

**TITLE:** Casemix, readmissions and patient perspectives in Lebanon: impact of the national hospital pay-for-performance initiatives.

## **Introduction**

There has been mixed evidence on the impact of Pay-for-Performance (P4P) in healthcare, particularly for hospitals at scale. In 2014, the Lebanese Ministry of Public Health integrated a P4P model for determining hospital reimbursement tiers, including casemix and patient satisfaction, across about 140 hospitals. In 2018, this model was updated to include a readmissions component. The impact of these interventions was previously undetermined, and may present a useful contribution to some of the known knowledge gaps regarding hospital P4P, and more broadly value-based healthcare, particularly in limited resource settings.

## **Methods**

We used a mixed methods approach, combining quantitative and qualitative study designs, to conduct four research investigations. The first study used a descriptive analysis to address how and why hospital P4P was developed in Lebanon. The second and third studies used an interrupted time series design on data collected from the national hospitalization database, with Newey-OLS regression and autoregressive integrated moving average models, respectively. P4P impact on casemix index (study two) and on readmissions (study 3) was assessed. The fourth study investigated patient perspectives, using qualitative content analysis of data collected eight focus groups discussions with patients.

## **Results**

Hospital P4P was developed in Lebanon to due to stakeholders recognizing the limitations of the previous reimbursement model that had been solely based on accreditation status. Casemix index was included to improve the appropriateness and fairness of the relation between the Ministry and hospitals. The second study included 1,353,025 hospitalizations between 2011 and 2016. This revealed an abrupt increase in casemix among short-stay cases, and a gradual increase in medium-stay cases. Code-level analysis suggested this was attributable to a decrease in unnecessary hospitalizations and improved coding practices. The third study included 1,333,691 hospitalizations across 2011-2019. An abrupt decrease of cholecystectomy and stroke readmissions was found, but not of general and pneumonia readmissions. The qualitative study allowed us to identify six patient perspectives, including satisfaction, health status, perceptions on each of quality, access and health system, and valuing of health, all of central relevance to health systems performance.

## **Discussion**

Hospital P4P in Lebanon led to several positive impacts, including improving the relation between hospitals and the Ministry of Public Health, and providing a tool for continuous development of the health system. The 2014 and 2018 P4P interventions improved system effectiveness and related patient outcomes, by decreasing unnecessary hospitalizations

and decreasing some types of readmissions. The P4P model should be further developed to capture the entire spectrum of hospital visits. A useful approach for evaluating health system interventions involves applying appropriate interrupted time series analysis on readily available data. In Lebanon, patients valued health highly and supported improving public hospitals, and decreasing the influence of personal connections and money. People and patients can be more widely engaged by their health systems, and they should have the central role in shaping the values and functions of a health system.

Funding: Grant from the Joint Health Systems Research Initiative (DFID/MRC/Wellcome Trust/ESRC).