National audit of critical care resources in South Africa – transfer of critically ill patients

Juan Scribante, Sats Bhagwanjee

Objectives. To establish the efficacy of the current system of referral of critical care patients: (i) from public hospitals with no ICU or HCU facilities to hospitals with appropriate facilities; and (ii) from public and private sector hospitals with ICU or HCU facilities to hospitals with appropriate facilities.

Design and setting. A descriptive, non-intervenive, observational study design was used. An audit of all public and private sector ICUs and HCs in South Africa was undertaken.

Results. A 100% sample was obtained; 77% of public and 16% of private hospitals have no IC/HC units. Spread of hospitals was disproportionate across provinces.

There was considerable variation (less than 1 hour - 6 hours) in time to collect between provinces and between public hospitals that have or do not have ICU/HCU facilities. In the private hospitals, the mean time to collect was less than an hour.

In public hospitals without an ICU, the distance to an ICU was 100 km or less for approximately 50% of hospitals, and less than 10% of these hospitals were more than 300 km away. For hospitals with units (public and private), the distance to an appropriate hospital was 100 km or less for approximately 60% of units while for 10% of hospitals the distance was greater than 300 km.

For public hospitals without units the majority of patients were transferred by non-ICU transport. In some instances both public and private hospitals transferred ICU patients from one ICU to another ICU in non-ICU transport.

Conclusion. A combination of current resource constraints, the vast distances in some regions of the country and the historical disparities of health resource distribution represent a unique challenge which demands a novel approach to equitable health care appropriation.

Methodology

Approval to conduct the study was obtained from eight universities, the appropriate health authorities including the Department of National Health, the Surgeon-General of the South African Defence Force, respective provincial health departments and private hospital groups. Approval was thereafter obtained from the respective hospital managements before proceeding with the study.

A descriptive, non-intervenive, observational study method was used. A structured telephone interview for hospitals without an ICU or HCU was undertaken. An audit of all public and private sector ICUs and HCs in South Africa was undertaken.

For hospitals with units (public and private), the distance to an appropriate hospital was 100 km or less for approximately 60% of units while for 10% of hospitals the distance was greater than 300 km.

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and the information was obtained from the CEO of the hospital or the nursing service manager. The medical director, nursing unit manager or nursing service manager completed the questionnaire. Completed questionnaires were reviewed by one of two researchers.

The objective of this phase of the audit was to: (i) establish the efficacy of the current system of referral of critical care patients from public hospitals with no ICU or HCU facilities to hospitals with appropriate facilities; and (ii) establish the efficacy of the current system of referral of critical care patients from public and private sector hospitals with ICU or HCU facilities to hospitals with appropriate ICU facilities.

Strict anonymity was ensured at all times and International Conference on Harmonisation (ICH) guidelines for good clinical research practice were adhered to. A detailed description of the methodology is discussed in a separate paper.7

Results

The mode of transport is reported as follows: (i) ICU transport is a suitably equipped vehicle (including fixed and rotary wing aircraft) with critical care trained para-medical staff; (ii) non-ICU transport is an ordinary ambulance, or hospital or family vehicle.

A 100% sample was obtained. Of the public sector hospitals 77% (304/396) do not have ICU/HCU facilities compared with 16% (40/256) in private hospitals. The spread of hospitals was disproportionate across the provinces (Table II).

In Gauteng and the Northern Cape the average time to collect was an hour or less for both categories of hospital (Table III). In Limpopo and the SANDF, time to collect was less than an hour for hospitals that have ICU/HCU facilities. In all other provinces the time to collect exceeded an hour and was the longest in the Eastern Cape (6 hours). There was considerable variation between provinces and between hospitals that have or do not have ICU/HCU facilities (Table IV). In the private sector hospitals, the mean time to collect was less than an hour for all groups and in all provinces with a range of 0.6 - 0.9 hours.

In the group of public hospitals without ICU, the distance to a hospital with facilities was 100 km or less for approximately 50% of hospitals (Fig. 1). The distance to facilities was more than 300 km for less than 10% of hospitals. For hospitals with units (public and private), the distance to an appropriate hospital was 100 km or less for approximately 60% of units while for 10% of hospitals the distance was greater than 300 km (Fig. 2).

For public hospitals without units in all the provinces (except Gauteng), the majority of patients were transferred by non-ICU transport (Fig. 3). Hospitals with ICU facilities transferred patients primarily with ICU transport (Fig. 4). Both public and private hospitals transferred ICU patients from one ICU to another ICU in non-ICU transport in some instances. Public sector hospital ICUs in the Northern Cape only transferred by means of non-ICU transport.

Comments that were made by participants on two or more occasions are listed in Table IV. The comments emphasise the lack of resources and inefficient use thereof.

Discussion

Intensive care should start before the patient is admitted to ICU. Critically ill patients should be transferred to the most

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Table II. Hospital facilities by province

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Table III. Average time to collect by province

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procedures are neither centralised nor standardised. Each
clinical and critical clinical adverse events among paediatric
related adverse events and outcome of transferred patients.
period of time.
appropriate ICU in the most effective manner in the shortest
province functions independently and there are vast differences
between the public and private sectors. A centralised system
of patient transfer has been shown to be safe and effective.8,9
The time from request to collection from the transferring
hospital varies throughout South Africa and does not reflect
the total time of the critically ill patient’s transfer. Delayed transfer
to ICU negatively influences morbidity, mortality, length of
ICU stay and scarce resource utilisation.10,11 The current practice
of inter-unit transfer is inappropriate, particularly where
resource constraints exist.

The distance that patients are transferred is regarded as an
independent risk factor for mortality in transferred patients.12
A significant percentage of patients are transferred more
than 100 km and even in excess of 300 km to an appropriate
ICU. Comments from respondents indicate that patients are
not always transferred to the closest appropriate ICU (e.g.
in another province), but to an ICU that is geographically
predetermined (e.g. within the same province).

Usaro et al.13 have shown that critically ill patients with
severe unstable respiratory and circulatory failure can safely
be transported over long distances when a specially equipped

Table IV. Frequently listed comments
Not enough ambulances, especially ICU ambulances
Ambulances in poor working condition and are used to service
large rural areas with poor roads
Insufficient number of staff to drive and accompany patients,
available staff not adequately trained
Authorisation process was perceived as a major obstacle
Not authorised to transfer to the closest ICU in another province,
must transfer to ICU much further away in same province
Inappropriate use of ambulances

Fig. 1. Cumulative referral distance for public hospitals without
ICU/HCU.

Fig. 2. Cumulative referral distance for public and private hospitals
with ICU/HCU.

Fig. 3. ICU versus non-ICU transport for public sector hospitals
without ICU/HCU.

Fig. 4. ICU versus non-ICU transport for public and private hospitals
with ICU/HCU.
vehicle and qualified transport team are used. A significant number of critically ill patients are transferred using non-ICU transport or transport that is not well maintained, ill equipped and inadequately staffed. There is ample evidence confirming that transfer of critically ill patients in an appropriately equipped and staffed vehicle or aircraft, also referred to as a mobile ICU, improves patient outcome and reduces adverse events.\textsuperscript{13-17} The patient should receive the same level of monitoring and care during transfer that would be offered in an ICU.\textsuperscript{18}

Appropriate stabilisation of the critically ill patient before transfer is another important aspect that influences patient outcome and effective ICU resource utilisations.\textsuperscript{14,18} The professional societies, authorities and units that are involved in the transfer of critically ill patients should adopt guidelines for transferring such patients.\textsuperscript{17}

There are limitations to this study. The data on time to collect rely on the subjective perceptions of unit/hospital managers. Conversely, the data on distance to the respective unit and mode of transport are guided by current policy and practice. Lastly, the impact of potential delays and inappropriate transportation on patient outcome was not measured.

These limitations suggest the need for appropriate prospective data collection. We admit, however, that there is sufficient evidence to argue for integration and regionalisation of emergency and critical care services. Integration implies \textit{de novo} transfer of patients to an appropriate facility that is capable of managing the identified clinical problem. Health care services have been tiered but integration of each tier remains an unresolved challenge. Timeous and appropriate referral has to be accomplished on a regional basis. Regions cannot be prescribed by provincial boundaries.

The combination of current resource constraints, the vast distances in some regions of the country and the historical disparities of health resource distribution represent a unique challenge which demands a novel approach to equitable health care appropriation.

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References