). Good roads connected a few towns in the region but elsewhere there were dirt roads. Under the apartheid regime, now defunct, the region included the former homeland of KaNgwane, in which the health services were divided into three districts, each with a community hospital and associated primary care clinics. Ambulances, based at the hospitals, responded to calls that came mainly from clinics but also from members of the community, or transferred patients to a tertiary hospital about 350 kilometres away. Radiophones provided the principal means of communication between clinics and the ambulance services. Buses and taxis were available as alternative means of transporting patients to hospital. The ambulance services in an adjacent “white” area, run by a separate authority, were much superior.

The aim of the evaluation was to describe the overall effectiveness of provision in the homeland in terms of ambulance availability and service cost. The factors that it was considered desirable to investigate are indicated in the box overleaf. Although constraints of time and finance prevented a detailed examination of the quality of care received by individual patients, it was possible to make some deductions concerning this matter.

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Issues relevant to evaluation of rural ambulance services

- Adequacy of ambulance design
- Adequacy of medical, communications and vehicle repair equipment carried by ambulances
- Adequacy of petrol supply
- Speed of response to calls
- Use of ambulances for non-emergency purposes as opposed to use in emergencies
- Arrangements for patients when no ambulance is available
- Referral patterns and mode of transport for referral
- Staff training
- Quality of care
- Labour relations
- Running costs and factors contributing to them
- Procedure for purchase and maintenance of vehicles
- Constraints, e.g., hilly terrain, bad roads
- Differences in services between rural and urban areas

Data collection

Because the ambulance services were under-resourced and had a poor information system it was decided to use a combination of methods with a view to arriving at a fairly comprehensive picture of the situation. At least 10% of each set of ambulance-related records for the calendar year preceding the evaluation were examined (see table). Where possible, data from different sources were studied to see whether they were accurate, complete and comparable.

The review of records did not provide information on:

- the characteristics of patients who required to be transported by ambulance;
- the time between a nurse’s request for an ambulance and its arrival at her clinic;
- alternative arrangements in the event of an ambulance not being readily available.

Such information was gathered with the help of simple self-administered questionnaires in the form of clinic diaries, which were distributed to all clinics in the study area together with an introductory letter and a list of instructions. The questionnaires were also explained to nurses at workshops. Information was recorded by the nurses for a month. Data that had been routinely recorded in ambulance logbooks were also used. For purposes of comparison and validation, abridged information was also noted in diaries held by radiophone operators based in hospitals. Providers at all levels were interviewed about their perceptions of the problems confronting the ambulance services and about possible solutions.

With the help of simple checklists, inspections were made to ascertain the condition and design of ambulances and the availability of medical, communication and vehicle maintenance equipment. In fact the ambulances were converted minibuses and were not fitted with any medical equipment. In areas where ambulances are more sophisticated a detailed inventory of the
Useful sources and types of data in a review of ambulance records

<table>
<thead>
<tr>
<th>Source of data</th>
<th>Type of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambulance logbooks</td>
<td>Dates, mileages, departure and arrival times, places of departure, destinations, purposes of trips, petrol and oil consumption, number of services and repairs, life span of ambulances and days operative (i.e., days when available to respond to calls)</td>
</tr>
<tr>
<td>Rail warrant books</td>
<td>Numbers and destinations of patients and escorts referred by train instead of ambulance</td>
</tr>
<tr>
<td>Monthly salary printouts</td>
<td>Salaries, benefits, bonuses and overtime pay of ambulance-related staff (including nurse escorts)</td>
</tr>
<tr>
<td>Financial records</td>
<td>Fees collected from patients for transport by ambulance</td>
</tr>
<tr>
<td>Duty registers</td>
<td>Numbers of hours worked by ambulance staff, including overtime</td>
</tr>
<tr>
<td>Personnel files</td>
<td>Qualifications and experience of drivers</td>
</tr>
</tbody>
</table>

These indicators and the qualitative data allowed the situation to be described fairly comprehensively. Thus, for example, there were two ambulances per 100,000 population and the revenue amounted to 5% of running costs. The pinpointing of resource and management limitations helped towards proposing strategies for service development, even though there was no possibility of examining measures of outcome such as lives saved or the degree to which unmet need was reduced.

Costs relating to vehicles were calculated from data on mileages, numbers of trips, petrol and oil consumption, and wear and tear. Those relating to ambulance staff were worked out on the basis of information on hours worked, the percentage of trips on which there was an accompanying nurse, and salaries. Costs were expressed in their totality and per kilometre, hour and trip. Revenue in the form of fees charged to patients for the use of the ambulance services was taken into account.

Analysis

The quantitative data were used to calculate:

- input indicators (relating to vehicles, personnel, equipment and per capita expenditure);
- process indicators (relating to general policies and procedures, staff relations, vehicle utilization, speed of response, petrol supply, repairs, maintenance, revenue, costs, first aid and other matters);
- an outcome indicator (percentage of cases transported unnecessarily).

Recommendations

A draft report of findings was circulated to all personnel involved in the ambulance services, ranging from drivers to planners, and to community representatives. A workshop attended by the same people produced recommendations that were incorporated into the final report of the research team. These recommendations...
dealt not only with the need for increased resources, but also with:

- cost reduction, for instance by shortening response times and equipping ambulances with radiophones;
- alternative referral arrangements with a nearby regional hospital that had been segregated under the apartheid system;
- the user fee structure for ambulances;
- alternative forms of transport for patients not needing emergency care;
- centralization of emergency transport under a regional authority.

Nevertheless, it was possible to piece together reliable information from the range of sources used. The collection of qualitative information from staff through informal contacts and formal interviews complemented the quantitative findings and helped to place them in context. The inclusion in the research process of the providers who were closest to the ambulance services, namely the drivers and clerks, was advantageous because, in general, they were more aware of shortcomings than were the senior administrators.

By gathering quantitative and qualitative data it proved possible to evaluate underresourced ambulance services with a relatively poor information system. A comprehensive approach made it possible to overcome the difficulties presented by incomplete and inaccurate data and to offer useful recommendations. It is important to undertake evaluations of this kind, as properly functioning ambulance services are vital for the sustainability and quality of primary care, especially in rural locations.

In the present study the authors inevitably came into contact with service personnel on a daily basis, and this helped to bring about the participation of health staff in workshops and other aspects of the research process. Evaluation was both feasible and affordable, and the methods that were employed could probably be applied in other countries, especially if used by health personnel rather than by researchers from outside institutions. In-house evaluation would encourage the constructive use of records and help to improve the effectiveness of staff. The methodology could, of course, be simplified to reduce costs or expanded to heighten reliability.
Acknowledgements
Gratitude is expressed to the ambulance services and the clerical and managerial staff of Themba, Emphuleni and Shongwe Hospitals in the former homeland of KaNgwane, and to personnel of the Nelspruit and Barberton emergency services operating in the surrounding areas, for generously assisting with the collection of data and participating in the formulation of recommendations.

Reference

Referral of severely ill children

The core of the Integrated Management of Childhood Illness (IMCI) strategy, and the first intervention to be made available to countries, is a set of guidelines for integrated case management of the five most important causes of childhood deaths – acute respiratory infections (ARI), diarrhoea, measles, malaria and malnutrition – and of common associated conditions, in outpatient settings.

Training health workers to identify and refer severely ill children to hospital can have a substantial impact on childhood mortality if adequate treatment is received in hospital. A key consideration in developing the IMCI guidelines was that they should be safe. This meant reducing to a low level the number of children who need potentially life-saving treatments that are only available in hospital, but who are not referred. To achieve adequate sensitivity in detecting severely ill children who require referral, criteria must be used that inevitably lead to some children being referred unnecessarily.