The Project Margherita for Assessing Italian ICU Performance (G. Bertolini, M. Langer, D. Poole)

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Early in 1991 an increasing number of Italian intensive care units (ICUs) agreed to collect and share data on organisation, case-mix and patients outcome as a basis for quality asses sment and continuous education. To this end we established a nationwide network (GiViTI – Italian Group for the Evaluation of Inter ventions in Intensive Care Medicine; www.giviti.marionegri.it).

In 2002 GiViTI launched the Project Margherita (meaning daisy in Italian), for the continuous evaluation and improvement of the quality of care (Boffelli et al. 2006). The Project objectives are:

• To standardise data collection on admitted patients;

• To analyse and evaluate clinical outcomes and resource consumption in participating ICUs;

• To allow each ICU to monitor its own performance over time and to compare this with the average;

• To provide ICUs with an effective system for promptly identifying own critical states with a view to assuring good clinical care.

The Project Margherita adds to the general purpose of continuous quality of care assessment the opportunity to have a flexible tool for easily implementing new prospective data collections. The Project uses an ad hoc electronic platform with a modular structure that allows the basic data collection (the Margherita's Core) to be enlarged to meet the requirements of specific research projects (the Margherita's Petals).

The Core data collection includes demographics, admission diagnoses (including major infections), co-morbidities, surgical status, source and reasons for admission, the Simplified Acute Physiology Score (SAPS II) variables (Le Gall et al. 1993), failures and diseases occurring during ICU stay, major procedures/ interventions performed during ICU stay, ICU and hospital outcomes. The Petals consist of specific data collections, which are not mandatory or permanent components of the system; rather, they correspond to specific areas of investigation. Examples are: the infections surveillance Petal (Malacarne et al. 2008), the COMPACT randomised clinical trial form, the surveillance on Xigris use (Bertolini et al. 2007). The Margherita software is distributed free of charge to all ICUs adhering to the GiViTI group.

In each ICU, a trained physician is responsible for the data collection. A call-centre is active for any question during the study. The software provides investigators with an online definition of each item to collect, and numerous validity checks are done concurrently with the data entry. To avoid selection bias, patients admitted in months with more than 10% of incomplete or inconsistent records were excluded.

The participation to the project increased over time from 2002 to 2007 with the following progression: The GiViTI Coordinating Centre produces an annual report, where a prediction model of hospital mortality is calculated by logistic regression analysis. A personalised report for each participating ICU is also provided each year. Here the ICUs may find specific analyses by which to compare their own data with those of all other participating centres and with their own centre over time.

Specifically the yearly reports contain:

• Description of collected data

• Description of data quality checks and data validation procedures

• Description of statistical analysis performed on the collected data

• Statistics results grouped by the following sections:

- Characteristics of ICU patients on admission

- Failures and diseases occurred during the stay

- Procedures/interventions performed during the stay

- ICU and hospital outcomes

Figure 1 shows the overall calibration curve of the 2007 data based on the 2006 prediction model (top) (Boffelli et al. 2008), and an example of the variable life-adjusted (VLAD) plot of a single random chosen ICU (bottom) (Lovegrove et al. 1997). The overall calibration curve demonstrates a relative improvement in 2007 over 2006 in terms of observed versus expected adjusted mortality in sicker patients (with the highest expected mortality). The curve was computed on 25,958 patients who stayed at least 24 hours in the ICU. The VLAD for the individual ICU shows that there were more deaths than expected from the case-mix of this particular ICU in 2007. Two "crisis" periods can be detected: from February to the end of May and from September to the end of November. The curve was computed on 303 patients.

In the end, the GiViTI philosophy is based on three key concepts:

1) Only extensive data collection allows adequate insight and analysis of ICU data.

2) Only powerful analysis of outcome data, adjusted for as many confounders as possible, allows acceptable benchmarking.

3) The comparison with comparable units is a very good approach since it enables each unit to identify directions in which to improve performance.

The Project Margherita is successful and participating ICUs have significantly improved their performance levels and consequently reduced mortality rates during the years in which the scheme has been in operation.

A full list of participants is available on the project website: www.giviti.marionegri.it/MargheritaDue.asp

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