

Reporting under Fear, Silence under Hierarchy: Event Reporting, Blame and Speaking up in Secondary and Tertiary Hospitals in Bayelsa State, Nigeria

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Abstract

Background: Incident reporting and speaking up are how hospitals learn from error. Both are thought to depend on a non-punitive, "just" culture. Evidence on how these behaviours vary across levels of care in sub-Saharan Africa is scarce. We examined event reporting, response to error, communication openness and feedback in secondary and tertiary hospitals in Bayelsa State, Nigeria. **Methods:** Between December 2015 and March 2016, we conducted a cross-sectional survey of 438 healthcare workers (response rate 87.6%) in five general hospitals (n = 252) and one federal teaching hospital (n = 186). We used 11 items from four dimensions of the Hospital Survey on Patient Safety Culture, plus respondents' free-text comments. Items were compared with Welch's t-test, Hedges' g and Holm correction across all 41 survey items. **Results:** Secondary hospitals had the most punitive climate in the survey (non-punitive response index 48.0% vs 65.8%). Their staff were far more worried that mistakes are kept in personnel files (g = 1.10, the largest difference in the survey). Yet they reported events more often (70.8% vs 60.4%), especially mistakes with no potential for harm (3.63 vs 2.82; g = -0.82). Tertiary staff were the least free to question the decisions of those with more authority (mean 2.10, the lowest item score at that level; g = -0.43) and less likely to speak up freely (g = -0.34). They were, however, less afraid to ask questions (g = 0.54). They also received more feedback about errors. Among coded free-text comments, 18.3% described doctors not admitting prescription errors. Field observations, mainly in the general hospitals, showed that incidents went unrecorded for fear of disciplinary queries, allowing them to recur. **Conclusions:** The levels of care showed two distinct failure modes. Secondary hospitals showed *defensive reporting*: events are reported, but in a climate of blame. The teaching hospital showed *filtered silence*: blame is lower, but reporting is severity-filtered and upward challenge is muted by hierarchy. A non-punitive climate was necessary but not sufficient for reporting. Interventions should combine just-culture policy in general hospitals with structured speaking-up and hierarchy-flattening practices in teaching hospitals.

Keywords: Incident Reporting; Just Culture; Non-Punitive Response; Speaking Up; Authority Gradient; Psychological Safety; HSOPSC; Nigeria

I. INTRODUCTION

Much of the harm that patients suffer in hospitals is preventable, and most of the global burden falls on low- and middle-income countries [1,2]. Hospitals learn to prevent harm mainly from their own near misses and errors. That learning depends on staff doing two things. They must report events, and they must speak up when they see risk in real time.

Reason called an organisation with these properties a "reporting culture" and argued that it rests on a "just culture" [3]. In a just culture, honest errors are not punished and blame is reserved for reckless conduct. Incident reporting systems have been promoted worldwide on this basis [4], although their value depends on what hospitals do with the reports [5]. Just-culture frameworks are now widely recommended [6,7] and underpin the World Health Organization's Global Patient Safety Action Plan [1].

A second line of research concerns speaking up. Edmondson showed that teams learn from failure only when members feel it is safe to take interpersonal risks [8]. In healthcare, professional status shapes that safety. Staff lower in the hierarchy feel less safe to challenge those above them unless leaders actively invite it [9]. Reviews of speaking up for patient safety find that hierarchy, fear of retaliation and doubts that anything will change keep staff silent even when they see danger [10,11].

The Hospital Survey on Patient Safety Culture (HSOPSC) captures these ideas in four dimensions: frequency of events reported, non-punitive response to error, communication openness, and feedback and communication about error. Worldwide, non-punitive response and event reporting are among the weakest HSOPSC dimensions [12]. In Africa, non-punitive response is the single weakest, with a pooled positive score of 34.5% [13]. Nigerian studies from Katsina and Ibadan found event reporting among the weakest dimensions; in Ibadan it was the weakest [14,15]. Studies of reporting barriers routinely name fear of blame first [16,17].

The standard interpretation is linear: reduce blame and reporting will rise. Associations between non-punitive response and reporting within hospitals support it [18]. However, blame and voice may work differently in settings with steep professional hierarchies. Nigerian hospitals are one such setting, and Nigerian society scores high on power distance [19]. Teaching hospitals, with layered hierarchies of consultants, residents, house officers, pharmacists and nurses, may be especially affected.

No study from the Niger Delta has examined these behaviours across levels of care. We therefore asked three questions:

1. Do event reporting, non-punitive response, communication openness and feedback differ between secondary and tertiary hospitals in Bayelsa State?
2. Do reporting and blame move in opposite directions across levels, as the linear model predicts?
3. Which specific behaviours (reporting by severity, speaking up, challenging authority, receiving feedback) account for any difference?

Novelty statement

Most patient safety culture studies assume one causal chain. A less punitive climate is expected to produce more reporting and more speaking up, so reporting and blame should move in opposite directions. This study is the first from Nigeria's Niger Delta to test that assumption across levels of care, and the data contradict it. The general hospitals had the most punitive climate in the survey yet reported most. The teaching hospital was the least punitive yet reported least and showed the weakest upward voice.

We make three original contributions.

1. **A voice-blame typology.** We separate *defensive reporting* (high blame, high reporting) from *filtered silence* (low blame, low reporting and muted challenge). Each needs a different intervention.
2. **A severity filter on reporting in the teaching hospital.** Reporting fell most for mistakes with no potential to harm, which are the near-miss data that learning systems depend on.
3. **A voice asymmetry.** Teaching-hospital staff felt free to *ask* but not to *challenge*. Psychological safety for learning and voice across the hierarchy are distinct constructs, and the HSOPSC communication-openness composite hides the difference.

What this study adds

- **What is already known:** Non-punitive response to error is the weakest safety culture dimension in African hospitals. Fear of blame is the most cited barrier to incident reporting.
- **What this study adds:** Across levels of care, reporting and blame did not move in opposite directions. The most punitive setting reported most, while the least punitive setting reported least and challenged authority least. A non-punitive climate was necessary but not sufficient.
- **How this might affect practice:** General hospitals need a written just-culture policy that separates reporting from discipline. Teaching hospitals need structured speaking-up tools, active near-miss reporting and leaders who invite challenge.

II. METHODS

Design, setting and participants

We conducted a multicentre cross-sectional survey in six public hospitals in Bayelsa State, in the central Niger Delta of Nigeria, reported according to the STROBE statement [20].

- **Secondary level:** the general hospitals at Okolobiri, Sagbama, Otuasega, Amassoma and Kaiama, which are state-run and nurse-led.
- **Tertiary level:** the Federal Medical Centre, Yenagoa, a federal teaching and referral hospital with a resident-doctor training programme.

All staff on duty during the survey period, clinical and non-clinical, were invited. Questionnaires were given to those who gave verbal informed consent. Of 500 questionnaires distributed, 438 were retrieved and analysed, a response rate of 87.6%. Of these, 252 came from secondary hospitals and 186 from the tertiary hospital. Data were collected between December 2015 and March 2016. Respondent characteristics are described in detail in the companion paper [21].

In brief, 71.7% of secondary respondents were registered nurses. The tertiary sample was mostly pharmacists and intern pharmacists (21.9%), resident doctors and house officers (14.8%) and other staff (39.9%).

Measures

We used four dimensions of the adapted Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture, version 1.0 [22]:

- **Frequency of events reported** (three items, frequency scale): how often three kinds of mistake are reported. These are a mistake caught and corrected before it affects the patient, a mistake with no potential to harm, and a mistake that could harm but does not.
- **Non-punitive response to error** (three items): whether mistakes are held against staff, whether a report targets the person rather than the problem, and whether mistakes are kept in personnel files.
- **Communication openness** (three items): speaking up freely about risks to patients, feeling free to question the decisions or actions of those with more authority, and not being afraid to ask questions.
- **Feedback and communication about error** (three items): feedback on changes made after event reports, being informed about errors, and discussing ways to prevent recurrence.

Items used 5-point agreement or frequency scales. Negatively worded items (R) were reverse-coded so that higher scores are always more positive.

For the feedback item "we are given feedback about changes put into place based on event reports", the thesis table repeated the values of a communication-openness item, which indicates a transcription error. We excluded this item from item-level analysis. Our analytical set was therefore 11 items. The feedback composite index reported here comes from the original analysis of individual responses.

The questionnaire ended with an open comment section. Free-text comments were analyzed thematically using a hybrid approach. Deductive coding applied codes defined in advance from the study's focus on safety culture. Inductive coding developed further codes from the comments themselves. Themes are expressed as percentages of coded comments. In addition, the investigators made field observations of how incidents were handled during data collection, mainly at the general hospitals; these are reported descriptively.

Scoring and analysis

Composite scores were expressed as a mean score index: the mean of item means, divided by 5 and multiplied by 100. We classified them as a strength ($\geq 75\%$), an area for improvement (50–74.9%) or a weakness ($< 50\%$). This index is not AHRQ's percent-positive score and runs higher than it.

Individual-level records were no longer available, so comparative inference was re-run from item-level summary statistics (n, mean, SD) in Python 3 (SciPy). For each item we calculated:

- Welch's unequal-variance t-test [23];
- Hedges' g with a 95% confidence interval [24], with positive values favouring the tertiary hospital;
- a Holm-adjusted p-value across all 41 analyzed items of the survey [25].

We interpreted |g| of 0.2, 0.5 and 0.8 as small, medium and large. Within-level contrasts between reporting items (for example, no-harm versus potential-harm mistakes) could not be tested formally, because the correlation between items is not recoverable from summary statistics. We describe these contrasts descriptively.

Cronbach's alpha, taken from the original analysis [26], was 0.81 for frequency of events reported, 0.77 for non-punitive response, 0.64 for communication openness and 0.41 for feedback about error. Because of the low alpha for feedback, we interpret that dimension at item level.

Ethics

Ethical approval was granted by the Bayelsa State Ethics Committee. The management of each hospital also approved the study. Participation was voluntary and anonymous, and each respondent gave verbal informed consent.

III. RESULTS

Profile of the four dimensions

The two levels of care moved in opposite directions across the four dimensions (Table 1). The tertiary hospital scored higher on non-punitive response to error (+17.8 index points) and on feedback about error (+7.6). The secondary hospitals scored higher on frequency of events reported (+10.4) and on communication openness (+4.2). Non-punitive response in secondary hospitals (48.0%) was the only area of weakness in the entire 12-dimension survey. Feedback about error in the tertiary hospital (80.8%) was an area of strength.

Table 1. Mean score index (%) for the four reporting and blame dimensions, by level of care

Dimension	Secondary (n = 252)	Tertiary (n = 186)	Difference (tertiary minus secondary)	Classification: secondary / tertiary
Frequency of events reported	70.8	60.4	-10.4	Improvement / improvement
Non-punitive response to error	48.0	65.8	+17.8	Weakness / improvement
Communication openness	64.2	60.0	-4.2	Improvement / improvement
Feedback and communication about error	73.2	80.8	+7.6	Improvement / strength

Mean score index = mean of item means / 5 × 100. Strength ≥75%; improvement 50–74.9%; weakness <50%.

Item-level differences

Ten of the 11 items differed between levels after Holm correction (Table 2; Figure 1). The pattern was clear. All three non-punitive items, both feedback items and "not afraid to ask questions" favoured the tertiary hospital. All reporting items, "speaking up freely" and "questioning authority" favoured the secondary hospitals.

Blame. The largest difference in the whole survey concerned personnel files. Secondary staff were much more worried that their mistakes are kept on file (mean 2.31 vs 3.50; $g = 1.10$). They also more often felt that mistakes are held against them (2.36 vs 3.16; $g = 0.77$) and that a report targets the person rather than the problem (2.53 vs 3.20; $g = 0.63$). All three secondary means fell in the weakness band (<2.50) or just above it.

Voice: asking versus challenging. Communication openness split in two. Tertiary staff were *less* afraid to ask questions when something did not seem right (4.00 vs 3.56; $g = 0.54$). But they were *less* likely to speak up freely about risks to patients (2.73 vs 3.11; $g = -0.34$). They were also less free to question the decisions or actions of those with more authority (2.10 vs 2.63; $g = -0.43$). At 2.10, questioning authority was the lowest of all 41 item scores in the tertiary hospital and the only tertiary item in the weakness band.

Feedback. Tertiary staff were more often informed about errors in their unit (4.02 vs 3.74; $g = 0.40$). They also more often discussed ways to prevent recurrence (4.11 vs 3.69; $g = 0.45$). Both levels scored in or near the strength band on these two items.

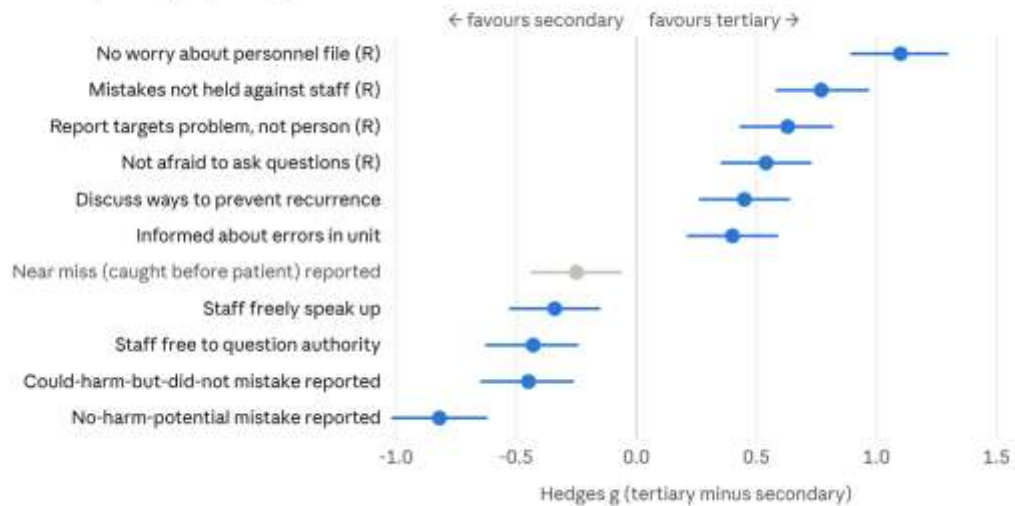
Table 2. Item-level comparison for the reporting and blame dimensions

Dimension / item	Secondary mean (SD)	Tertiary mean (SD)	t	p	Holm p	Hedges' g (95% CI)
Frequency of events reported						
When a mistake is made but is caught and corrected before affecting the patient, how often is this reported?	3.39 (0.88)	3.16 (0.97)	-2.55	0.011	0.112	-0.25 (-0.44 to -0.06)
When a mistake is made that has no potential to harm the patient, how often is this reported?	3.63 (0.90)	2.82 (1.09)	-8.27	<0.001	<0.001	-0.82 (-1.02 to -0.62)
When a mistake is made that could harm the patient but does not, how often is this reported?	3.59 (0.98)	3.09 (1.24)	-4.55	<0.001	<0.001	-0.45 (-0.65 to -0.26)
Non-punitive response to error						
Staff feel like their mistakes are held against them (R)	2.36 (0.98)	3.16 (1.10)	7.88	<0.001	<0.001	+0.77 (+0.58 to +0.97)
When an event is reported, it feels like the person is being written up, not the problem (R)	2.53 (0.94)	3.20 (1.22)	6.24	<0.001	<0.001	+0.63 (+0.43 to +0.82)
Staff worry that mistakes they make are kept in their personnel file (R)	2.31 (0.91)	3.50 (1.28)	10.82	<0.001	<0.001	+1.10 (+0.89 to +1.30)
Communication openness						
Staff will freely speak up if they see something that may negatively affect patient care	3.11 (1.12)	2.73 (1.11)	-3.52	<0.001	0.006	-0.34 (-0.53 to -0.15)
Staff feel free to question the decisions or actions of those with more authority	2.63 (1.29)	2.10 (1.11)	-4.60	<0.001	<0.001	-0.43 (-0.63 to -0.24)
Staff are afraid to ask questions when something does not seem right (R)	3.56 (0.69)	4.00 (0.95)	5.36	<0.001	<0.001	+0.54 (+0.35 to +0.73)
Feedback and communication about error						
We are informed about errors that happen in this unit	3.74 (0.62)	4.02 (0.80)	3.97	<0.001	0.001	+0.40 (+0.21 to +0.59)
In this unit, we discuss ways to prevent errors from happening again	3.69 (1.01)	4.11 (0.81)	4.83	<0.001	<0.001	+0.45 (+0.26 to +0.64)

Item means on a 1–5 scale; (R) = reverse-coded, so higher is always more positive. t and p: Welch's t-test. Holm p is adjusted across all 41 survey items. g > 0 favours the tertiary hospital. Secondary n = 251–252; tertiary n = 184–186.

Figure 1. Less blame at tertiary level, but less voice

Hedges g with 95% CI per item; grey = not significant after Holm correction

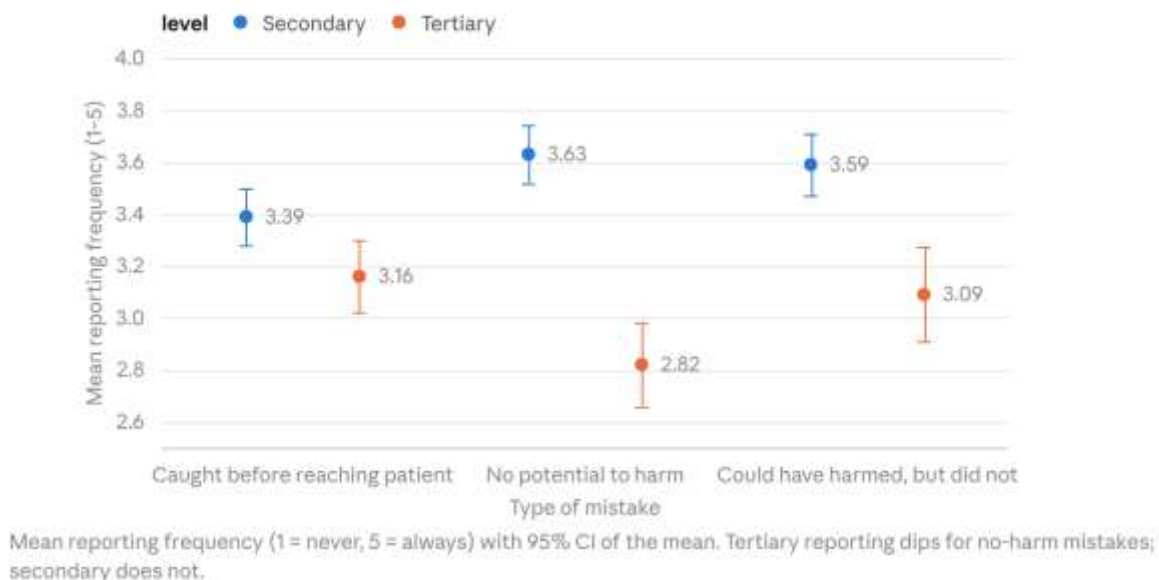


Reporting by type of mistake

The gap in reporting depended on the type of mistake (Figure 2). In secondary hospitals, reporting frequency was similar across the three types, and was highest for mistakes with no potential to harm (3.63). In the tertiary hospital the profile dipped for the same category: mistakes with no potential to harm were the least reported (2.82). Caught near misses (3.16) and mistakes that could have harmed (3.09) were reported more often.

The difference between levels was therefore largest for no-harm mistakes ($g = -0.82$), moderate for potential-harm mistakes ($g = -0.45$), and small and not robust for caught near misses ($g = -0.25$; Holm $p = 0.11$). Because within-person correlations were unavailable, the within-level contrasts are descriptive. However, in the tertiary hospital the 95% confidence interval for no-harm reporting does not overlap that for caught near misses, and barely overlaps that for potential-harm mistakes.

Figure 2. Reporting by type of mistake



Thesis item means; 95% CI = mean $\pm$ 1.96 $\times$ SD/ $\sqrt{n}$

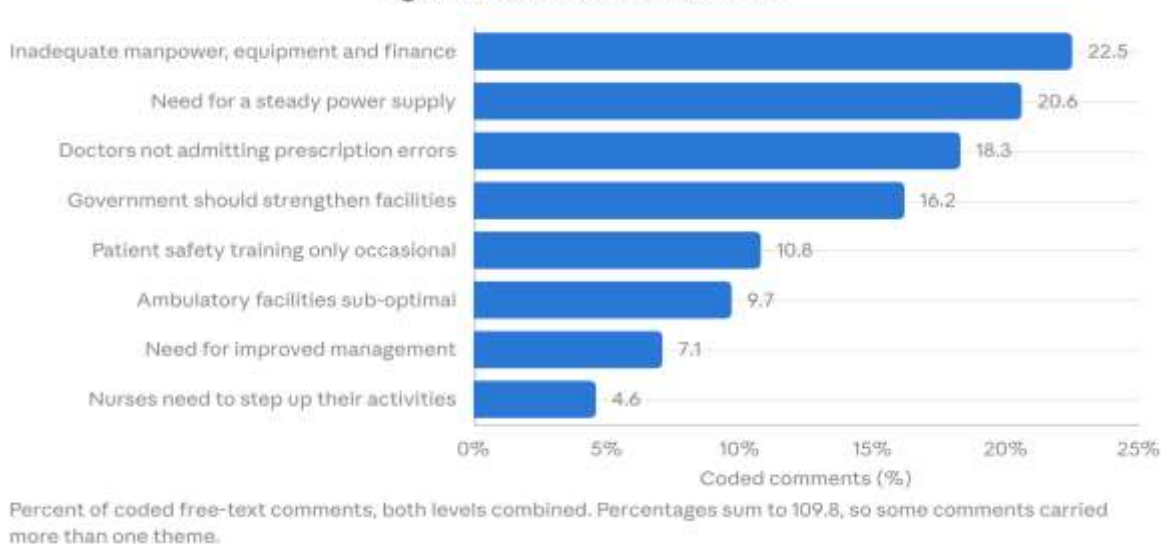
Staff comments and field observations

The free-text comments fell into two groups (Figure 3). Most concerned structural resources: manpower, equipment and finance (22.5%), unreliable electricity (20.6%) and facility strengthening by government (16.2%).

The third most frequent theme was about error disclosure itself. 18.3% of coded comments said that doctors do not admit prescription errors. Smaller themes were that patient safety training is only occasional (10.8%) and that nurses should "step up" (4.6%). Together, the comments about doctors and about nurses suggest that professional groups attributed responsibility for safety to each other.

Field observations made during data collection, mainly at the general hospitals, showed that incidents were often not recorded because staff feared being issued a query, the formal disciplinary letter used in the Nigerian public service. Because unrecorded incidents were never analysed, the same incidents recurred.

Figure 3. Themes in staff comments



IV. DISCUSSION

Principal findings

The linear model predicts that the least punitive setting will report most. We found the reverse. The general hospitals had the most punitive climate recorded anywhere in the survey, yet their staff reported mistakes more often, including those with no potential for harm, and spoke up more freely. The teaching hospital was markedly less punitive and gave better feedback about errors. But its staff reported less, filtered their reporting by severity, and were the least free of anyone to question those with more authority. The free-text comments pointed the same way: nearly one in five coded comments described doctors not admitting prescription errors.

Why reporting and blame did not move in opposite directions

We propose that the two levels show two different failure modes. We call them **defensive reporting** and **filtered silence** (Table 3).

Defensive reporting in the general hospitals. Reporting can serve two purposes: learning, or accountability [5]. Several findings suggest that in the general hospitals it serves accountability. Staff felt that a report "writes up" the person rather than the problem. They worried that mistakes go into personnel files. Services were nurse-led. Field observations at the general hospitals show what this means in practice. Staff often left incidents unrecorded because a formal record could bring a disciplinary query, and unrecorded incidents recurred. The high survey scores for reporting therefore probably reflect events that are hard to hide or already known to supervisors, while the written record stays thin and personally risky. In this setting reporting is experienced as surveillance rather than learning.

Nurses also report incidents more readily than doctors in most settings [16,27], and nurses formed 72% of the secondary sample. Part of the gap may therefore reflect profession rather than level. Reporting done under threat is a fragile foundation: it tends to produce defensive, minimal reports and does not build the trust needed for staff to report the latent conditions behind errors [3,7].

Filtered silence in the teaching hospital. In the teaching hospital blame was lower, but two filters operated. The first was **severity**. Reporting fell most for mistakes with no potential to harm, a pattern consistent with the belief that "minor" events are not worth reporting. That belief is one of the most frequently cited barriers to reporting [16,17]. Yet near misses and no-harm events are the data from which organisations learn at no cost to patients [4,5]. The companion paper found that the teaching hospital also scored lowest on "mistakes have led to positive changes" [21]. This is consistent with a learning system that receives too few low-harm signals. The second filter was **hierarchy**. Tertiary staff were not afraid to *ask* questions, which fits the teaching mission of a training hospital. But they did not feel free to *challenge* decisions made by those above them, and were less likely to speak up freely about risks. Status and hierarchy suppress speaking up unless leaders explicitly invite it [9,10]. In a classic survey, many surgeons held that junior team members should not question the decisions of senior staff [28]. Nigerian hospitals combine a layered medical hierarchy with a national culture of high power distance [19]. In such settings asking is permitted but challenging is not. The comments that doctors do not admit prescription errors, from a sample in which pharmacists were the largest named tertiary group, fit this picture of error concealment at the top of the gradient.

Asking is not the same as challenging

The HSOPSC communication-openness composite mixes three behaviours: speaking up, questioning authority and not being afraid to ask. At composite level the two levels differed by only 4.2 index points. At item level, the tertiary hospital scored best on asking and worst on challenging. The composite therefore hides a large, clinically important asymmetry.

This supports Morrison and Milliken's distinction between low-risk voice (seeking information) and high-risk upward voice (challenging the powerful) [11]. It also supports Edmondson's point that psychological safety for learning does not automatically extend to challenging authority [8,9]. Future Nigerian surveys should report communication openness item by item. They should also add validated speaking-up measures [10].

Feedback loops

The teaching hospital's advantage in being informed about errors and discussing prevention is encouraging. Effective feedback is what turns reports into learning [29]. But feedback cannot exceed its input. A strong feedback loop around a narrow, severity-filtered set of events may produce the pattern described in the companion paper: plenty of discussion, and little system change [21,30].

Comparison with other settings

In Palestinian and Turkish hospitals, low non-punitive scores went together with low reporting and low openness [31,32]. That is the classic blame-culture pattern, in the high-blame, low-voice quadrant of Table 3. Neither Bayelsa level fits that pattern. The African meta-analysis reported only pooled estimates and could not show whether reporting and blame vary together across settings [13]. Within Lebanese hospitals, higher non-punitive scores were associated with more frequent reporting [18]. Our two-level comparison is ecological and does not contradict that individual-level association. It does show that between care settings, other forces (profession, hierarchy, and the purpose reporting serves) can outweigh it.

Table 3. A voice-blame typology of reporting cultures, with the pattern observed in this study

Pattern	Blame	Reporting and voice	Where observed	Main risk	Priority interventions
Blame culture	High	Low	Palestinian and Turkish hospitals [31,32]	Errors hidden; no learning	Just-culture policy; confidential reporting; leadership commitment
Defensive reporting	High	High	Bayelsa general hospitals	Reports used for discipline (queries); incidents left unrecorded and recur; latent causes not reported	Separate incident reports from personnel files; just-culture decision aid for supervisors; confidential reporting; feedback that shows system fixes
Filtered silence	Lower	Low, severity- and hierarchy-filtered	Bayelsa teaching hospital	Near misses lost; unchallenged senior decisions; errors concealed	Structured speaking-up tools; leader inclusiveness; active near-miss reporting; interprofessional error

Pattern	Blame	Reporting and voice	Where observed	Main risk	Priority interventions
					review
Just and reporting culture (target)	Low	High	—	—	Sustain through feedback and learning reviews

Implications for practice

General hospitals (Bayelsa State Hospitals Management Board):

- Issue a written just-culture policy stating that incident reports are never placed in personnel files or used as grounds for a query. This addresses the largest single effect in the survey.
- Train ward supervisors in a just-culture decision algorithm that separates system error, at-risk behaviour and reckless conduct [6,7].
- Offer a confidential reporting route.
- Close the loop with "you reported, we changed" feedback [29].

Teaching hospital:

- Adopt structured speaking-up tools, such as graded assertiveness phrases and the two-challenge rule.
- Have consultants and unit heads explicitly invite challenge; leader inclusiveness weakens the effect of professional status on psychological safety [9].
- Actively solicit and celebrate no-harm and near-miss reports, for example with a simple pharmacy-led medication-error log.
- Make morbidity and mortality meetings interprofessional and system-focused, so that pharmacists and nurses can raise prescribing errors without personal cost [30,33].

Research:

- Validate a Nigerian HSOPSC 2.0 with an expanded speaking-up module.
- Link survey data to actual incident-report volumes by profession.
- Use qualitative interviews to test the defensive-reporting and filtered-silence explanations proposed here.

Strengths and limitations

Strengths. This is the first study from the Niger Delta to examine reporting, blame and voice across levels of care. It covers every staff group in six hospitals. We report effect sizes with confidence intervals and control multiplicity across the whole survey, and we triangulate survey items with staff comments and field observations. The typology in Table 3 generates hypotheses that can be tested.

Limitations.

- **Ecological comparison:** The comparison involved two groups and a single tertiary hospital. It cannot show how blame and reporting relate within individuals, so the paradox should be read as a pattern between settings, not as an individual-level association.
- **Professional mix and measurement:** Profession differed sharply by level, and individual-level data were unavailable for adjustment. The reporting items also measure perceived reporting frequency, not actual report counts, and the field observations were not quantified.

V. CONCLUSION

In Bayelsa State's public hospitals, reporting and blame did not move in opposite directions. The general hospitals showed *defensive reporting*: frequent reporting in a punitive climate, with staff fearing that their mistakes follow them in personnel files or bring a query, so that some incidents go unrecorded and recur. The teaching hospital showed *filtered silence*: less blame, but reporting screened by severity and upward challenge suppressed by hierarchy.

A non-punitive climate is necessary but not sufficient for a reporting culture. General hospitals should start by separating reporting from discipline. The teaching hospital should start by flattening the authority gradient and actively collecting near misses. Safety culture assessments should examine asking and challenging separately, because the standard composite hides the difference.

Declarations

Ethics approval and consent to participate: Ethical approval was granted by the Bayelsa State Ethics Committee. Permission was also obtained from the management of all participating hospitals. All participants gave verbal informed consent. Participation was voluntary and anonymous.

Consent for publication: Not applicable.

Availability of data and materials: All item-level summary statistics analyzed in this study are reported in Table 2 and the companion paper. The analysis script is available from the corresponding author.

Competing interests: The authors declare that they have no competing interests.

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