Analysis of hospital bed management and patient mobility using open data sources

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To properly assess strengths and weaknesses of care services it is necessary to develop robust models for the acquisition, analysis and presentation of clinical data provided by different sources \cite{1,2}. In this perspective recent actions have promoted the diffusion of open databases to improve the transparency of economic and clinical activities from the structural, organizational, financial and professional points of view. In Italy the Ministry of Health has released different open datasets to describe facilities and staff involved in the healthcare system as well as clinical outcomes related to interventions. In this project \cite{3} we use these datasets to study: hospital bed management to analyse the ability of a hospital to care for patients; patient mobility to assess the ability of a region to attract patients from other regions in the provision of care services.

Bed management is analyzed based on two indicators: beds occupancy rate (BOR) (i.e. beds occupied over a period) and turnover interval (TOI) (i.e. days that a bed remains empty). Regions are classified in three groups: green if $3 \geq \text{TOI} \geq 1 \land \text{BOR} \geq 75\%$; yellow if $\text{TOI} < 1 \lor \text{TOI} > 3 \lor \text{BOR} < 75\%$; red if $\text{TOI} < 1 \lor \text{TOI} > 3 \land \text{BOR} < 75\%$. An overall index ($HBM$) is also computed depending on the distance from the green area: $HBM \geq 0$ if the region is within the green group, while $HBM < 0$ if outside (see Table). Patient mobility is studied using the mobility index ($M$) computed considering the patients attracted from other regions and migrated outside the region to receive care. Three groups are detected: green for $M \geq 1$; yellow for $1 > M \geq 0.5$; red for $M < 0.5$(see Table).

This paper reports a preliminary study to define a methodology for healthcare quality assessment integrating information provided by open data sources. Future studies will extend this analysis integrating other data banks to capture additional clinical and non-clinical information, such as demographic, geo-references.

\begin{table}[h]
\begin{tabular}{|c|c|c|c|c|}
\hline
Region & Emilia & Trento & Calabria & Liguria & Campania \\
\hline
HBM & G 0.86 & Y -0.21 & R -0.89 & G 0.66 & Y -0.07 \\
M & G 2.40 & Y 0.58 & R 0.17 & Y 0.81 & R 0.29 \\
\hline
\end{tabular}
\caption{Table}
\end{table}

Groups: G = green, Y = yellow, R = red


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