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ORIGINAL RESEARCH

# From Reporting to Improving: How Root Cause Analysis in Teams Shape Patient Safety Culture

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**Background:** Given the increasing focus on patient safety in healthcare systems worldwide, understanding the impact of Continuous Quality Improvement Programs (QIPs) is crucial. QIPs, including Morbidity and Mortality Conferences (MMCs) and Experience Feedback Committees (EFCs), have been identified as effective strategies for enhancing patient safety culture. These programs engage healthcare professionals in the identification and analysis of adverse events to foster a culture of safety (ie the product of individual and group value, attitudes, and perceptions about quality and safety). This study aimed to determine whether patient safety culture differed regarding care provider participation in MMCs and EFCs activities.

**Methods:** A cross-sectional web-only survey was conducted in 2022 using the Hospital Survey on Patient Safety Culture (HSOPS) among 4780 employees at an 1836-bed, university-affiliated hospital in France. We quantified the mean differences in the 12 HSOPS dimension scores according to MMCs and EFCs participation, using Cohen d effect size. We performed a multivariate analysis of variance to examine differences in dimension scores after adjusting for background characteristics.

**Results:** Of 4780 eligible employees, 1457 (30.5%) participated in the study. Among the respondents, 571 (39.2%) participated in MMCs or EFCs activities. Participants engaged in MMCs or EFCs reported significantly higher scores in six out of twelve HSOPS dimensions, particularly in "Nonpunitive response to error", "Feedback and communication about error", and "Organizational learning" (Overall effect size = 0.14, 95% confidence interval = 0.11 to 0.17, P<0.001). Notably, involvement in both MMCs and EFCs was associated with higher improvements in patient safety culture compared to non-participation or singular involvement in either program. However, certain dimensions such as "Staffing", "Hospital management support", and "Hospital handoffs and transition" showed no significant association with MMCs or EFCs participation, highlighting broader systemic challenges.

**Conclusion:** The study confirms the positive association between participation in MMCs or EFCs and an enhanced culture of patient safety, emphasizing the importance of such programs in fostering an environment conducive to learning, communication, and nonpunitive responses to errors. While MMCs or EFCs are effective in promoting certain aspects of patient safety culture, addressing broader systemic challenges remains crucial for comprehensive improvements in patient safety.

**Keywords:** patient safety culture, quality improvement programs, morbidity and mortality conferences, experience feedback committees

## Introduction

Ensuring patient safety is a critical challenge in healthcare, with medical errors being a significant cause of morbidity and mortality worldwide.[1,2] In France, a national study found that between 55,000 and 130,000 serious adverse events occurred in hospitals in 2019.[3] One of the primary focal points for enhancing healthcare safety is situated within health services and medical teams.[4,5] Numerous obstacles are associated with the sociology of healthcare organizations, making



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it essential for healthcare professionals to share a common set of values that prioritize patient safety in their practices.[6,7] These values, which shape the behaviors and attitudes of clinicians and care teams by setting common guidelines and benchmarks, must be directed towards a unified goal of improving patient safety.[8,9] This collective set of values constitutes the concept of a patient safety culture, which the World Health Organization has ranked as the third priority among the top 20 health research objectives for developed countries.[10]

Consequently, various initiatives aimed at fostering this culture among healthcare professionals have been implemented. Among the strategies adopted to enhance patient safety culture, Continuous Quality Improvement Programs (QIPs) such as the Comprehensive Unit-based Safety Program,[11,12] TeamSTEPPS,[13] and Crew Resource Management[14] have proven effective in improving some dimensions of patient safety culture according to several studies.[15] In France, the National Health Authority encourages healthcare providers to regularly participate in two QIPs that engage them in conducting root cause analyses of adverse events in their care services, namely Morbidity and Mortality Conferences (MMCs) and Experience Feedback Committees (EFCs). MMCs and EFCs rely on the periodic meetings of professionals and adhere to a common principle: identifying adverse events and analyzing their root causes to correct them. These initiatives are designed to directly engage caregivers in analyzing adverse events and implementing effective interventions.[16]

MMCs are a traditional and essential component of medical education and quality improvement.[17] These conferences offer a structured forum for healthcare professionals to review and discuss clinical cases where a patient experienced an adverse outcome or death.[18] The primary aim of MMCs is to identify factors that contributed to the outcome, focusing on learning from these events to improve future patient care. By encouraging open and constructive dialogue, MMCs contribute to the development of a non-punitive culture where errors can be freely discussed and learning from mistakes is prioritized.[19]

EFCs, on the other hand, represent a more formalized approach to examining adverse events and near misses. Originating in France, EFCs involve multidisciplinary teams that systematically analyze incidents to identify root causes and develop targeted actions to prevent recurrence.[20,21] Unlike MMCs, which primarily focus on discussion and education, EFCs are action-oriented, aiming to translate insights from adverse events into concrete changes in practice. The collaborative nature of EFCs fosters a shared responsibility among healthcare providers to contribute to a safer care environment.[22]

Both EFCs and MMCs aim to engage healthcare professionals in managing adverse events and in the continuous quality improvement of their healthcare departments. These regular programs require substantial commitment from the participating caregivers, necessitating not just their presence but also their active contribution to the discussions and initiatives that emerge from these sessions. This demanded investment from caregivers can sometimes be challenging to maintain, especially during periods when healthcare systems are facing crises, with increasing workloads and diminished human resources.[23–26] While the benefits of such involvement for enhancing quality within medical teams seem logical, there is a lack of objective data to validate this hypothesis. Although it is difficult to measure the direct contribution of these programs to the improvement of care quality and safety, it is possible to use proxies, such as their impact on the safety culture among healthcare providers.[27–29]

The aim of this study is to investigate whether patient safety culture, as measured by the Hospital Survey on Patient Safety Culture (HSOPS),[30] varies in relation to healthcare providers' involvement in QIPs, specifically through participation in MMCs and EFCs. This research seeks to expand our understanding of how these programs influence perceptions and attitudes towards patient safety culture among healthcare professionals.

Additionally, it is important to consider whether these components work synergistically to create a culture of safety, continuous learning, and quality improvement within healthcare organizations. By examining the combined effects of MMCs and EFCs, we can better understand how these programs collectively enhance patient safety culture and contribute to systemic improvements in healthcare settings.

# Materials and Methods

## Survey Design and Setting

A cross-sectional survey utilizing the Hospital Survey on Patient Safety Culture (HSOPS) was conducted in 2022 at an 1836-bed, university-affiliated hospital, servicing a predominantly urban population of 448,000 in France. In 2022, the

hospital accounted for 168,000 patient stays. The staff comprised 4079 registered healthcare providers and 701 board-certified physicians, primarily specialty hospitalists. This study replicated the methods used by Boussat et al in their 204 study,[21] notably updating from paper-based to web-based questionnaires to reflect contemporary data collection practices.

## Participants

Full-time or part-time employees (working half-time or more) with a minimum of 6 months' tenure in clinical, laboratory/pathology, radiology, or pharmacy departments were eligible. When Participants were affiliated with multiple departments, only their primary affiliation was considered. Neither administrative nor extended sick leave served as exclusion criteria. The study did not encompass hospital administrators, food service, security, maintenance, or house-keeping staff. Consistent with recommendations,[30] HSOPS questionnaires were omitted from analysis if an entire section was skipped, fewer than half of the items were answered, or the same non-neutral response was given to all items.

## HSOPS Questionnaire

Patient safety culture was evaluated using the French-adapted HSOPS.[31] This included 42 items spanning the 12 original HSOPS dimensions, with 18 negatively worded items. Responses utilized a five-point Likert scale from "Strongly disagree" (1 point) to "Strongly agree" (5 points), or "Never" to "Always" where applicable. Global safety grades and incident reports over the past 12 months were collected but not factored into dimension score calculations. Demographic and employment data were also gathered, classifying employees into seven categories for analysis (ie nurse, nursing assistant, physician, other healthcare, administrative, technical, and other).

## Data Collection

The survey was conducted using a web-only format from January to March 2022. No major quality and safety oriented action plans or events (eg, accreditation visits) were implemented or took place during this time. Following HSOPS User Guide[30] suggestions, a prenotification letter was emailed to staff outlining the survey's purpose and procedures. Subsequent invitation emails included individual survey links, along with instructions for assistance. Anonymity and confidentiality were assured by omitting identifiers from the questionnaires. Reminder emails targeted non-respondents to reach a minimum 30% response rate.

## Dimension Scores

Dimension scores were calculated by averaging item responses (range, 1–5). Missing responses were addressed through multiple imputation using predictive mean matching, with the number of imputations set to five, aligning with prior HSOPS studies' methodologies.[32,33]

## QIP Framework

The EFC complies with a written procedure in accordance with the method proposed by Air France Consulting. They are composed of volunteer representatives of the various professions within the medical teams. Committee meetings are conducted monthly within a standardized framework: (1) reading the list of reported events, (2) choosing a priority event to investigate by consensus according to the criticality of each incident, (3) choosing the investigator, (4) reviewing the root cause analysis conducted for the previous month's chosen event, (5) choosing corrective actions, and (6) monitoring on-going actions. The root cause analysis is carried out during the month after the EFC by a designated person using a method, called Orion, developed from systemic analysis methods used in civil aviation and adapted to the healthcare domain by Air France Consulting. Previously trained investigators must follow the main steps of the Orion method to fill out a standardized report: collecting data, describing the chronological facts that occurred before, during and after the event, describing the failures, looking for causes of errors and latent factors that could have contributed to the failures, implementing corrective actions, and writing a report of the analysis.[16,20–22]

In line with the French National Health Authority's guidelines,[19] MMCs convene all professionals affected by an adverse care event or its management in a supportive, non-judgmental environment. These conferences aim to precisely describe the adverse event and its context, analyze immediate and root causes, and identify both effective and failed

safety barriers. The MMCs may lead to the development of action plans aimed at preventing recurrence and enhancing the detection and timely correction of similar events in the future. The MMC process emphasizes collective action to improve care quality and safety, ensuring that event data are anonymized to focus on systemic improvements rather than individual blame.

In both EFCs and MMCs, root cause analyses must be conducted by participants who were not directly involved in the adverse events selected.

## Statistical Analysis

Respondent demographics and QIP participation were summarized using frequencies and percentages, with HSOPS scores presented as means and standard deviations. HSOPS scores were compared across subgroups defined by QIP involvement using *t*-tests and Cohen's d effect sizes. A multivariate analysis of variance (MANOVA) adjusted for respondent backgrounds was employed to analyze dimension score differences. Chi square tests were used to analyse differences in categorical variables. Statistical significance was set at p-values less than 0.05, using Stata version 16.0 for all analyses (Stata Corporation, College Station, TX, USA).

# Results

## Study Sample Characteristics

Out of 4780 employees eligible for the study, 1485 (31.1%) participated. Following the removal of 28 questionnaires due to post-response identification of exclusion criteria, our analysis included 1457 completed surveys, reflecting a 30.5% response rate (Figure 1).

Table 1 presents the demographic and professional characteristics of QIP participants compared to non-participants.

Participants involved in QIPs, such as EFC or MMC, were more likely to be physicians (36% vs 8%) and less likely to be nursing assistants (6% vs 19%). Additionally, a higher proportion of QIP participants worked in critical departments like intensive care, emergency, and anesthesia (29% vs 24% for non-participants), with these differences being statistically significant ($P < 0.001$ and $P = 0.018$, respectively).

## Main Analysis

Figure 2 illustrates the primary analysis, comparing QIP participants to non-participants across the HSOPS dimensions.

QIP participants (involved in either EFC or MMC) reported significantly higher scores in six out of twelve HSOPS dimensions when compared to non-participants. The most notable improvements were seen in non-punitive response to error, feedback and communication about error, and organizational learning. Contrarily, in the dimension of hospital management support, QIP participants scored lower than non-participants. A multivariate analysis of variance (MANOVA) revealed significant differences across all twelve dimensions, taken together, based on QIP involvement ($P < 0.001$), regardless of sex, age, department, and professional category (Table 2).

The regression model showed significantly positive coefficients for eight HSOPS dimensions and a negative coefficient for the hospital management support dimension. No significant association with QIP participation was observed for staffing, teamwork across hospital units, and hospital handoffs and transitions.

## Subgroup Analyses

In subgroup analyses, individuals participating in both QIPs (EFC and MMC) exhibited significantly higher scores in seven HSOPS dimensions compared to non-participants (Figure 3).

The greatest disparities were observed in organizational learning, non-punitive response to error, and feedback and communication about error. However, scores were notably lower in hospital management support and staffing for these participants. The multivariate analysis Results were consistent for six dimensions where participants scored higher and for the hospital management support dimension where they scored lower, as detailed in eTable 1.

Participants solely involved in EFC reported higher scores in six HSOPS dimensions, aligning with the main analysis findings in the multivariate analysis (eFigure 1 and eTable 2).

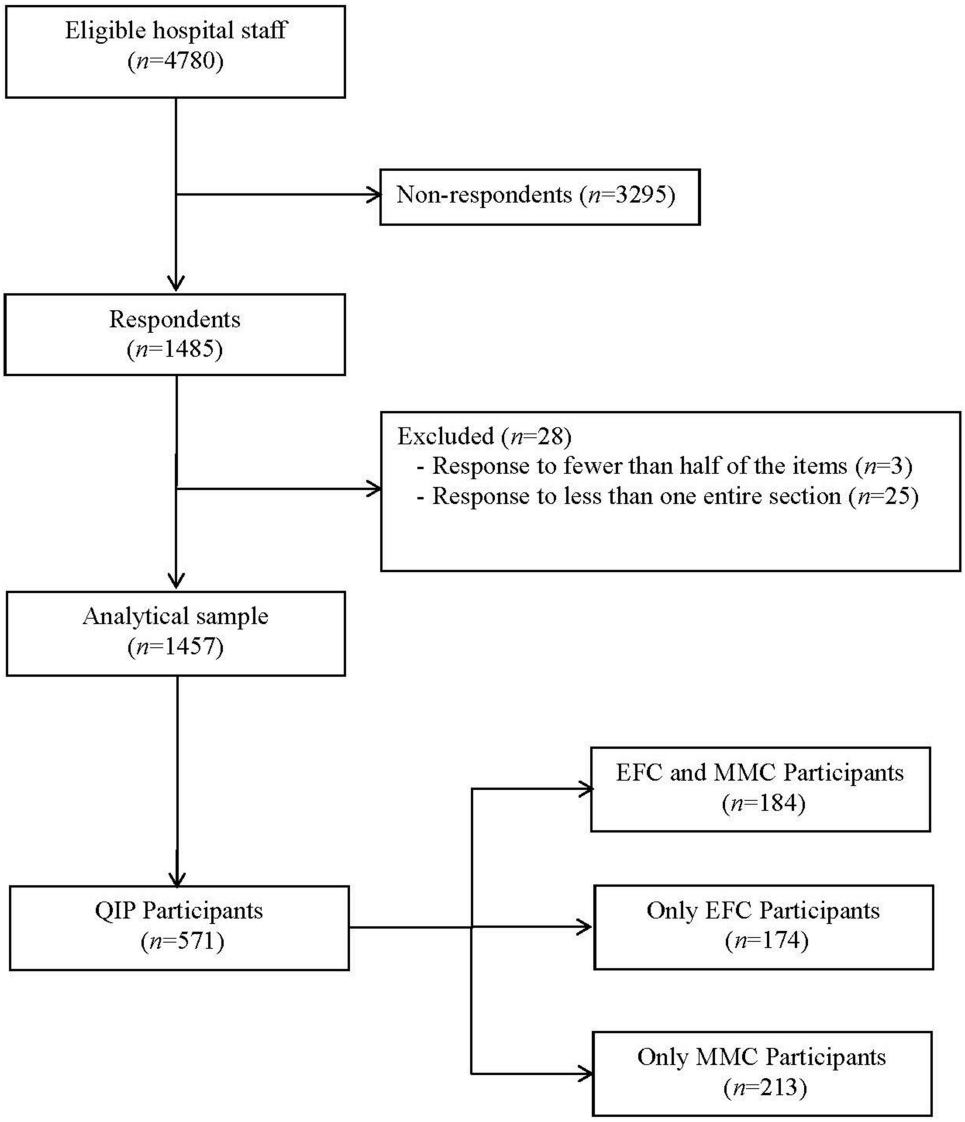


**Figure 1** Survey participation according to QIP participation.

Those only participating in MMC demonstrated higher scores in three dimensions—non-punitive response to error, organizational learning, and teamwork within hospital units—while scoring lower in hospital management support and hospital handoffs and transitions (eFigure 2 and eTable 3).

## Global Safety Grade and Event Reporting

A significantly higher percentage of QIP participants reported at least one adverse event in the past year compared to non-participants across all categories (74.4%, 78.2%, 66.2%, and 80.4% for EFC or MMC, EFC only, MMC only, and both EFC and MMC, respectively, vs 57.2% for non-participants). Regarding the overall safety grade within their units, a higher percentage of participants in QIP rated patient safety as very good or excellent in comparison to non-participants, highlighting the positive impact of QIP involvement on safety perceptions (eTable 4).

**Table 1** Respondent Characteristics According to QIP Participation

| Characteristics, n (%) | Non-Participants (n=886) | Participants (n=571) | |
|---|---|---|---|
| Female | 728 (84.5) | 419 (75.0) | <0.001 |
| Age, year | | | 0.007 |
| < 35 | 277 (31.7) | 138 (24.3) | |
| 35–44 | 243 (27.8) | 196 (34.5) | |
| 45–54 | 236 (27.0) | 149 (26.2) | |
| ≥ 55 | 118 (13.5) | 85 (15.0) | |
| Occupational group | | | <0.001 |
| Nurse | 338 (38.8) | 206 (36.7) | |
| Nursing assistant | 164 (18.8) | 31 (5.5) | |
| Physician | 70 (8.0) | 200 (35.7) | |
| Other healthcare | 73 (8.4) | 49 (8.7) | |
| Administrative | 80 (9.2) | 20 (3.6) | |
| Technical | 68 (7.8) | 38 (6.8) | |
| Other | 79 (9.1) | 17 (3.0) | |
| Hospital sector | | | 0.018 |
| Medicine and pediatrics | 292 (33.0) | 175 (30.7) | |
| Surgery and gynecology | 229 (25.9) | 153 (26.8) | |
| Technical (pharmacy, operating rooms, imaging, laboratories) | 115 (13.0) | 68 (11.9) | |
| Intensive care, emergency, and anesthesia | 215 (24.3) | 167 (29.3) | |
| Several or other | 35 (4.0) | 8 (1.4) | |

**Notes**: Values were missing for gender (n=37), age (n=15), occupational group (n=24).

## Discussion

This study showed that being involved in MMC and EFC activities was associated with higher patient safety culture, in a large university-affiliated hospital in France. Our analysis reveals that participation in QIPs is associated with higher scores across several dimensions of the HSOPS, independently of baseline characteristics.

Notably, these dimensions include "Organizational learning", "Feedback and communication about error", and "Nonpunitive response to error", underscoring the pivotal role of QIPs in promoting a culture of safety and continuous quality improvement. The findings highlight the effectiveness of QIPs, particularly through root cause analysis conducted in team settings, in enhancing patient safety culture. These results are particularly interesting because these essential dimensions for patient safety are often the weakest in safety culture barometers conducted in hospitals.[34,35] The nonpunitive error dimension, for example, was one of the weakest in a study comparing patient safety culture in four European countries,[36] and the second lowest in the HSOPS database in the US.[37] Our results suggest that feedback and communication about error could be improved, and a blame-free culture could be established in hospitals implementing quality improvement programs like EFCs and MMCs. By facilitating structured, team-based reviews of adverse events, MMCs and EFCs encourage open Discussions, collaborative problem-solving, and the implementation of targeted interventions to prevent future errors. This team-oriented approach to root cause analysis serves as a critical mechanism for fostering an environment where learning from mistakes is prioritized, and continuous quality improvement is achieved.[38–40]

Our study confirms the positive association between EFC participation and patient safety culture observed in the 2014 study,[21] with significant improvements noted in nine out of twelve HSOPS dimensions. The inclusion of MMCs in our analysis introduces a novel perspective, highlighting the complementary role of MMCs alongside EFCs in enhancing patient safety culture. As in the previous study on EFCs in 2014,[41] we find here that MMC participants are also more inclined to report adverse events than non-participants. These results are not surprising, given that MMCs and EFCs operate by analyzing reported adverse events, which are the cornerstone of these meetings. These results have also been demonstrated by Szekendi et al,[40] showing that MMCs promote transparency and voluntary reporting of errors.

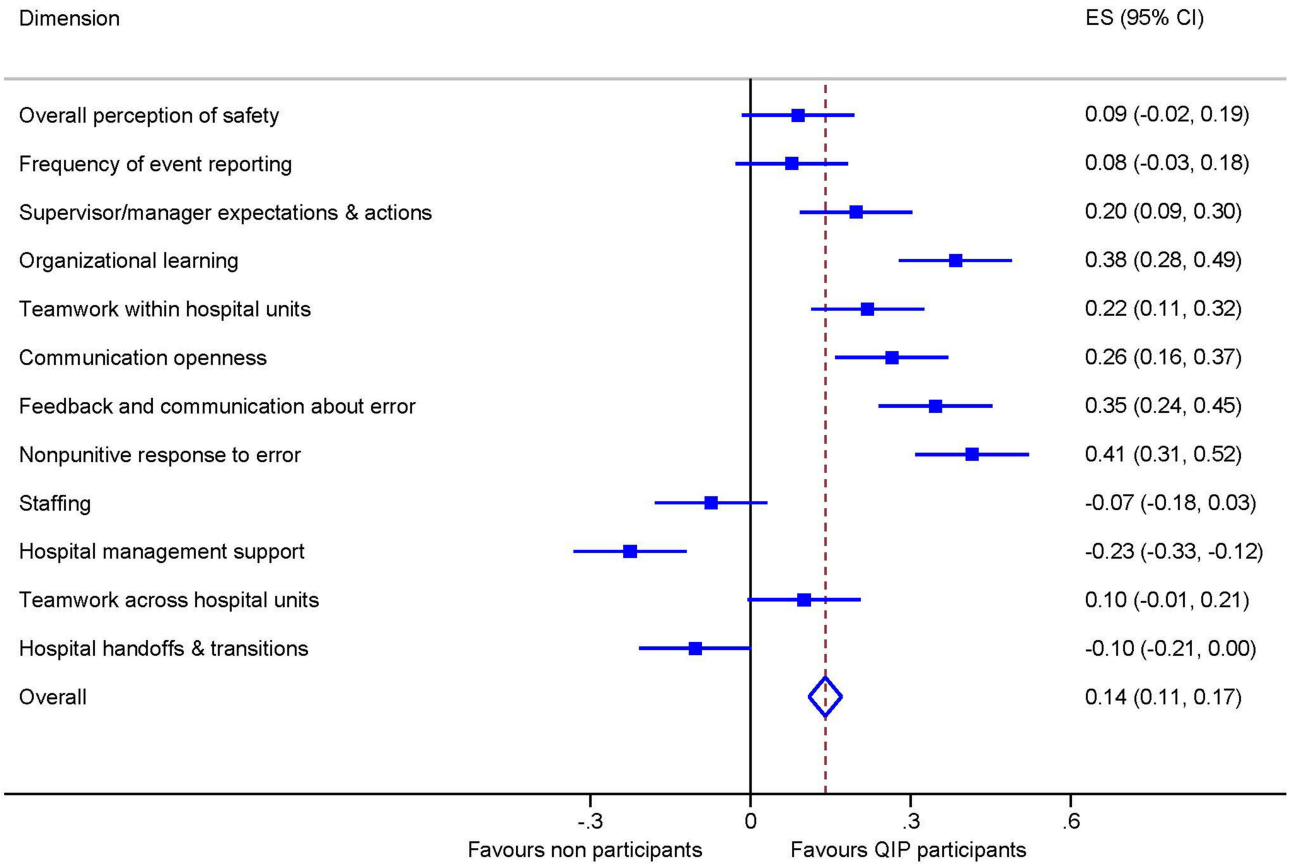


**Figure 2** Comparison of HSOPS scores according to QIP participation (effect size).

Although exploratory, our subgroup analysis identified several interesting points. Firstly, participation in either an EFC or an MMC was generally associated with a better safety culture, demonstrating the inherent value of these two programs, and justifying the decision to measure their impact together in the main analysis. Secondly, there appeared to be a cumulative effect of the two programs on the safety culture of participants. Indeed, the largest effect sizes and regression coefficients concerned the group of health professionals participating in both an EFC and an MMC. Although this remains hypothetical, there appears to be a synergy between these two programs, likely due to their complementary nature. Although similar in their goal of engaging healthcare professionals in root cause analysis, the methodologies of EFCs and MMCs are slightly different, and the typologies of adverse events analyzed are also different. EFCs are often more multidisciplinary, and the events are often oriented towards organizational problems, while MMCs are more oriented towards errors in the medical management of patients.[22,41,42] Our results suggest that the complementarity between EFCs and MMCs can leverage the unique strengths of each program to foster a more robust and resilient safety culture. It also implies that the integration of educational and action-oriented approaches to patient safety can lead to greater improvements than those achieved by focusing on a single method. This enhanced effect of combined participation may also reflect the broader engagement and commitment of healthcare providers to patient safety initiatives, indicating a deeper integration of safety principles into daily practices. It also emphasizes the importance of a collaborative culture in healthcare, where various professional groups work together to address and learn from adverse events, thereby enhancing the overall safety climate within the institution.[43,44]

These findings have significant implications for future research and practice, suggesting that healthcare organizations should consider strategies to facilitate and encourage involvement in both EFCs and MMCs. Such an approach could optimize the impact of QIPs on patient safety culture, contributing to the ongoing efforts to reduce medical errors and improve care quality across healthcare settings.

**Table 2** Multivariate Analysis of Variance Results According to QIP Participation

| | QIP PARTICIPATION | | P |
|---|---|---|---|
| MANOVA | Statistics | F | |
| Wilks' lambda | 0.9259 | 9,11 | <0.001 |
| Pillai's trace | 0.0741 | 9,11 | <0.001 |
| Lawley Hotelling trace | 0.0800 | 9,11 | <0.001 |
| Roy's largest root | 0.0800 | 9,11 | <0.001 |
| Multivariate regression underlying the MANOVA | Coefficient | 95% CI | |
| Overall perception of safety | 0.10 | 0.01 to 0.19 | 0.031 |
| Frequency of event reporting | 0.17 | 0.05 to 0.29 | 0.005 |
| Supervisor/Manager expectations and actions | 0.19 | 0.08 to 0.29 | <0.001 |
| Organizational learning | 0.26 | 0.18 to 0.35 | <0.001 |
| Teamwork within hospital units | 0.13 | 0.04 to 0.22 | 0.003 |
| Communication openness | 0.18 | 0.09 to 0.27 | <0.001 |
| Feedback and communication about error | 0.31 | 0.21 to 0.40 | <0.001 |
| Non punitive response to error | 0.29 | 0.19 to 0.38 | <0.001 |
| Staffing | 0.01 | −0.08 to 0.10 | 0.768 |
| Hospital management support | −0.14 | −0.22 to −0.05 | 0.002 |
| Teamwork across hospital units | 0.03 | −0.04 to 0.10 | 0.370 |
| Hospital handoffs and transitions | −0.01 | −0.09 to 0.07 | 0.822 |

**Notes**: *The model included the 12 dimensions scores as dependent variables and the QIP participation, sex, hospital sector, and healthcare profession category as independent variables.

Despite their benefits, our study also highlights the limitations inherent in root cause analysis practices, particularly when conducted at the department level.[16,24,45] Indeed, certain dimensions of patient safety culture, such as "Staffing", "Hospital management support", and "Hospital handoffs and transition", were not significantly associated with QIP participation. The absence of association might seem paradoxical at first, but it is a finding echoed in other studies.[21] A potential explanation is that participants in root cause analyses are more aware of the underlying causes of adverse events, such as patient and information transfers and staffing problems, which are often identified as contributing factors in root cause analyses. This increased awareness, however, does not necessarily translate into improvements in these areas, especially when the issues are systemic and require more comprehensive interventions. The dimension of hospital management support follows a similar pattern, often stemming from the dissatisfaction of those involved in QIPs due to the perceived indifference of leadership towards these critical issues. This might also reflect broader structural challenges within the healthcare system, such as staffing shortages and budget constraints, which cannot be addressed solely through department-level interventions like EFCs and MMCs. Addressing these dimensions represents a future challenge for decision-makers and researchers in patient safety. Staffing, in particular, is a critical issue that affects many aspects of patient care and safety. Chronic understaffing can lead to increased workloads, burnout, and higher rates of errors, all of which undermine the effectiveness of QIPs. Solutions to staffing issues often require organizational and policy-level changes, including better workforce planning, improved working conditions, and increased funding for healthcare services. These areas are consistently identified as weak points in studies using the HSOPS questionnaire,[35] such as the HSOPS database including surveys from more than 400 hospitals in the US in 2022.[37] Structural issues like staffing shortages require systemic solutions that go beyond the scope of individual departments and call for organizational and policy-level interventions.

Our study demonstrated a positive association between participation in MMCs and EFCs and an enhanced patient safety culture in a large university-affiliated hospital in France. To further contextualize our findings, it would be interesting to consider evidence from developing countries where there is often a strong moral culture towards patient care. Numerous studies report safety culture surveys using HSOPS in developing countries,[46–49] but none studied the link between QIP participation and Patient Safety Culture. However, Lahouni et al reported a study showing that MMCs were

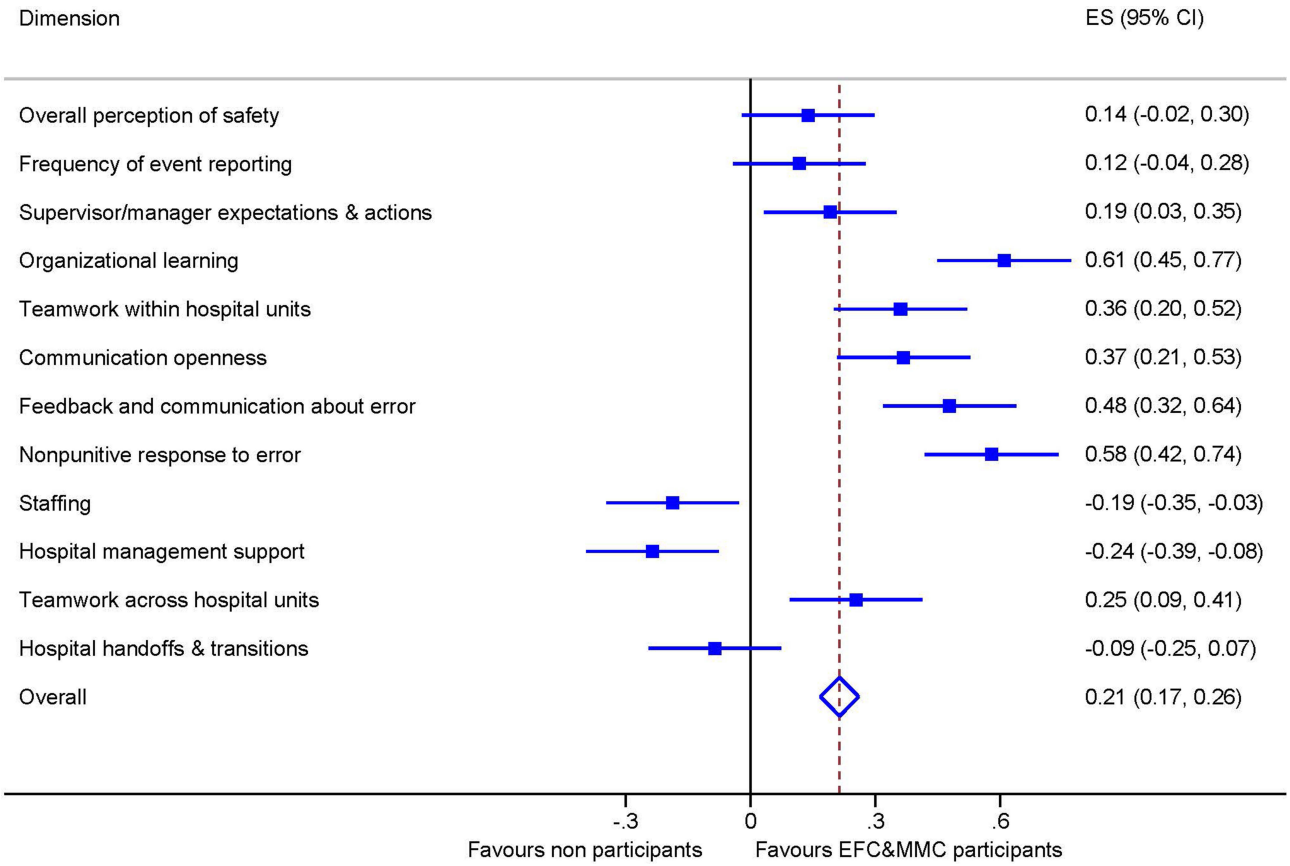


**Figure 3** Comparison of HSOPS scores according to EFC & MMC participation (effect size).

applicable to the context of developing countries, and we believe that our study could be reproduced in other contexts.[18] Such studies would be interesting and would allow verification of whether QIPs can have a similar effect on the safety culture of participants, despite budgetary constraints and different cultures.

While our study provides valuable insights, it is subject to limitations, including its cross-sectional design and the potential for reverse causality bias. As the QIP participation is voluntary, we cannot exclude that participants may be more aware of the patient safety concept than the nonparticipants, before their involvement in the QIP. However, we adjusted our analyses on respondents' characteristics, demonstrating the robustness of the association between QIP participation and patient safety culture. Moreover, the response rate of 30% for our survey, though aligning with typical online survey responses, might not comprehensively represent the entire range of caregivers' perceptions. Furthermore, conducting the study in a single university hospital may limit the generalizability of the findings to other settings. We believe that only a prospective, randomized controlled trial can offer more definitive evidence of the impact of QIPs on patient safety culture.[50]

## Conclusion

In Conclusion, our study reinforces the notion that active involvement in EFC and MMC activities is associated with a more positive patient safety culture, as assessed by the standardized HSOPS questionnaire, particularly in dimensions that emphasize learning, communication, and nonpunitive responses. Despite facing systemic challenges, EFCs and MMCs represent valuable tools for engaging healthcare professionals in the continuous improvement of patient safety. The effectiveness of these programs underscores the importance of a collective and structured approach to enhancing the safety culture within healthcare settings.

To further improve patient safety culture, healthcare providers should actively participate in MMCs and EFCs and share insights and learnings with colleagues to promote a culture of safety across the organization. Hospital management

should provide support and resources for continuous quality improvement programs, ensure adequate staffing, and foster an environment that encourages open communication and nonpunitive responses to errors. Policy makers should develop policies that support and incentivize participation in QIPs and provide guidelines for implementing effective patient safety strategies. By taking these steps, stakeholders can work together to address systemic challenges and enhance the overall safety culture in healthcare settings.

Future studies should aim to explore the long-term impact of QIP participation on patient safety culture across various healthcare settings, including both developed and developing countries. Longitudinal studies could provide more definitive evidence on the sustainability of improvements in safety culture and the specific mechanisms by which QIPs influence safety outcomes. Additionally, randomized controlled trials could offer stronger evidence of causality between QIP participation and enhancements in patient safety culture.

Further research should also investigate the role of organizational factors, such as leadership support and resource allocation, in the effectiveness of QIPs. Understanding these factors could help tailor QIP implementations to different healthcare environments, maximizing their impact. Lastly, examining the experiences and perceptions of non-physician healthcare providers involved in QIPs could provide valuable insights into how these programs can be more inclusive and effective in fostering a comprehensive culture of safety.

By addressing these areas, future research can contribute to a deeper understanding of how QIPs can be optimized to enhance patient safety culture globally, ensuring that all healthcare providers are equipped to deliver safe and high-quality care.

## Abbreviations

QIP(s), quality improvement program(s); EFC(s), experience feedback committee(s); MMC(s), morbidity and mortality conference(s); HSOPS, Hospital Survey on Patient Safety Culture.

## Data-Sharing Statement

The data analyzed in this study are available from the corresponding author on reasonable request.

## Ethics Approval

The authors confirm that all methods were carried out in accordance with relevant guidelines and regulations. Research have been performed in accordance with the Declaration of Helsinki. Ethics approval was deemed unnecessary according to French legislation. LOI n° 2012 − 300 du 5 mars 2012 relative aux recherches impliquant la personne humaine.[51] Available on the website: https://www.legifrance.gouv.fr/eli/loi/2012/3/5/SASX0901817L/jo/texte.

Participants were fully informed about the study and could oppose the use of their data. Informed consent was obtained from all subjects.

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## Disclosure

Laurent Boyer reports honoraria/has been a consultant for Lundbeck, outside the submitted work. The authors report no other conflicts of interest in this work.

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