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Measuring hospitals performance: Applying the management approach in Nepal

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ABSTRACT
The paper has twofold objectives: to measure management practices from the employer perspective of both public and private hospitals of Nepal and to explore the relationship between management practices and output indicators of the hospitals by utilizing data collected from a primary survey. The total sample size of the hospital was 100. Among the total hospitals, 33% were public hospitals while 67% were private hospitals. The double-blind in-depth survey technique was adapted in order to measure management practices. A single management score was developed by giving equal weightage for all 18 questions. Ordinary least squares were used to establish the relationship between management practices and outputs of the hospitals. The result suggests that the average management score is found to be 2.04, 95% confidence interval (CI) 1.93–2.15. The management score is slightly higher for private hospitals (2.08) than for public hospitals (1.94); however, this difference is not statistically significant. Average management scores are strongly associated with total inpatient days, infection prevention practice score, bed occupancy rate, and inpatient days per technical staff. These associations are statistically significant at the 1% level and each regression model has an R^2 value greater than 34. In conclusion, management practices can be measured using the systematic tool and compared across the hospitals. Better management practices are strongly associated with the indicators of performance of the hospitals.

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Introduction

Hospitals, the first referral unit for specialized institutional care, are highly prioritized within the national health policy framework of Nepal [1]. It is a result of many contributing factors, for example, a gradual shift in public health services from community-based care to institutional care due to priority to under-five and maternal mortality. Similarly, the increasing burden of non-communicable diseases also requires that specialized services be available to the majority of the population. The national goal of Universal Health Coverage also adds gravity to the increasing demand for institutional care. Hospitals have a central role in achieving good health for the population. Performance measurement offers policy makers a major opportunity to understand hospital outcome, quality of health services, and accountability of the institution. Performance of hospitals is directly related to cost of healthcare and health outcomes. The inefficiency of health institutions has contributed to increase in healthcare costs. As very little evidence exists in low-income countries, the policy of controlling the escalating healthcare cost through improving the performance of the hospitals is uncertain and becomes a matter of debate.

In practice, two general approaches, a nonparametric (or data envelopment analysis) and a parametric (the stochastic frontier approach), are popular to measure hospital performance [2]. Each method has particular strengths and weaknesses and potentially measures different aspects of efficiency [3]. For example, a nonparametric approach assumes no statistical noise, but it is likely to be sensitive to the influence of outliers. A parametric approach captures random fluctuations and overcomes the shortcoming of the deterministic cost frontier; however, it requires strong assumptions as to the form of the frontier [4]. Strong assumptions and several limitations of econometric analysis may produce bias results. Measures of quantity of output may neglect differences in quality across hospitals, which may have bias estimates of economies of scale. The choice of an appropriate method is of critical importance. Recently, a new method of measuring and understanding the performance of a hospital using the management approach has been developed [5].

Improving management practice is also associated with large increases in productivity and output of the hospitals. Measuring firm performance using the management approach is increasingly popular since the last decade in manufacturing and service sectors [6–9]. The

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paper has twofold objectives: to measure management practices from the employer perspective of both publicly and privately funded hospitals of Nepal and to explore the relationship between management practices and output indicators of the hospitals by utilizing the data collected from a primary survey.

Theoretical background and hypothesis

Most of the researches on hospital performance have tended to focus on measures of inputs such as labor, capital, and human skills. A systematic study that included 19 case studies from Asia and sub-Saharan Africa and other studies establish that 'managerial capital' is an important driver of a firm's growth and a key determinant of the productivity of a firm [5,6,10]. There are good and bad management practices with the hospitals or firms. Some studies have demonstrated the importance of management practices for hospital performance; however, most of them were based on case studies, rather than on systematic empirical data across hospitals [8,9]. A major problem has been the absence of high-quality data related to management practices. Quantitative (interval and ratio scale) measured managerial practices can explain different levels of performance with the hospitals. Recent research in management economics has suggested a new way of measuring and understanding management practices within an organization or a hospital [11].

An innovative survey-based tool to quantify the set of management practices has been implemented in thousands of manufacturing firms including hospitals in Europe, Asia, and United States. The tool defines and scores from one (worst practice) to five (best practice) across 18 key management practices used by firms [5,6,11,12]. The outcome of the literature review demonstrated that management practices have a direct impact on firm performance in terms of productivity, profitability, growth rates, survival rates, and market value [11].

The outcome of the literature review demonstrates that high-quality data related to management practices can allow to measure the direct impact on hospital performance. Below are the null and alternative hypotheses that guided this study.

> H0: There is no difference in hospital performance based on management practices of both public and private hospitals in Nepal.

> H1: There is a difference in hospital performance based on management practices of both public and private hospitals in Nepal.

Methods and materials

Study design

This quantitative study seeks to determine whether hospitals' management practices were related to the performance of hospitals in terms of bed occupancy rate, inpatient days, quality of care, and cost of producing inpatient services. The research mainly relies on a primary source of data. A total of 109 hospitals were randomly selected from a list of both public and private hospitals. A telephone survey using a double-blind survey technique with senior managers of the selected hospitals was conducted to measure management practices. A facility survey was also conducted to capture hospital performance-related data through the administration of pre-designed and pre-tested questionnaires. Then we investigated the role of management practices in explaining differences in performance across hospitals using the ordinary least squared method.

Conceptual framework

Hospital performance-related variables are dependent variables. Management score is an independent variable. We used an interview-based evaluation tool that defines and scores key management practices. We aggregated the questions together by z-scoring each individual question to develop a single variable. We have hypothesized that certain management practices are, on average, productivity-enhancing. We seek to investigate whether a higher management score is correlated with a better performance. We also collected a set of variables that describe the process of the interview and individualities of respondent which can be used as 'noise controls' in the econometric analysis. These variables help reduce residual variation. The conceptual framework of the study is illustrated in Figure 1.

Measuring management practices

We focused on constructing a robust measure of management practices in the hospitals by paying attention to scoring management practices, collecting accurate responses, and obtaining interviews with managers. We applied a new survey methodology to quantify and measure management practices in four broad dimensions, operational management, monitoring, target setting, and people management, as suggested by the previous studies [5,9]. The four dimensions are organized into an interview-based evaluation tool that defines and scores from 1 ('worst practice') to 5 ('best practice') based on 18 basic management practices, details are found in Bloom et al. [6]. The higher average of these 18 scores reflects 'good management'. Scoring of management practice using a double-blind survey (researchers do not know the performance indicators of the hospital before conducting the survey and respondents are not aware in advance that they are being scored) is a key element while measuring the management practices. It quantifies management practices in the selected hospitals. The paper provides evidence about the robustness and usefulness of a

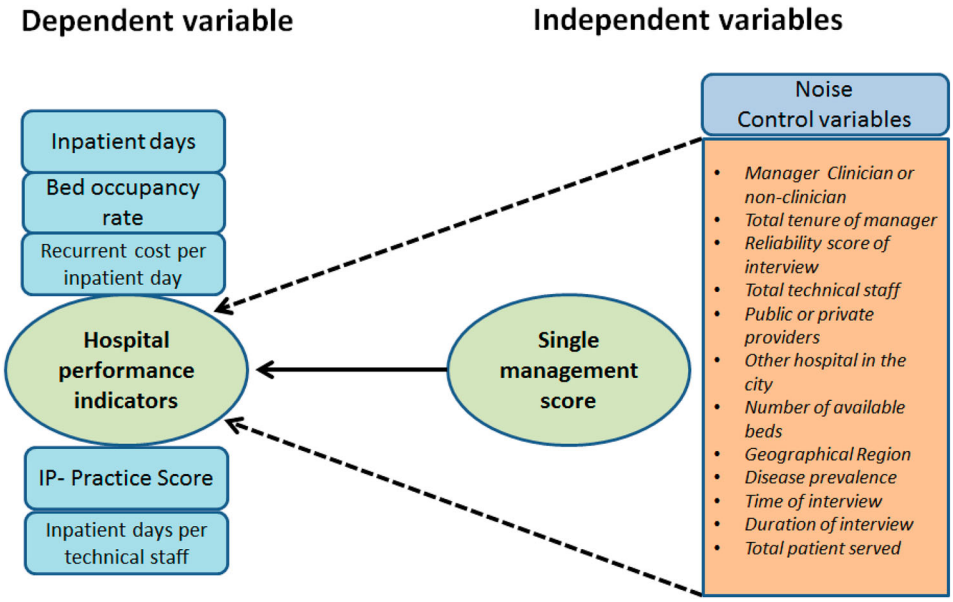

Figure 1. Conceptual framework. Source: Authors.

management practice measurement tool developed [5,6,11,12] in the context of Nepal.

Sample size

Hospitals were primarily the unit of analysis. In the sampling process, first of all, districts were identified based on the availability of both public and private hospitals. Thirty-three districts where both public and private hospitals were available, out of 75 districts, were selected for the survey. The sampling frame of the hospitals was developed from the Department of Health Services (DoHS) [13] along with some basic information, such as year of establishment, number of beds, and annual reporting status. Inclusion criteria for selecting the hospitals were: (a) number of beds greater than 15 (minimum number of beds to consider hospitals), (b) the hospital should be operating for at least 2 years before the survey, (c) hospitals should provide, at least, outpatient, emergency, indoor, and surgical services, and (d) it should regularly be reporting at the district health office. A total of 109 hospitals were randomly selected from the list of the hospitals that met the given criteria. This sample size represented almost 25% of a total of both public and private hospitals (431) that were the criteria of district-level hospitals in Nepal [13]. At the first stage, a telephone interview using a double-blind technique was conducted; the response rate was 91.74%. A total sample of the hospitals for the data analysis was 100.

Management survey

As mentioned in the previous literature [6,12,14], the management survey includes 18 questions from which the overall management score was computed. Double-blind survey methodology was adapted in order to score management practices. Telephone interviews with senior managers were conducted without telling the respondents that they were being scored. At the time of the interview, some additional information related to respondents and some features of the hospitals were also collected. This enabled scoring to be based on the interviewer's evaluation of the hospitals' actual practices, rather than their aspirations, the respondent's perception or the interviewer's impression. The methods and procedures were strictly followed as suggested in previous studies [12,14].

Hospital survey

The hospitals that provided complete information during the telephone interviews with senior managers were included in the facility survey. A hospital survey questionnaire was prepared in order to capture the data related to hospital characteristics, human resources, services, number of beds, quality indicators, and hospital expenditure among others. The questionnaire was finalized after pre-testing in the hospitals. The data related to hospital characteristics and human resources were collected from general hospital administration. Expenditure details were obtained from the account section based on the audited report. The medical records section was contacted to get the key service indicators as per the National Health Management Information System (HMIS)-34. For the private sector, the same HMIS format was used in order to collect the data related to hospital services. For the Infection Prevention (IP) practice, standard guidelines published by the Ministry of Health and Population (MOHP) [15] for the hospitals were used.

Data management and model specification

The collected data were managed and analyzed by using *R* and STATA software. The management score was presented in terms of average of 18 management questions. All questions were provided equal weightage while preparing a single index of management score. The average score was then displayed as a bivariate distribution across other hospital characteristics. The management score was standardized in order to include it in further analysis, for example, *z*-score for each management question was calculated as a deviation from the mean value. Then, the *z*-score for each question was averaged, and at last the *z*-score was calculated for this average score.

Economists generally use labor or total factor productivity as a measure of organizational performance. In the case of hospitals, it is so difficult to measure output, particularly where multi-services are available. It is not straightforward to develop a single summary measure of hospital performance and data restrictions limit the indicators that are available on a consistent cross-hospital basis. We developed five separate indicators that reflect one or more sets of policy goals of providing health services particularly related to low-income countries [16]: (1) Total inpatient days; (2) IP practice score; (3) Bed occupancy rate; (4) Inpatient days per technical staff; and (5) Recurrent expenditure per inpatient day. A total inpatient day was selected as an absolute measure of performance particularly for three reasons. First, inpatient care is the prime objective of all the hospitals. Second, inpatient services represent the bulk of services within the hospital that consume the greatest proportion of total available resources in the hospitals. Third, literature [17,18] suggested to use inpatient days as output indicators while evaluating the performance of hospitals. There is a positive relationship between better management practices and higher number of inpatient days.

The IP practice score was used to represent the process quality of services. It is based on the national standard for quality improvement developed by MoHP [15]. It is an observation checklist that includes 48 aspects to be monitored in order to evaluate the standard IP practice in the hospitals. A single index is required for the IP practice indicator. The most popular option is to use the Principal Component Analysis-based composite index. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy for the correlation matrix requires 80% [8,19]. A total of 48 variables were used with addressing the requirements to create a composite index for IP practice. IP practice is increased with increase in score of management practices.

Bed occupancy rate was widely used as a performance indicator for the hospitals in the national and international literature. The bed occupancy rate is frequently used as a prime indicator for evaluating the performance and efficiency analysis of hospitals [19]. Better management practices and bed occupancy rate should have a positive relationship. The inpatient days per technical staff can be an output indicator that represents the services against the available technical staff. This indicator suggests the efficiency of technical human resources to produce the services [19,20]. The per capita services in terms of inpatient days of the technical staff have a positive relationship with management practices. The annual recurrent expenditure indicator provides the efficiency in the use of recurrent resources in order to produce one unit of inpatient day. The performance of the hospital increases with decrease in unit cost of inpatient day. Therefore, there will be a negative relationship between management practices and unit cost of inpatient days.

All five indicators were collected on different scales. In order to make them comparable, variables were standardized by calculating the standard *z*-score. In the further analysis, the *z*-score of these performance indicators is used. The principal component score was used as a single index. However, the KMO measure of sampling adequacy for the correlation matrix for the five performance indicators is 63% which is below the cutoff level as suggested by the literature [19,21] as adequate for creating a single index using the principal component analysis. So, we averaged the *z*-score of five performance indicators to create a single measure of performance.

Regression analysis

The hypotheses are tested by means of linear regression. After developing a reasonable measure of hospital performance and descriptive statistics of management score, the study checks whether the management score is robustly correlated with external performance measures. To explain whether a higher management score is correlated with a better performance or not, the following regression equation is estimated.

$$y_i^k = \alpha M_i + \beta' X_i + u_i \tag{1}$$

where y_i^k represents the kth performance indicator for hospital i. M_i represents the average management score for the ith hospital. X_i represents a vector of hospital characteristics, community characteristics, and noise controls. u_i represents an error specific to the ith hospital. Performance indicators like total inpatient days, inpatient days per technical staff, and recurrent expenditure per inpatient day were highly left-skewed. Therefore, these variables were transformed to ensure the normality of errors. Inpatient days and recurrent cost per inpatient day were log transformed while inpatient days per

technical staff were transformed using the square root function. Equations were checked for the presence of heteroskedasticity and robust standard errors were used for inference. As already mentioned, the standardized management score and performance indicators were used in the regression analysis, so the coefficients in the table can be read as the association of one standard deviation of management on the outcome.

In Equation (1), hospital-specific controls were hospital size proxy – total number of technical staff and total beds, private hospital dummy – and volume of services (total number of patients served by the hospital). Besides this, some community controls were also used in the regression such as the prevalence of diarrheal disease in the community as reported by the Annual Health Report, Department of Health Services. The purpose of this indicator is to reflect the fact that worse outcomes are likely if hospitals are located in a community with a high rate of ill health. Geographical regional dummies were also adjusted for the geographical differences.

Results

Summary results

Among the total hospitals, 33% were public hospitals and 67% private hospitals. The average management score was found to be 2.04, 95% confidence interval (CI) 1.93–2.15. Similarly, the average tenure of a manager was 3.58 years, 95% CI 2.94–4.22. Fifty-nine percent of hospital managers were of clinical background. The average number of technical staff was found to be 56. The average bed occupancy rate was 43%, 95% CI 37.99–48.12. On an average, hospitals maintained 82% of total standard IP practices as per the government guidelines. The average number of inpatient days per human resource was found to be 124, 95% CI 103.32–144.37. Similarly, the recurrent expenditure per inpatient day was found to be Nepalese rupees 6060.60, 95% CI 4289.11–7832.08. The average number of OPD visits was 27894 annually, 95% CI 14793.71–40996.23. The average number of indoor visits was found to be 3069 per year, 95% CI2197.81–3941.11 (Table 1).

Table 1. Descriptive statistics of variables included in the study.

Variable	Mean	Std. Err.	[95% Conf.	Interval]
Average management score	2.04	0.0574	1.9256	2.1534
Public hospitals	1.94	0.1130	1.7141	2.1748
Private hospitals	2.08	0.0650	1.9564	2.2160
Total tenure in the position (years)	3.58	0.3214	2.9467	4.2221
Reliability score (1–10)	6.50	0.2684	5.9675	7.0325
Total technical staff	55.76	4.1142	47.5966	63.9233
Total approved beds	58.36	6.4251	45.6112	71.1087
Bed occupancy Rate	43.06	2.5514	37.9984	48.1233
IP practice score (0–1)	123.85	10.3442	103.3209	144.3712
Inpatient days per HR	6060.60	892.6737	4289.1190	7832.0830
Total OPD visits	27894.97	6600.1830	14793.7100	40996.2300
Total inpatient	3069.46	439.1237	2197.8100	3941.1180

Source: Authors.

Table 2 shows the average management practice across four different areas of management. The scores are also compared across public and private hospitals. The management score is slightly higher for private hospitals (2.08) than public hospitals (1.94). However, this difference was not statistically significant at the 5% level of significance. The mean score for operational management is higher for private hospitals than public hospitals; however, the mean difference is not statistically significant at the 5% level of significance. Similarly, the mean score for monitoring and target setting aspects was not statistically significant at the 5% level of significance among public and private hospitals. People management practices were found relatively better in private hospitals; this was statistically significant at the 5% level.

Hospital performance and management practice

Before estimating regression, it may be useful to estimate the pairwise correlations of the dependent and independent variables (Table 3). Variables related to bed occupancy and availability of number of beds are highly correlated with inpatient days. IP practice score and diarrheal disease prevalence have a negative correlation; however, the correlation coefficient is less than 50%. IP practice score and other hospitals in the city exhibit a positive correlation. The correlation coefficients indicate that most of the dependent variables are weakly correlated with each other, aside from the inpatient-related variables.

In the cross-sectional data, we used the standard approach while estimating the relationship among the dependent and independent variables. This standard approach gives standard errors that are valid even if model errors are heteroskedastic. The regression analysis for the general model indicates that good management practices are positively related with better

Table 2. Difference of mean management practices across four components using the *t*-test.

Management dimensions	Management score-mean (standard deviation)		Mean difference between public and private hospitals (*t*-test) (*P*-value)
	Public hospital	Private hospital	
Operational management	1.99 (0.530)	2.11 (0.693)	0.323
Monitoring	2.25 (1.034)	2.24 (0.840)	0.966
Target setting	1.91 (0.665)	1.88 (0.617)	0.821
People management	1.81 (0.644)	2.16 (0.502)	0.009
Overall Management score	1.94 (0.65)	2.06 (0.53)	0.2818

Source: Authors.

Table 3. Pairwise correlations for dependent variables and independent variables.

Variables	Bed Occupancy Rate	Inpatient Days	IP-Practice score	Inpatient Days per technical staff	Recurrent Expenditure per Inpatient day	Management Score	Manager Non-Clinician	Total tenure as manager	Reliability score of interview	Total Technical staff	Public or private	Other hospital in the city	Available beds	Region categories	Diarrhoeal disease prevalence	Time category	Duration of interview	Total patients served
Bed Occupancy Rate	1																	
Inpatient Days	0.53	1																
IP-Practice score	−0.14	−0.05	1															
Inpatient Days per technical staff	0.69	0.80	−0.01	1														
Recurrent Expenditure per Inpatient day	−0.32	−0.19	0.05	−0.34	1													
Management Score	0.23	0.27	0.36	0.30	0.01	1												
Manager Non-clinician or clinician	−0.38	−0.23	0.22	−0.33	0.23	0.20	1											
Total tenure as manager	0.05	−0.09	0.13	−0.01	0.08	0.03	0.08	1										
Reliability score of interview	0.12	0.18	0.18	0.09	−0.01	0.25	0.03	0.15	1									
Total technical staff	0.33	0.67	0.12	0.33	0.01	0.27	−0.04	0.00	0.31	1								
Public or private	−0.39	−0.31	0.35	−0.32	0.02	0.11	0.45	0.28	0.13	−0.05	1							
Other hospital in the city	−0.21	−0.06	0.47	−0.23	0.27	0.20	0.37	−0.02	0.20	0.36	0.42	1						
Available beds	0.39	0.92	−0.04	0.62	−0.08	0.22	−0.18	−0.08	0.22	0.76	−0.28	0.03	1					
Region categories	0.11	0.03	0.23	−0.07	0.03	−0.02	0.03	−0.07	0.06	0.26	0.05	0.40	0.07	1				
Diarrheal disease prevalence	0.14	−0.01	−0.47	0.07	−0.05	−0.17	−0.30	−0.04	−0.16	−0.28	−0.36	−0.80	−0.05	−0.48	1			
Time category	0.09	0.03	0.09	0.03	0.12	0.12	−0.07	0.09	0.14	0.05	−0.03	0.06	0.10	−0.08	0.04	1		
Duration of interview	0.21	0.24	−0.10	0.14	−0.03	−0.02	0.00	−0.04	0.17	0.27	−0.23	−0.09	0.25	0.14	0.11	−0.04	1	
Total patients served	0.40	0.74	−0.05	0.53	−0.04	0.26	−0.15	−0.10	0.25	0.64	−0.36	−0.05	0.73	−0.09	0.06	0.09	0.27	1

Source: Authors.

performance of the hospitals. The null hypothesis was rejected. The research hypothesis was accepted that there is a difference between the management practices and hospital performance.

In Table 4, five performance indicators were regressed against the management score with some control variables. The first thing to be noted while looking at the first and second rows of Table 4 is that management scores are associated with hospital performance indicators. Each regression model has an R^2 value greater than 34%, which also represents reasonable fitness of the equation with the data-set. All regression models are statistically significant at the 1% level. Dependent variables and management score were standardized (i.e., used z-score of original variable) in the regression equation. Therefore, the coefficients should carefully be interpreted as one standard deviation change in management score is associated with the standard deviation change in the dependent variable. The relationships are statistically significant at the 1% level in every case except for recurrent expenditure per inpatient day (but it is almost statistically significant at the 10% level). In the first column of Table 4, bed occupancy is regressed on the management score after controlling for a wide number of confounding influences as described in the methodology section. As can be seen from the coefficient, a higher management score is associated with a significantly higher bed occupancy rate of each hospital. In the same vein, improvement in the management score is also associated with greater number of inpatient days served. In the third column, IP-practice score is regressed against management scores. The coefficient shows that one standard deviation increase in management score is associated with 0.19 standard deviation increase in IP-practice score. This also indicates that the management score is not only associated with total services but also associated with the delivery of quality service. The fourth column presents the regression result between inpatient days per technical staff and management score. The result indicates that improvement in management score is also associated with increasing number of inpatient days served per technical staff. In the last column, recurrent expenditure per inpatient day is regressed against management scores. The coefficient sign shows that increase in management score is associated with decrease in recurrent cost per inpatient day. The coefficient has the expected sign; the association is statistically significant at almost the 10% level of significance.

Discussions

The average management practice for the hospitals in Nepal was found to be 2.03. Management scores are positively correlated with the performance indicators. These findings are consistent with the literature and empirical application of the methodology in the international arena. The average management score in Nepal was found slightly higher than those for Indian hospitals (1.9) and strikingly lower than western countries [11,12,22]. Management practices, on average, are similar between private and public hospitals in Nepal; however, some of the studies suggested better management practices in private hospitals [6,7,22]. However, the people management component is significantly better among private hospitals as compared to public hospitals in Nepal as well. The rewarding and punishment system in public hospitals is not as functional as in private hospitals. These factors derived comparatively better people management practices in the private sector than in the public sector. District-specific averages of management score also show the districts that are good performers in terms of management practices also have more efficient hospitals [21,23]. This result supports external validity to the approach of measuring management practice.

The positive association between management practices and hospital performance indicators has several implications to be discussed. First, this positive association provides evidence for the fact that management practices matter in deriving the performance of the hospitals. This finding is also consistent with the results of previous researches [6,17,22–27] Second, as discussed above, management score is positively correlated with the use of capital resources (number of beds) and human resources; this finding indicates the fact that better-managed hospitals are also efficient. However, robust evidence in this respect needs further productivity and efficiency analysis together with management practices using appropriate tools and methods as suggested in previous studies [16,28]. Third, management practices are also associated with quality of service provision which, in our case, is proxied by the IP-practice score. This finding is also supported by the literature [7–9,22,24]. Additionally, it also provides evidence that better management practices not only indicate improvement in efficient behavior but also improves the quality of services. Quality and efficiency are the two aspects that the policy makers are mostly considering as the principal goal of providing health care services [20,24]. Fourth, local policy makers are always looking for ways to improve the efficiency and quality of services together; improving management practices seems a better strategy to achieve these goals jointly. Fifth, analyzing management practices and performance of the hospitals together provides a new approach to explain the performance of hospitals because management practice in hospitals was something that was in the shadow for a long time in the past while analyzing hospital performance [22,23,26,29].

Table 4. Relationship between hospital performance and management practice.

	Bed occupancy Rate				Log(inpatient days)				IP-practice score				log(inpatient days per technical staff)				Log(recurrent expenditure per inpatient day)			
Variables	Coef.	Std. Err.	*t*	*P* > *t*	Coef.	Std. Err.	*t*	*P* > *t*	Coef.	Std. Err.	*t*	*P* > *t*	Coef.	Std. Err.	*t*	*P* > *t*	Coef.	Std. Err.	*t*	*P* > *t*
Management score	0.319	0.092	3.470	0.001	0.210	0.075	2.790	0.007	0.161	0.080	2.020	0.047	0.303	0.090	3.360	0.001	−0.171	0.108	−1.590	0.117
Manager non-clinician	−0.540	0.200	−2.710	0.008	−0.433	0.176	−2.470	0.016	−0.077	0.177	−0.440	0.664	−0.502	0.187	−2.690	0.009	0.774	0.263	2.940	0.004
Total tenure as manager	0.049	0.031	1.590	0.116	0.039	0.020	1.950	0.055	0.006	0.021	0.290	0.772	0.029	0.024	1.170	0.244	0.030	0.025	1.220	0.225
Reliability score of interview	−0.006	0.037	−0.160	0.876	0.002	0.027	0.070	0.946	0.026	0.034	0.770	0.443	−0.013	0.031	−0.420	0.679	0.009	0.044	0.210	0.832
Total technical staff	0.004	0.005	0.880	0.379	0.009	0.004	2.160	0.034	−0.003	0.004	−0.660	0.512	−0.005	0.004	−1.280	0.204	0.005	0.003	1.340	0.185
Private hospital	−0.543	0.288	−1.890	0.063	−0.420	0.179	−2.340	0.022	0.312	0.220	1.420	0.160	−0.136	0.230	−0.590	0.556	−0.941	0.313	−3.000	0.004
Other hospitals in the city	−0.010	0.006	−1.580	0.117	−0.007	0.005	−1.560	0.123	0.019	0.005	3.730	0.000	−0.013	0.006	−2.270	0.026	0.018	0.007	2.660	0.010
Available beds	0.000	0.002	−0.050	0.956	0.003	0.002	1.440	0.155	0.000	0.002	0.250	0.802	0.008	0.002	3.870	0.000	−0.004	0.002	−1.990	0.050
Mid-western region	0.491	0.410	1.200	0.235	0.023	0.504	0.050	0.963	0.424	0.451	0.940	0.350	0.395	0.431	0.920	0.362	−0.392	0.687	−0.570	0.569
Western region	0.094	0.432	0.220	0.829	−0.465	0.415	−1.120	0.265	1.858	0.440	4.230	0.000	−0.134	0.413	−0.320	0.747	0.375	0.586	0.640	0.524
Central region	0.687	0.452	1.520	0.132	−0.188	0.428	−0.440	0.661	0.809	0.486	1.670	0.099	0.150	0.404	0.370	0.712	−0.103	0.584	−0.180	0.860
Eastern region	0.662	0.494	1.340	0.184	−0.255	0.461	−0.550	0.581	0.986	0.460	2.140	0.035	−0.007	0.471	−0.020	0.988	0.210	0.623	0.340	0.737
Diarrheal disease prevalence	−0.001	0.001	−0.800	0.428	−0.002	0.001	−2.380	0.020	0.001	0.001	0.810	0.423	−0.002	0.001	−2.150	0.035	0.002	0.001	1.680	0.097
Afternoon	0.279	0.212	1.320	0.192	0.107	0.152	0.700	0.484	−0.021	0.198	−0.110	0.915	0.118	0.176	0.670	0.504	0.070	0.204	0.340	0.732
Evening	0.105	0.203	0.520	0.605	−0.040	0.157	−0.250	0.800	0.191	0.158	1.210	0.228	−0.105	0.177	−0.590	0.555	0.459	0.229	2.010	0.048
Duration of interview	0.003	0.015	0.220	0.824	0.005	0.011	0.440	0.662	0.005	0.014	0.350	0.730	0.002	0.013	0.190	0.852	−0.007	0.015	−0.460	0.644
Total patients served	0.000	0.000	0.720	0.472	0.000	0.000	0.720	0.472	0.000	0.000	−0.140	0.888	0.000	0.000	1.460	0.147	0.000	0.000	0.260	0.792
Intercept	0.006	0.830	0.010	0.994	0.584	0.726	0.810	0.423	−2.239	0.723	−3.100	0.003	0.876	0.762	1.150	0.253	−1.179	0.996	−1.180	0.240
Number of hospitals	100				100				100				100				99			
R^2	0.470			0.000	0.650			0.000	0.570			0.000	0.560			0.000	0.340			0.001

Source: Authors.

Limitation of the study

There are some limitations of this study. First, we could not measure the recurrent expenditure using a micro-costing approach. Our approach considered gross costing where we relied on total recurrent expenses in the audit report. This might be the reason for the association not being significant at the 5% level even though the coefficient is correctly signed. Second, we could not use an instrumental variable approach for establishing the association between hospital competition and management practice as there is plenty of literature [5–7,22] rendering hospital density as an endogenous variable. So, it is likely that the identification assumption is broken which might have resulted in the biased coefficient estimates for this covariate. Again, we could not use the case-mix as an important control in the regression equation examining the association between performance and management practice. We used it with a total number of services provided by the hospitals as a control in the equation. However, it still warrants attention while interpreting the results.

For future research

Despite these limitations, the paper quantifies management practices of hospitals in Nepal which provides robust results when compared with results of previous studies. Management practice is well correlated with the performance indicators [5–7,29]. The findings of this study confirm that the management approach is a tool to assess the performance of hospitals in the countries with a similar socio-economic status to Nepal. The policy makers seek to know not only simply 'What works?' but 'under what conditions does it work and for how much?' Answers of these questions demand experimental evidence on the importance of management practices to improve the performance of the hospital. A prospective evaluation study using an experimental design in a low-income country will be a future research in this field.

Implication for practice

Performance of hospitals is directly related to the cost of health care and health outcomes. The inefficiency of health institutions has consequences of increase in health care costs. Efficient and evidence-based strategies for hospital operations and management innovations may be the cornerstone of the solution of the escalating cost problems for a low-income country. The overall health care costs can be reduced without a compromise in the quality or convenience of care through improving efficiency of hospitals. This study demonstrates a strong association between management practices and performances of hospitals; however, management score is very low, indicating low skill workforce, lack of managerial skill, and organizational capacities. Hospital management training can be provided to the managers in the existing system to improve management practices. The non-clinician manager should be hired to do better management practices. The structural quality of the hospital such as availability of instruments, diagnostic services, and functioning of the outpatient and inpatient departments can be improved through better management practices. Competitions among the hospitals to improve the management performance of both public and private hospitals are important.

Conclusions

Management practices can be measured using a systematic tool and compared across the hospitals and countries. Management score is slightly higher for private hospitals (2.08) than public hospitals (1.94); however, this difference is not statistically significant in Nepal. The study used a single score of management practices and the ordinary least squares method to measure the association between management practices and performance indicators. The results show that better management practices are strongly associated with the indicators of performance of the hospitals in terms of total inpatient days; average IP practices, bed occupancy rate, inpatient days per technical staff, and recurrent expenditure per inpatient day. The result indicates that management score is not only associated with total services but also associated with the quality of service delivery. Managerial capital matters to improve hospital performance by improving strategic and operational decisions.

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