Reduction in Pediatric Identification Band Errors: A Quality Collaborative

AUTHORS: Shannon Connor Phillips, MD, MPH, Michele Saysana, MD, Sarah Worley, MS, and Paul D. Hain, MD

Cleveland Clinic Children’s Hospital, Cleveland, Ohio; Riley Hospital for Children, Indiana University School of Medicine, Indianapolis, Indiana; Department of Quantitative Health Sciences, Cleveland Clinic, Cleveland, Ohio; and Monroe Carell Jr Children’s Hospital at Vanderbilt, Nashville, Tennessee

BACKGROUND AND OBJECTIVE: Accurate and consistent placement of a patient identification (ID) band is used in health care to reduce errors associated with patient misidentification. Multiple safety organizations have devoted time and energy to improving patient ID, but no multicenter improvement collaboratives have shown scalability of previously successful interventions. We hoped to reduce by half the pediatric patient ID band error rate, defined as absent, illegible, or inaccurate ID band, across a quality improvement learning collaborative of hospitals in 1 year.

METHODS: On the basis of a previously successful single-site intervention, we conducted a self-selected 6-site collaborative to reduce ID band errors in heterogeneous pediatric hospital settings. The collaborative had 3 phases: preparatory work and employee survey of current practice and barriers, data collection (ID band failure rate), and intervention driven by data and collaborative learning to accelerate change.

RESULTS: The collaborative audited 11,377 patients for ID band errors between September 2009 and September 2010. The ID band failure rate decreased from 17% to 4.1% (77% relative reduction). Interventions including education of frontline staff regarding correct ID bands as a safety strategy; a change to softer ID bands, including “luggage tag” type ID bands for some patients; and partnering with families and patients through education were applied at all institutions.

CONCLUSIONS: Over 13 months, a collaborative of pediatric institutions significantly reduced the ID band failure rate. This quality improvement learning collaborative demonstrates that safety improvements tested in a single institution can be disseminated to improve quality of care across large populations of children. Pediatrics 2012;129:1–7
Safe patient care begins with ensuring a health care provider is delivering care to the right person. Accurate and consistent placement of a hospital patient identification (ID) band is used in health care to reduce errors associated with patient misidentification. In fact, if the ID band is not placed on the patient but on equipment or supplies used to care for the patient, it has the opportunity to be separated from the patient, rendering it useless in correct patient ID to be separated from the patient, rendering it useless in correct patient ID placement.

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Barriers unique to the pediatric population, as documented in the study by Gray et al, suggest that both the process of care and culture are not highly reliable.14 Additionally, little is known about dissemination strategies among interorganizational networks of physicians representing unrelated institutions.15 Experts in implementation sciences have implored clinicians to report on their successful dissemination and implementation strategies.16 However, studies have not been published using quality improvement learning collaboratives to decrease patient ID band errors. We report on a quality improvement collaborative of pediatric hospitalists and their nursing and quality improvement colleagues who sought to apply the general improvement model developed and implemented by Hain and colleagues at the Monroe Carell Jr Children’s Hospital at Vanderbilt (MCJCHV) across 6 hospitals to reduce pediatric patient ID band error rates. The collaborative goal was to reduce by half the pediatric patient ID band error rate across a quality improvement learning collaborative of hospitals in 1 year. Additionally, the goal was to demonstrate that learning across institutions can effectively and efficiently drive quality improvement results.

METHODS

A self-selected 6-site learning collaborative, organized at the 2009 annual Pediatric Hospital Medicine meeting, formed with the intent to reproduce the ID band improvement initiative at MCJCHV. Two institutions served as collaborative leaders, 1 directly participating in the learning collaborative and serving as the data collection and analysis site (Cleveland Clinic) and the other serving as a consultant for quality improvement overall and specifically around the ID band improvement process (MCJCHV). Previous work demonstrated that focused attention to process, education, and accountability could drive ID band failure to low levels.13 Each participating hospital received internal review board approval or exemption and signed a data use agreement allowing transparent sharing of data (Table 1). The participants represented freestanding children’s hospitals, children’s hospitals within academic medical centers, and community hospitals with pediatric and neonatal inpatient care areas.

The collaborative had 3 phases: preparatory work and institution employee survey of current practice and barriers, data collection (ID band failure rate), and intervention driven by data and collaborative learning to accelerate change.

Survey

To assist each hospital in understanding its preexisting assumptions about ID bands, a survey originally developed at MCJCHV was provided to each institution to assess attitudes and barriers to correct patient ID band placement and maintenance local to the organization (see Supplemental Information). Survey participation for individual employees was voluntary and anonymous. No attempt was made to quantify or aggregate the results across organizations. However, organizations informally shared their results and sought guidance through the learning collaborative.

Interventions

The collaborative met approximately monthly by conference call. A key driver diagram was developed collectively (Fig 1). The drivers were prioritized...
through consensus among the members with consideration of baseline data and survey themes. Only those drivers felt to have the most significant impact were addressed by the collaborative. During each call, hospitals shared their current data and lessons learned, posed problems, and sought the counsel of the collaborative for resolution. Hospitals used consistent staff and patient educational materials (see Supplemental Information), shared collaborative results with their respective frontline staffs, and shared ID band alternatives for particularly vulnerable populations. The following interventions, from the MCJCHV initiative, were used by collaborative hospitals to impact improvement:

Run charts transparently reported failure data for each hospital and collaborative overall
ID bands were verified at nursing bedside handoff
Patients’ and families’ engagement in patient ID and the purpose of ID band
Hospital/unit education about why accurate patient ID bands matter
A sense of urgency was created by using storytelling, examples of wins and failures
Voluntary event reporting systems to catch errors or patients without bands in place
For some patient populations or hospitals, selection of new ID bands (softer) was critical to acceptance

With audit failures, the bedside RN was asked “why” and a fix occurred immediately
Leadership engagement
The topic was discussed on safety walk-rounds

Data Collection
The population for the improvement project included patients admitted to pediatric medical-surgical, pediatric intensive care, and NICU. Some hospitals included patients in emergency/ambulatory departments. ID band errors included absent bands (not present or present on patient care equipment), illegible bands, or inaccurate data on the bands. If a patient’s ID band had more than 1 error, the failure was only counted once. ID band failure rate was defined as the number of patients audited with ID band errors divided by all patients audited. Audits were completed on any patient physically present on the unit at the time the audit was scheduled. No attempt was made to find patients who were off the unit at the time of the audit. If a parent was not at the bedside and the patient

TABLE 1 Participating Institutions

<table>
<thead>
<tr>
<th>Collaborative Site</th>
<th>Location</th>
<th>Total Pediatric Beds</th>
<th>NICU Beds</th>
<th>PICU Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our Lady of the Lake Regional Medical Center</td>
<td>Baton Rouge, LA</td>
<td>95</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Cleveland Clinic Children’s Hospital</td>
<td>Cleveland, OH</td>
<td>105</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Children’s Hospital Colorado</td>
<td>Aurora, CO</td>
<td>288</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Riley Hospital for Children</td>
<td>Indianapolis, IN</td>
<td>266</td>
<td>55</td>
<td>33</td>
</tr>
<tr>
<td>New York Hospital Queens</td>
<td>New York, NY</td>
<td>39</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Scottsdale Healthcare</td>
<td>Scottsdale, AZ</td>
<td>52</td>
<td>20</td>
<td>0</td>
</tr>
</tbody>
</table>

To maintain confidentiality, the order of the hospitals in this table does not correspond to order of hospitals in the tables and figures in the article.

FIGURE 1 Collaborative key driver diagram.

### Potential Interventions

- **Visibility—campaign**
  - Education—nurse manager
  - Unit-level data and education
- **Best practice—routine check at handoff**
- **How to display—% of failure**
- **Industry representatives to demonstrate samples**
- **Child life**
- **Anticipate and bring a new ID band to procedure**
- **Education**

### Global Aim
Ensuring the correct patient identification is on each patient increases the likelihood that tests, treatments, and medications are administered to the correct patient.

### Specific Aim
We will reduce the percent of patient ID band errors at hospitals in this collaborative by 50% by September 1, 2010.
was not developmentally capable of verifying his or her personal identifiers, the auditor used a hospital census list to find eligible patients and verified the patient’s bed assignment with the medical record. If both were congruent, the medical record was used as the source of truth against which the ID band was verified. For identified failures, the auditor sought clarifying information from the family or nurse about why the band was not present on the patient. Each “failure” was an opportunity to provide just-in-time education to the staff, family, and patient about the importance of ID bands to safe care.

A baseline prevalence measurement was taken at each hospital between September 2009 and April 2010 followed by prevalence audits as often as 4 times monthly through September 2010. Those audits included night, day, and weekend assessments. Each of the hospitals contributed data for a minimum of 6 and a maximum of 13 months, and all participated for the final 5 months (from May to September 2010). Prevalence audits for each hospital were completed by the local nursing units, the hospital quality staff, or a combination of both. Data were submitted monthly on a standardized spreadsheet to a single site for aggregation and analysis. The data collection sheet was modified after the first few months to allow discrete data collections for the reason for ID band failure. The reasons list came from the initial work at MCJCHV with small revisions from our initial collaborative audits.

Because the goal was to reduce errors for the collaborative as a whole, data were collected and all analyses performed at the patient level. The primary analyses combined all patient audits in a single cohort, ignoring the effect of hospital (the “combined rate”). The trend in failure rate over time was assessed by using the Cochran-Armitage Trend Test, with the time variable created by defining each hospital’s baseline month as month 1 and numbering each subsequent month of submitted data in order. The difference in failure rate from baseline to end of study was assessed by comparing failure rates among patients audited during each hospital’s first and last month of study participation, regardless of the number of months each hospital participated in the study, by using the χ² test. A secondary repeated-measures analysis adjusting for intrahospital correlation was performed by using logistic regression with generalized estimating equations. All tests were 2-tailed and performed at a significance level of .05. SAS 9.2 software (SAS Institute, Cary, NC) was used for analysis and R software 2.11.1 (The R Foundation for Statistical Computing, Vienna, Austria) was used for graphics.

RESULTS
Survey
Through collaborative meetings, misbeliefs and practices among the staff of the collaborative hospitals were discussed, including placement of ID bands on isolette or intravenous tubing of neonatal patients, the belief that checking the band at each intervention with the patient was not a needed strategy to reduce error, and the impression that “I know my patient,” so an ID band is not required. Staff reported that ID bands cut into skin, so the bands were removed for comfort. Hospitals shared their locally identified barriers at collaborative meetings and brainstormed potential actions collectively.

Collaborative Initiatives
The iterative work of the collaborative resulted in the following interventions applied at all institutions: education of frontline clinical employees and support staff such as dietary and child life specialists regarding the importance of correct ID bands as a safety strategy; transparent sharing of performance with the clinical care areas; a change to softer ID bands, including “luggage tag” type ID bands for some NICU patients; and partnering with families and patients through education.

ID Band Observations
ID band audits were conducted on 11,377 patients between September 2009 and September 2010. Baseline patient ID band failure rates by hospital ranged between 4.9% and 52% with mean of 22% and a combined rate of 17% (140 failures in 795 audits) (Fig 2). Included in these failures were several hospitals where the practice for preterm or very ill patients was to place the ID band on the isolette/bed or IV tubing attached to the patient. Final month patient ID band failure rates by hospital ranged between 0% and 11% with mean of 4.0% and a combined rate of 4.1% (50 failures in 1129 audits) (Table 2).

The collaborative saw a 77% relative reduction in ID band failures over the 13 months of the initiative (Cochran-Armitage Trend Test, P < .001). At the initiation of the collaborative, the NICUs were the most likely location for ID band failure owing to skin issues and accepted practice of allowing the band to be placed on intravenous tubing attached to the patient or taped to the isolette. By the end, NICU failures were greatly improved but still most common (7% of the 167 NICU audits in the final month had ID band failures). PICU failures (often related to removal for procedures or fluid shifts/skin issues) were reduced from 21% of audits (24/112) to 3% (5/167; Fig 3). The band off the patient was the most common overall reason for patient ID band failure. Common reasons for the ID band being on the patient included falling off the patient, placement on another object, and being removed by a parent or patient (Table 3). Weekend and night
audits were significantly more common in the last month of evaluation than at baseline and therefore cannot be analyzed as independent factors. Because an ID band failure was defined as any defect in the ID band, the number of bands with multiple defects was not collected.

**DISCUSSION**

We report on a learning collaborative that resulted in a 77% relative reduction in ID band errors across 6 hospitals where pediatric care is delivered. Although quality improvement learning collaboratives have previously been reported in the literature, experts have questioned the enthusiasm for collaboratives that disseminate unproven quality improvement strategies. Indeed, calls have gone out to the quality community to publish successes in quality improvement learning collaboratives to build an evidence base that supports this method. A recent review of the impact of quality improvement collaboratives found positive overall effects on quality but stressed the need for creation of new knowledge regarding the effectiveness and success factors in future collaboratives. The authors are fortunate to report on a collaborative that satisfies those published concerns. Our project takes its basic methods from already successful and published improvement work. We report that a quality improvement learning collaborative is able to disseminate those methods with local modifications but equivalent success.

This quality improvement learning collaborative demonstrated that ID band processes of care were not highly reliable for hospitalized pediatric patients at several types of institutions. Although different types of institutions participated, many of our challenges were similar, which lent itself well to a collaborative approach to improvement. This collaborative was successful at meeting the goal of reducing patient ID band errors by half within 1 year.

Monthly collaborative conference calls gave each hospital the opportunity to present its current challenges and successes. These calls also held the members of the collaborative accountable for data submission and information sharing. Each institution had its own methodology for staff education about patient ID bands and patient safety. One institution incorporated this initiative in a patient safety blog. Another institution used the concepts of just culture to teach staff about patient safety and the importance of patient ID.

**TABLE 2** ID Band Failure Rates in First and Last Month by Hospital

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Failure Rate (First Month), %</th>
<th>95% CI</th>
<th>Failure Rate (Last Month), %</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15.3 (8.8–25.5)</td>
<td>1.9 (0.7–4.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>23.1 (10.7–42.4)</td>
<td>11.2 (6.7–18.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9.7 (6.5–14.3)</td>
<td>3.4 (1.7–6.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>25.5 (17.7–35.2)</td>
<td>1.8 (0.5–4.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>52.0 (43.3–60.7)</td>
<td>0.0 (0.0–9.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4.9 (2.8–8.5)</td>
<td>5.7 (3.6–8.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of failures is not included to conceal sites. CI, confidence interval.
bands on patients. At individual hospitals, sharing stories of patient ID band errors and patient impact helped staff understand the importance of patient ID.

For all the institutions, collaboration among nurses, physicians, and quality professionals ensured that the collaborative was a priority. Collaborative member sites shared data with all caregivers, from leadership to frontline staff at their institutions. Sharing with hospital employees helped engage all levels and appeared to strengthen the desire to change and the will to sustain gains made. Frequent auditing of the ID band error rate for each institution was instrumental in driving improvement and sustainability. Many hospitals in the collaborative continue to audit patient ID bands beyond the collaborative. Additionally, 1 site uses these audits as part of a manager incentive program.

Many of the collaborative participants were faced with the same challenge; 1 size and type of ID band did not work for all pediatric patients. This realization led some of the hospitals to develop prototype bands for patients when there are difficulties with skin integrity and keeping the band in place, as in the NICU. Hospitals reached out to vendors to help develop different bands for these patients, and not all incurred additional cost.

Another key intervention was the development of patient and family educational handouts. Beginning with a patient education poster developed at MCJCHV, the collaborative members edited the text incorporating our collective initial observations (see Supplemental Information).

These were then modified as needed to meet local facility standards for publishing. The final product was designed to be given to families or hung on the wall in the patient’s room to educate patients and families about the importance of the patient ID band and why it should remain on the patient at all times.

There are several limitations to this study. Although definitions for all data elements were clearly stated, we did leave some room for local processes. Each hospital needed to have its own standard process to confirm ID band accuracy. Because the hospitals involved were geographically diverse, we did not ensure interrater reliability. Additionally, we encouraged units to self-monitor, in addition to “external” audits, because this creates local champions for improvement. We were not able to track patient misidentification errors, nor did we evaluate wrong patient, wrong procedure/medication events. Hospitals voluntarily participating in the collaborative likely have caregivers with greater interest and resources to devote to patient safety research than an average hospital and

### TABLE 3 Reasons for ID Band Failure Overall

<table>
<thead>
<tr>
<th>Reason for Failure</th>
<th>Contribution to Failures, %</th>
<th>Total (n = 957)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID band off patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fell off (too loosely applied)</td>
<td>18.4</td>
<td>176</td>
</tr>
<tr>
<td>Unspecified or unknown</td>
<td>17.2</td>
<td>165</td>
</tr>
<tr>
<td>Band is on another object</td>
<td>16.7</td>
<td>160</td>
</tr>
<tr>
<td>Other</td>
<td>16.1</td>
<td>154</td>
</tr>
<tr>
<td>Removed or refused by parent/patient</td>
<td>12.7</td>
<td>122</td>
</tr>
<tr>
<td>Removed by staff</td>
<td>3.2</td>
<td>31</td>
</tr>
<tr>
<td>Never placed ID band</td>
<td>3.2</td>
<td>31</td>
</tr>
<tr>
<td>Gets in the way of care</td>
<td>2.7</td>
<td>26</td>
</tr>
<tr>
<td>Total ID band off patient</td>
<td>90.4</td>
<td>865</td>
</tr>
<tr>
<td>Inaccurate ID information</td>
<td>4.7</td>
<td>45</td>
</tr>
<tr>
<td>Illegible</td>
<td>3.6</td>
<td>34</td>
</tr>
<tr>
<td>Other</td>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>Wrong Patient</td>
<td>0.3</td>
<td>3</td>
</tr>
</tbody>
</table>
may have seen greater improvement than can be expected in a large-scale initiative.

This collaborative provides a framework for any hospital to assess and address the gaps in performance in ID band placement. The steps include the following: audit current ID band performance to define the problem, survey perceptions of staff, and apply targeted interventions to drive improvement. Future work regarding ID bands should evaluate the association between accurate patient ID bands and ID-related errors. One collaborative site noted more than 50 near misses around patient ID each month. Furthermore, the culture that allows caregivers to assume that the hospitalized patient is already correctly banded needs to be explored. Lastly, future work regarding quality improvement collaboratives should include publication of proven collaborative strategies and the generation of new knowledge regarding which types of collaborations are best able to create improvement.

REFERENCES


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