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# Comparative Impact Analysis of Low-Deductible Insurance Versus In-house Hospital Assumption of Risk and Management on Medical Malpractice Claims

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**Objectives:** Claims management is critical to ensure the safe and high-quality medical care for which liability insurers and/or hospitals are responsible. The aim of this research is to determine whether increasing hospital malpractice risk exposure, with increasing deductibles, has an impact on malpractice claims and payouts.

**Methods:** The study was conducted at a single tertiary hospital, the Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy. Payouts on closed reported and registered claims were analyzed during 4-study periods, which ranged from 1.5 million euro annual aggregate deductibles entirely managed by the insurance company to 5 million euro annual aggregate deductibles entirely managed by the hospital. We retrospectively analyzed 2034 medical malpractice claims submitted between January 1, 2007, and August 31, 2021. Four periods were examined depending on the claims management model adopted, ranging from total outsourcing to the insurer (period A) to an almost total hospital assumption of risk method (period D).

**Results:** We found that progressive hospital assumption of risk is associated with a decrease in the incidence of medical malpractice claims (average variation per year:  $-3.7\%$ ;  $P = 0.0029$  if the 2 initial periods and the 2 last periods—characterized by the highest risk retention—are respectively aggregated and compared), an initial decrease in the mean claims cost followed by an increase that is still lower than the national increase ( $-5.4\%$  on average), and an increase in the total claims cost (when compared

with the period where the insurer solely managed claims). We also found that the rate of increase in payouts was less than the national average.

**Conclusions:** The assumption of more malpractice risk by the hospital was associated with the adoption of numerous patient safety and risk management initiatives. The decrease in claims incidence could be due to the implementation of patient safety policies, while the cost increase could be attributed to inflation and rising costs of healthcare services and claims. Notably, only the hospital assumption of risk model with a high-deductible insurance coverage is sustainable for the studied hospital, while also being profitable for the insurer. In conclusion, as hospitals progressively assumed more risk and management responsibility of malpractice claims, there was a progressive decrease in the total number of claims, and a less rapid rise in claim payouts as compared with the national average. Even a small assumption of risk appeared to elicit meaningful changes in claim filings and payouts.

**Key Words:** risk management, medical malpractice, claims, management models, tertiary university hospital in Italy

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Over the last few decades, analyses of incidence of medical malpractice claims (MMCs) and their associated costs have played a pivotal role in healthcare risk management globally, in terms of safety, efficiency, physician-patient relationship management, as well as for its direct economic and legal impacts.

For this reason, several specialized studies have been conducted, together with national and global databases developed, to gather information on the reported adverse outcomes of these claims and to attempt to evaluate the trends in the incidence and costs of MMC, and their causes.<sup>1–4</sup> In particular, in the ongoing so-called malpractice crisis era, assessing the cost-effectiveness of different MMC management models is essential.<sup>5,6</sup>

In Italy, compensation for medical malpractice can be obtained after a negotiation with the hospital (in case of hospital direct assumption of the risk), an alternative dispute resolution process or (if the previous methods fail) a civil proceeding.<sup>6</sup> In civil trials, if the plaintiff proves the damages and breach of duty, the hospital is compelled to compensate them. In case of physical and/or psychological damages, an expert in legal medicine assesses what percentage of the activities the plaintiff used to do before the event can be no longer pursued (the so-called biological damage). Finally, national tables, like the so-called Milanese tables, are used by Italian civil courts (and insurance companies) to set the compensation and the relative degree of personalization on the basis of the medicolegal assessment.

In Italy, there are 3 different MMC management models: first where MMC management is completely delegated to a liability insurer; second where the risk can be completely retained by the hospital (the so-called self-insurance, system); and, finally, where the risk can be comanaged by the hospital and the insurer. In the final

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G.V. and S.G. equally contributed and thus should be considered joint first authors A.O. and A.O. should be considered cosenior authors

This study complied with the ethical standards.

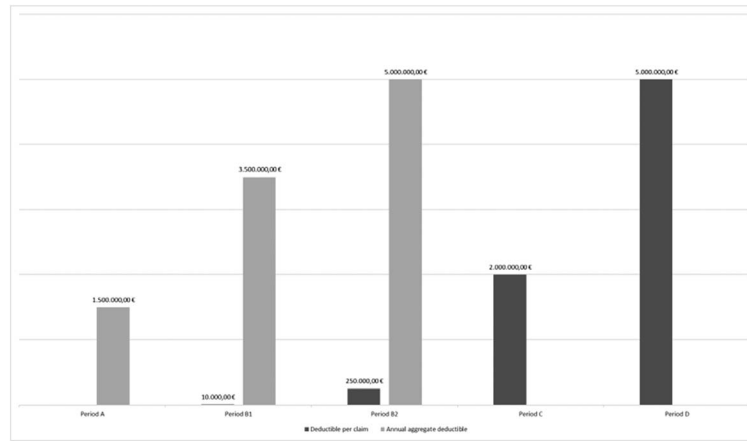
The study regarded fully anonymized data unrelated to identifiable individuals and thus no consent was required.

Data were processed following the EU General Data Protection Regulation No. 2016/679. As only fully anonymized data were used, ethical committee approval and consent were both waived.

Data are available on reasonable request to the corresponding author.

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**FIGURE 1.** Chronological changes in MMC management in our institution: 4 periods are considered (A: 2007–2009; B: 2010–2014; C: 2015–2018; D: 2018–2021) and deductible per claim (dark gray) and annual aggregate deductible (gray) are displayed.

scenario, the insurance and aggregate deductibles can also be established in a manner where the insurer covers only exceptional payouts.

To the best of our knowledge, there is no available research comparing the impact of different management models on the incidence and costs of MMC. Hence, we retrospectively analyzed the MMC received by the Fondazione Policlinico Universitario Agostino Gemelli IRCCS between 2007 and 2021, a period when the hospital gradually shifted from completely outsourcing its risk management to retaining most of its medicolegal risk. Our aim was to evaluate whether variations in these management models impact the incidence and cost of MMC, as well as to describe their economic sustainability.

### METHODS

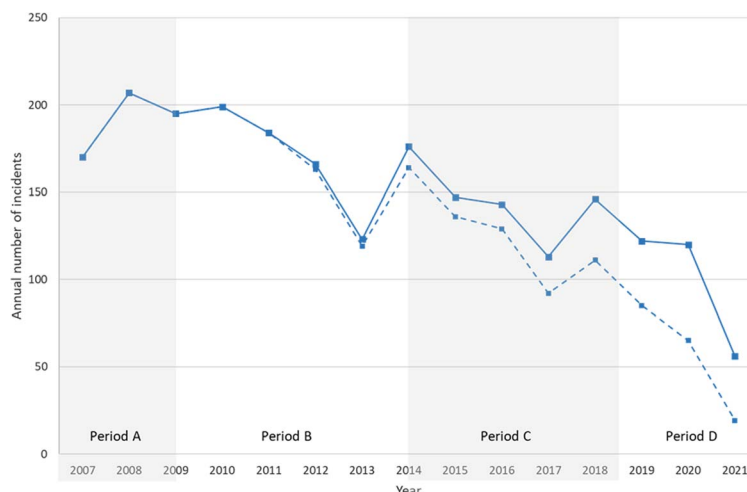
We analyzed the MMC received by the Fondazione Policlinico Universitario Agostino Gemelli IRCCS, a 1558-bed tertiary hospital in Rome, Italy, between January 1, 2007, and August 31, 2021. In this institution, MMC were managed by a unit directed by an expert in legal medicine and clinical risk management (G. V.). Ten experts in legal medicine and clinical risk management (A.O., S.G., F.F., C.S., V.M.G., C.C., F.D.G., F.C., R.R., V.L.P.)

participated in the medicolegal analysis of the MMC, while an actuary (R.G.) calculated the aspects of economic interest.

We specified four study periods based on whether the clinical risk was retained by the hospital and the set deductible/aggregate deductible (Fig. 1):

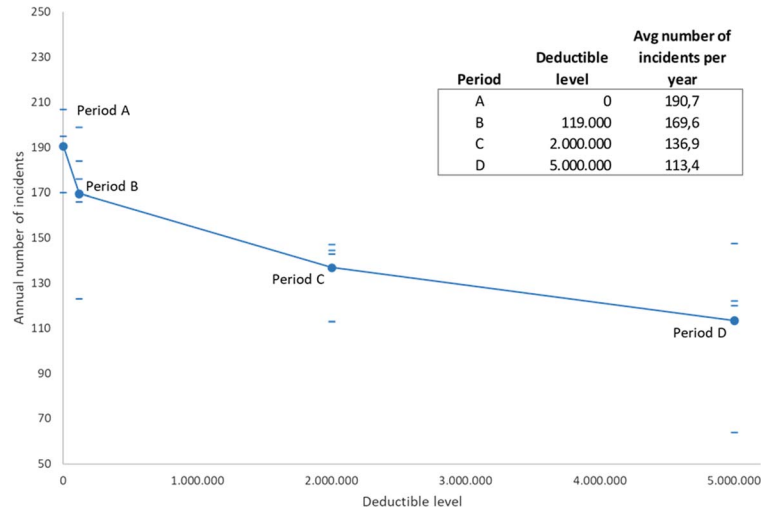
- Period A (January 1, 2007–December 31, 2009): MMC was entirely managed by the insurance company (annual aggregate deductible: €1,500,000)
- Period B (January 1, 2010–December 31, 2014): MMC was comanaged by the hospital’s risk management unit and the insurance company (annual aggregate deductible: €3,500,000 in the first half of this period (B1) and €5,000,000 in its second half (B2); deductible per claim: 10,000 € in B1 and 250,000 € in B2)
- Period C (January 1, 2015–June 30, 2018): MMC was almost entirely managed by the hospital (deductible per claim: €2,000,000)
- Period D (July 1, 2018–August 31, 2021): MMC was entirely managed by the hospital (deductible per claim: €5,000,000)

The annual incidence of reported, occurred, and incurred (but not reported) incidents; the costs of the MMC; the deductibles; the total reserves; the total compensations; the costs paid by the hospital and the insurance company; and the paid insurance



**FIGURE 2.** Reported and not-reported incurred incidents. Reported and not-reported incurred incidents: continuous line; only reported incidents: dotted line.

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**FIGURE 3.** Annual MMC average number versus deductible value. For each period (A, B, C, and D), the dot represents the annual average number, and the dashes represent the number of incidents per single year in the period (if a period includes fractions of a year, e.g., a semester—the incident count for these time intervals is normalized to the year).

premiums were all registered and analyzed for each study period. Data regarding the MMCs were stored using the software “TaleteWeb–Gestione del Rischio Clinico” (TaleteWeb, Italy). We included any MMCs for which compensation was paid, including those regarding criminal and civil litigations and any sentinel events (as defined by the Joint Commission<sup>7</sup>), which were paid to avoid reputational damages. Incurred, but not reported, incidents were also registered because they are normally included in the estimation of the actuarial reserve.

The 4 periods in terms of numbers of incidents were statistically compared, considering a *P* value less than 0.05 statistically significant. Because mean values were compared, Student *t* test was performed, using JMP software v. 17 (JMP Statistical Discovery LLC, NC).

Finally, “Milanese tables” were used to calculate the mean national increase in MMC cost, which we used as a benchmark for our analysis. The tables are regularly updated (in the study period, they were updated in 2008, 2009, 2011, 2013, 2014, 2018, and 2021, respectively) to be adjusted for inflation and to comply with judicial trends.

**RESULTS**

During the study period, we recorded 2034 MMCs, and 224 incurred but not reported incidents are estimated. The variations between the 4 different periods followed a downward trend (Fig. 2)

(average variation per year: -3.7%), even when the number of incurred but not reported cases were included in the analysis.

For period B, we considered as deductible level the weighted average of deductible levels for subperiods B1 and B2 as reported in Table 1 (with time length of the subperiods B1 and B2 considered as weight).

Considering a *P* value less than 0.05 statistically significant, the decrease shown in Figure 3 resulted statistically significant when periods A and D (*P* = 0.0025), B and D (*P* = 0.0084), and A and C (*P* = 0.0214) were compared. The decrease between periods B and C (*P* = 0.0918), A and B (*P* = 0.3000), and C and D (*P* = 0.2360) resulted not significant. Nevertheless, aggregating A and B periods in a “low-risk retention” L-class (annual average in number of incidents = 177.50) and C and D in a “high-risk retention” H-class (annual average in number of incidents = 125.12), we found for these classes an overall average difference of 52.38, which is statistically significant (*P* = 0.0029).

Furthermore, the average economic impact of the incidents showed a decrease from period A to period B and then an increase for subsequent periods (-5.4% on average; Fig. 4).

Moreover, the annual average payout amount demonstrated an increasing trend over the study period (Table 2).

If the mean MMC cost of period A is used as the baseline, and the relative cost increases during periods B, C, and D were compared with the mean national increase in MMC costs (as per the “Milanese tables”), the cost increases in our organization appeared

**TABLE 1.** Cost-Increase Comparison Between Mean MMC and Mean National MMC Weights (“Milanese Tables”) in Periods B, C, and D Compared With Period A (Which Served as a Baseline)

Loss Period	No. Months	No. Incidents	No. Incidents Having Economic Impact >0	Total Economic Indemnity Incurred, €	Average Economic Impact Per Incident, €	SD Economic Impact Per Incident, €	Increment in the Average Economic Impact With Respect to Loss Period A	Increment in the Weight Used in the Courts to Quantify Medmal Damages With Respect to Loss Period A
A	36	572	187	28.158.729	150.581	352.291		
B	60	829	323	47.324.804	146.516	333.904	-2.70%	4.77%
C	42	416	221	35.023.458	158.477	243.313	5.24%	9.66%
D	38	217	150	24.077.826	160.519	251.072	6.60%	11.03%

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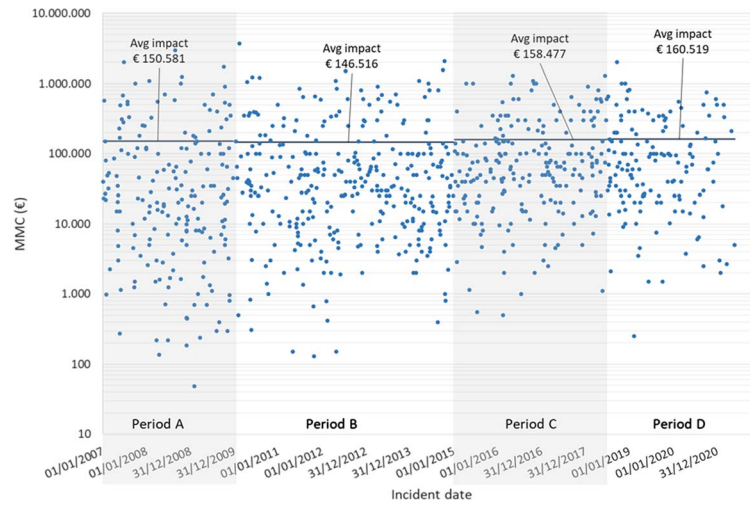


FIGURE 4. Costs of MMCs reported during the study period.

to be relatively low (Table 1, Fig. 5). There was a relative decrease observed in period B because there were no catastrophic medical malpractice payouts, with many of the MMC during this period being of low economic value (thus, the mean variation was negative). In general, as showed by Figure 5, the rate of increase in payouts was less than the national average (indicated by the Milanese tables).

Table 3 shows various economic sustainability indicators during the different study periods, while considering the following variables: the average profit margin of the insurance company (insurance premium – compensation paid by the insurance company) and the average total cost for the hospital (insurance premium + compensations paid by the hospital). For the hospital, the most convenient model is the one adopted in period A (however, it was not sustainable for the insurance company), while the least convenient was that used in period B, where it had relatively high deductibles and a paid a relatively high insurance premium. On the other hand, the current model (period D) seems to appropriately balance the interests of both the insurance company and the hospital.

DISCUSSION

We analyzed trends in MMC incidence and costs over time by comparing the 4 different MMC management models adopted by our tertiary hospital since 2007. These models have evolved from a system in which all MMCs were completely managed by an insurance company to an in-house hospital assumption of risk in which the insurance only covers so-called catastrophic medical malpractice payouts (which, according to general data, represent less than a tenth of all paid MMCs).<sup>1</sup>

Our retrospective analysis of the 2034 MMCs from our chosen hospital’s database showed a decreasing trend in their incidence during the 14-year period (2007–2021). The steepest part of this curve (Fig. 3) occurred between model A and model B, that is, when the hospital started to retain part of the financial risk. Even after this shift, the MMC incidence continued to decrease.

We also found that hospital assumption of risk was associated with lower values of time variations in the mean MMC cost with respect to the values of time variations of the national benchmark given by Milanese tables (Table 1, Fig. 5). The negative variation observed during period B was likely due to the combined effects of risk retention and of the absence of catastrophic medical malpractice payouts together with a large number of MMCs with low payouts. Regarding this point, we cannot exclude that the absence of catastrophic payout could have been due to a change in hospital operations rather than just being a random finding.

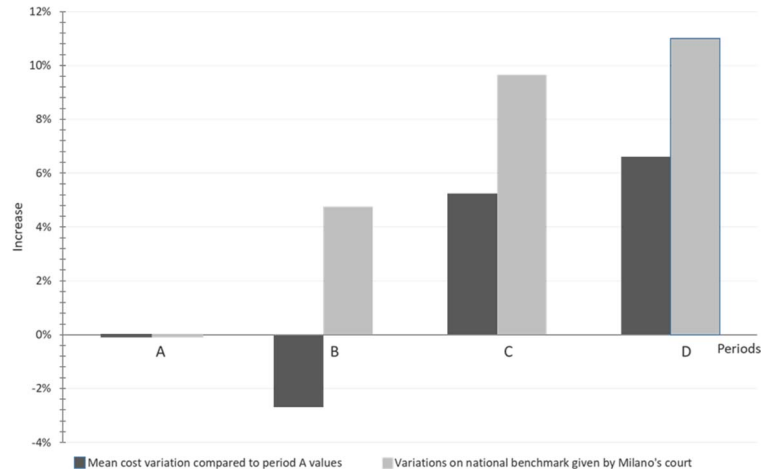
We decided to compare, for each period, the relative increase or decrease in mean MMC costs with a national benchmark given by the Milanese tables, because many macroeconomic factors that have no relationship with any given MMC management model could have influenced their overall cost (e.g., inflation). This comparison (Fig. 5) revealed that, as specified previously, when there was an increase in the mean cost registered by our hospital, it tended to be lower than the national mean increase in MMC costs.

One of the most interesting findings from our study is the observed relationship between variations in MMC incidence and variations in their cost. This is particularly notable as the trends in MMC incidence and costs reported in the literature are not consistent. For instance, Li et al<sup>3</sup> described an increase in Chinese MMC incidence between 2008 and 2015, which was associated with an increase in the payoff amounts. Conversely, in the United States, a

TABLE 2. Total MMC Costs and the Relevant Payers Across the 4 Study Notification Periods

Notification Period	Total Reserve, €	Total Paid Compensations, €	Total Cost of the Incidents, €	MMC Paid by Hospital, €	MMC Paid by Insurance Company, €
A	1.224.945	8.713.916	9.938.862	3.937.115	6.001.746
B	12.253.792	25.135.662	37.266.954	34.049846	3.217.108
C	23.875.371	12.005.277	35.418.648	35.318.648	100.000
D	44.455.850	7.504.503	51.960.53	51.960.353	—

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**FIGURE 5.** Cost increase comparison between mean MMC and mean national MMC weights (“Milanese tables”) in periods B, C, and D. Histograms regarding our hospital are in dark gray while histograms regarding Milanese tables are in pale gray.

decrease in MMC incidence was found to be associated with an increase in their costs.<sup>4</sup> In addition, within an Italian context, in 2016, Bonetti et al<sup>8</sup> reported that an increase in MMC incidence (especially in the Lazio region wherein the hospital used in this study is located) was associated with an average increase in fatal incidents and a slight decrease in injuries. Furthermore, in 2020, Gualniera et al<sup>9</sup> reported a slight decrease in the MMC incidence in the given hospital that had adopted a self-insurance system over a 4-year period (2014–2018).

In general, studies that reported a downward trend in MMC incidence were not able to identify a specific cause, suggesting that there are likely to be numerous factors involved in this relationship, including tort reforms, improvements in patient safety (e.g., the use of checklists and patient handoff protocols), the enhancement of alternative dispute resolution methods, and the implementation of communication and resolution programs.<sup>4,10–14</sup>

After our hospital started to retain part of the MMC risk, Italy experienced 2 national tort reforms (in 2012 and 2017). Moreover, our hospital also began to adopt numerous diverse patient safety and risk management policies (e.g., the creation of a risk management unit that was highly trained in alternative dispute resolution methods, the implementation of guidelines, regular clinical audits, accident/near-miss reporting policies, and communication and resolution programs), intensifying its efforts in 2018 to comply with the standards needed for Joint Commission International accreditation (obtained in 2021). We do think that direct assumption of liability has helped spur this change: indeed, one of the most likely explanations for the decrease in MMC incidence is that, when the hospital is directly accountable for (most of) the resulting compensations and can directly manage the MMC, it has a stronger interest in the prevention of any adverse events.

The creation of a risk management unit that deals with both MMC and risks allows for a better exploration of the link between adverse events and MMC, as it would always perform effective root cause analysis to find the underlying causes of an incident and would then tailor interventions to prevent similar issues in future.<sup>15–17</sup> The implementation of guidelines, regular clinical audits, alternative dispute resolution methods, and communication and resolution programs are all ways to limit risks and costs. Specifically, hospital policies have a significant impact on both technical errors (i.e., through improving the skills of operators via simulation and training programs) and nontechnical errors or organizational faults, which represent a significant portion of the causes of preventable errors.<sup>18,19</sup>

Furthermore, even increases in medical malpractice compensation over time are related to various factors, including increases in the costs of healthcare and in those bringing forth a claim.<sup>2,4</sup> Schaffer et al<sup>4</sup> underlined that because of the higher administrative costs of lawsuits, lawyers currently tend to refuse cases with smaller potential compensation. That being said, in our cases, the increase in total costs corresponded to substantial benefits to the patients, proven by the 40.5% reduction in incidents.

Finally, regarding the cost-effectiveness and economic sustainability of the different models examined, Table 1 shows that from an economic perspective, the model adopted in period A was optimal for the hospital because the paid compensations here were significantly higher than the aggregate deductible. However, this model is not economically sustainable for the insurance company, whose payouts were significantly higher than the premium during this period. Rather, period B was optimal for the insurance company, as it earned a high premium herein and had to compensate for a relatively low number of MMCs, while periods C and D—

**TABLE 3.** Deductible Profit Margins of the Insurance Company, and the Total Hospital Costs Across the Different Study Periods

Period	Period Length, mo	Average Deductible, €	Average Aggregate Deductible, €	Average Profit Margin of the Insurance Company, €	Average Total Cost for the Hospital, €
A	36	0	1.500.000	-4.445.741	5.472.142
B1	24	10.000	3.500.000	-1.692.145	8.339.162
B2	36	191.667	5.000.000	2.027.207	11.883.230
C	42	2.000.000	—	1.630.027	11.183.544
D	33	5.000.000	—	555.382	9.853.107

during which the hospital directly managed the MMCs and directly compensated most of them (via paying a lower premium)—led to an optimal balance between the profits for the insurer and the costs of the hospital.

Despite the severe impact that COVID-19 has had on Italian health system, no special laws have been passed to shield providers from claims during this time.<sup>18</sup> If the small increase in claims during this time is considered, this evidence would suggest an excellent performance in claims management.

### CONCLUSIONS

According to our data, an MMC management model in which the hospital directly manages each MMC and has insurance coverage with a high deductible (that only covers catastrophic medical malpractice payouts) is the most sustainable for the hospital and most profitable for the insurer. While the observed increase in mean compensations may have been due to macroeconomic variables, including an increase in health expenditure, the administrative costs of MMC and inflation (being lower than the Italian general trend), the overall decrease in the MMC incidence suggests that when the hospital is directly involved in the management and compensation of MMC, it is more likely to adopt policies aimed at decreasing the occurrence of any potentially adverse events. As hospitals progressively assumed more risk and management responsibility of malpractice claims, there was a progressive 40.5% decrease in the total number of claims, and a less rapid rise in claim payouts as compared with the national average. Even a small assumption of risk seemed to elicit meaningful changes in claim filings and payouts. The large decrease in claims was associated with a modest increase in hospital costs but had significant benefit to patient safety. The assumption of more malpractice risk by the hospital was associated with the adoption of numerous patient safety and risk management initiatives.

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