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Costs of Intermediate Care and Intensive Care

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Intermediate care units (IMCUs) are suitable for patients needing a level of care lower than Intensive Care Unit (ICU) but higher than ward (Zimmerman et al. 1996; Vincent and Burchardi, 1999). Accordingly, IMCUs can act both as step-up units for deteriorating and step-down units for improving patients. IMCUs have been recommended to reduce post-ICU mortality (Smith et al. 1999; Beck et al. 2002), to facilitate earlier ICU discharges (Bone, 1993; Weissman, 2000), to limit the cost of staffing, and to optimise ICU resource utilisation (Arabi Y et al. 2004; Iapichino et al. 2005).

The costs can be grouped into patient-related (incl. staff, consumables and clinical support) and nonpatient-related (incl. capital equipment, estates and non-clinical support) (Edbrooke et al, 1999). Staff cost is the strongest determinant of total costs while nursing staff has been reported responsible for more than 50% of the ICU costs. Therefore, if the patients admitted to the IMCU need a lower intensity of treatment than intensive care by definition, the nurse-to-patient ratio in the IMCU can be lower than in the ICU: a nurse-to-patient ratio of 1:3 or 1:4 has been proposed for IMCUs (Zimmerman et al. 1996), while ICU nurse-to-patient ratio ranges from 1:1 to 1:2 in Continental Europe (Miranda and Nap, 2001). As a consequence, daily costs of IMCUs are lower than those of ICUs but higher than wards'.

However, both the IMCU and the ICU are just parts of the hospital, sharing the same final objectives - to allow patients to recover their health at the lowest cost possible. Therefore, the main economic issue is not the daily cost of stay in the ICU or in the IMCU, but the patient's total hospital cost. Therefore, to stay in the IMCU is cheaper than in the ICU only if the patient spends in the IMCU some of the time he/she could have spent in the ICU. Thus, IMCU length of stay should be carefully considered in the analysis of costs.

Despite the high number of studies suggesting the effectiveness of IMCUs, only few analysed existing units. Junker et al (2002), who considered 5,116 ICU low-risk monitor and 8,971 IMCU patients, found differences in age, type of patients, and severity of illness. In comparison to ICU, IMCU patients showed higher mortality rate (3.1% vs. 2.3%), higher incidence of readmissions (5% vs. 4%), and longer length of stay (2.6 ± 2.2 days vs. 3.9 ± 3.1 days). The nursing Whole Time Equivalent per one patient staying for 3.9 days in an IMCU with nurse-to-patient ratio of 1:3 is the same as that per one patient staying 2.6 days in an ICU with nurse-to-patient ratio of 1:2, provided that the ICU and the IMCU have the same occupancy.

Others studied the effect of adding an IMCU. Abizanda et al (2005) found that the IMCU patients of a new, 4-bed, step-down unit were older and less seriously ill than those in the ICU. No change in hospital mortality ratio was noticed, but post-IMCU hospital mortality and IMCU length of stay increased. Eachempati et al (2004) studied the effect of the change in a surgical department from a 9-bed ICU to a 10-bed ICU + 4-bed IMCU. The mean APACHE II of the whole group of patients was higher in the second period (14.2 vs. 13.4). The mortality showed a trend towards a decrease from 8.7% to 6.0%, but the general length of stay in the unit increased from 3.8 to 4.3 days.

Consumables and clinical support costs were also analysed using a bottom-up approach in a sample of 60 ICU and 65 Respiratory IMCU patients admitted with acute exacerbation of Chronic Obstructive Pulmonary Disease (Bertolini et al. 2005). Total consumables and clinical support cost per patient in the Respiratory IMCUs amounted to approximately half of that in the ICUs, while median length of stay was 7 days in ICU and 8 days in Respiratory IMCU. Nevertheless, it has been demonstrated that the cost of treatment varies according to diagnostic category and severity of illness (Rossi et al. 2006).

Furthermore, any preliminary analysis of a new IMCU has to consider provisional number of beds and bed occupancy, as well as logistical link

with the ICU. When the IMCU is integrated in the ICU, its minimum number of beds depends on the nurse-to-patient ratio required, usually 1:3. Otherwise, it cannot be lower than a multiple of the nurse-to-patient ratio, being at least 1:6. Situations such as sudden deterioration of patients need to be considered. If the IMCU and the ICU are physically jointed, one nurse is sufficient for the intermediate care because ICU nurses can provide help when needed, guaranteeing the safety of the patients. If the IMCU is not integrated (e.g. being next to an operating room, which is closed at night), one nurse in the unit is not enough: if a patient's condition suddenly worsens the nurse alone cannot manage the critical patient, call for a doctor and take care of other patients. In such cases, patient safety is not guaranteed. Furthermore, a study showed that 5% of the 1,092 bed-days surveyed in a surgical ward were occupied by patients needing a higher level of care (Coggins RP, 2000). Nevertheless, a 3-bed IMCU, integrated in the ICU, would provide a number of bed-days double the required.

In conclusion, the cost of staffing, which is the most relevant part of total costs, is lower in IMCUs than in ICUs. Moreover, bed capacity and length of stay are the major determinants of unit throughput, so predictions made before any change in bed availability should be compared with occupancy rate and length of stay observed after the change. In fact, healthcare systems are flexible and can adapt to multiple external constraints, maintaining a natural disposition to growth.

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