Variable pre-transfusion patient identification practices exist in the perioperative setting

Il existe des pratiques d'identification des patients avant transfusion variables dans le cadre périopératoire

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Abstract

Purpose The operating room (OR) has been identified by hemovigilance systems as a hospital area at high risk for transfusion errors. Where it was confirmed that transfusion products were being administered to the intended patient, we sought to determine the frequency that surgical patients' identification (ID) bands were inaccessible, the procedures used to identify patients when ID bands were inaccessible, and the effect on pre-transfusion bedside checks when ID bands were inaccessible.

Methods We tracked the accuracy, location, and accessibility of patient ID bands in the operative phase over three months at a single Canadian Academic Health Sciences Centre. We also evaluated the surgical team's

compliance with transfusion policy, focusing on bedside checks.

Results Forty-four percent of the 426 patients who were tracked had accessible ID bands intraoperatively. The ID bands were removed from 6.3% of surgical patients, primarily for the placement of additional vascular lines. Cardiovascular procedures, which have a high frequency of transfusions, had the highest rate of ID band removals (26.9%) and the third-to-lowest ID band accessibility rate (19.2%). General surgery procedures had the lowest percentage of accessible ID bands (14.8%). Sixty-four of the 77 patients observed receiving transfusions in the OR had inaccessible ID bands due to positioning of the patient's arm, interference from equipment, or the surgeon. No patient ID bands were used at bedside checks, and addressograph cards and anesthetic records were used in place of the ID band in 97.4% and 2.6% of transfusions, respectively.

Conclusion Due to intraoperative inaccessibility, the system of patient ID banding has inherent limitations as a means for providing consistent pre-transfusion checks in surgical patients. A consistently accessible ID source that is continuously affixed to surgical patients should be introduced in the OR.

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Résumé

Objectif Les systèmes d'hémovigilance ont permis d'identifier la salle d'opération comme une zone à haut risque d'erreurs de transfusion dans les hôpitaux. Dans les cas où il a été confirmé que les produits de transfusion étaient administrés au patient voulu, nous avons cherché à déterminer la fréquence à laquelle les bracelets d'identification des patients chirurgicaux étaient inaccessibles, les procédures utilisées pour identifier les patients lorsque les bracelets étaient inaccessibles, et

l'effet sur les contrôles au chevet du patient avant la transfusion lorsque les bracelets d'identification étaient inaccessibles.

Méthode Nous avons examiné l'exactitude, l'emplacement et l'accessibilité des bracelets d'identification des patients dans la phase opératoire sur une période de trois mois dans un seul centre universitaire des sciences de la santé canadien. Nous avons également évalué le respect des politiques de transfusion par l'équipe chirurgicale, avec une emphase sur les contrôles au chevet du patient.

Résultats Les bracelets d'identification de 44 % des 426 patients suivis étaient accessibles pendant la période per-opératoire. Les bracelets d'identification ont été retirés chez 6,3 % des patients chirurgicaux, principalement dans le but de placer des voies d'accès supplémentaires. Les chirurgies cardiovasculaires, qui nécessitent fréquemment des transfusions, avaient le taux de retrait de bracelet d'identification le plus élevé (26,9 %) et l'antépénultième taux d'accessibilité du bracelet (19,2 %). Le taux d'accessibilité le plus bas des bracelets d'identification a été observé lors des interventions de chirurgie générale (14,8 %). Les bracelets d'identification de 64 des 77 patients évalués recevant des transfusions en salle d'opération étaient inaccessibles en raison du positionnement du bras du patient, ou d'interférence des équipements ou du chirurgien. Aucun bracelet d'identification du patient n'était utilisé lors des contrôles au chevet, et les cartes du patient et les dossiers d'anesthésie étaient utilisés à la place des bracelets dans 97,4 % et 2,6 % des transfusions, respectivement.

Conclusion En raison de l'inaccessibilité des bracelets pendant l'opération, le système d'identification des patients par bracelet a des limites inhérentes lorsqu'il est utilisé pour permettre des contrôles réguliers avant transfusion chez les patients chirurgicaux. Une source d'identification systématiquement accessible et fixée sans interruption aux patients chirurgicaux devrait être introduite en salle d'opération.

The risk of acquiring an infection from a blood transfusion is substantially lower than the risk of non-infectious transfusion complications.¹⁻³ Recently, increased attention has been directed towards reducing human and system errors in the transfusion process, such as those made during the identification of patients and blood components being transfused.⁴ The 2007 Serious Hazards of Transfusion (SHOT) report from the United Kingdom highlighted the need for this paradigm shift, as there were reports of only three cases of transfusion transmitted infections compared with 332 cases of incorrect blood component transfused

(IBCT).¹ In 2006² and 2007 (see footnote 1), SHOT reported that 54 (14%) and 46 (14%) IBCTs, respectively, were *wrong blood events*, where a patient received either blood of the wrong ABO type or blood intended for a different patient. Other causes of IBCTs include unnecessary transfusions, transfusion of products after storage errors, or transfusion of products that do not meet the special needs of a particular patient.⁵

A report from the U.S. Food and Drug Administration (FDA) found that 51% of transfusion-related fatalities were due to ABO-incompatible transfusions of red blood cells (RBCs).⁶ The bedside check, where the identity of the patient and the blood component to be transfused are verified, is most commonly identified as the point in the transfusion process where errors occur.⁷⁻¹⁰ The American Association of Blood Banks and the Canadian Society for Transfusion Medicine recommend that a bedside check be performed immediately prior to transfusion to ensure that correct blood products are being administered to the correct patient.^{11,12}

At Sunnybrook Health Sciences Centre, where this study was performed, identification (ID) bands are used to identify patients. Surgical patients receive an ID band that is checked by a nurse in the preoperative area and in the operating room (OR), but there is no official hospital policy regarding ID bands or patient identification. The ID bands at our institution are placed around the patients' wrist, except in some rare instances where the ID band is placed on the ankle. At our institution, all patients receiving blood components must be wearing an ID band unless anatomic considerations make this requirement impossible. The accuracy of this ID band must be confirmed by two transfusionists during the bedside check. Whenever possible, the patient should verbally confirm his/her identity. Unlike some institutions, our hospital does not utilize a separate blood identification band system.

Addressograph cards are credit-card-sized plastic cards that are stored in patient charts and used to stamp patient information onto ID bands and chart documents. These cards are used in institutions around the world.¹³⁻¹⁵ We were interested in observing addressograph cards because we believed that the cards were being used to identify patients in the OR. All addressograph cards for a given patient have a near-identical appearance, and no policy exists to limit or monitor the number of addressograph cards within a patient's chart.

¹ Taylor C, Cohen H, Jones H, et al. Serious Hazards of Transfusion: Annual report 2007. Manchester (EN): SHOT Steering Group; 2008. 119 p. Report No.: 978-0-9558648-0-3.

² Taylor C, Cohen H, Stainsby D, et al. Serious Hazards of Transfusion: Annual report 2006. Manchester (EN): SHOT Steering Group; 2007. 92 p. Report No.: 09532789 99.

Nearly 25% of IBCTs reported by SHOT in 2003 occurred in high-stress clinical areas such as the OR, the postanesthesia care unit (PACU), or the intensive care unit (ICU).³ In a recent review of eight deaths from ABO-incompatible transfusions, six of eight cases involved transfusions administered in the OR.¹⁶ Surprisingly, there are no published investigations of intraoperative ID band accessibility or reports that focus on identifying aspects of the transfusion process responsible for the apparently increased risk of transfusion errors in the OR. The goal of this study was to determine the frequency of primary patient identification (the ID band) accessibility during the intraoperative phase, and the processes used to identify patients when the ID band was inaccessible during the bedside check. We tracked patient ID bands perioperatively for elective surgical patients, monitored addressograph cards, and observed intraoperative bedside checks. We hypothesized that ID bands would be accessible in the majority of surgical cases. Furthermore, we expected that we would find decreased ID band accessibility and an increased removal rate of ID bands as the complexity of the procedure increased.

Methods

This prospective observational study was approved by the institutional Research Ethics Board of the Sunnybrook Health Sciences Centre in Toronto, Ontario, Canada. Patients were invited to participate if they appeared on the elective surgery OR list. Patients who could not speak English, those who were incoherent or sedated, or individuals who had cognitive barriers were excluded from participation. Patients were informed of the study's purpose, were told that no personal data would be collected, and were given the option not to participate.

Data were collected from June to August 2008 between the hours of 07:00–14:30 on 37 non-consecutive weekdays. We sought to determine the intraoperative accessibility of patient ID bands, the identification procedure used when the ID band was inaccessible, and the effect that accessibility of ID bands had on the bedside checks before intraoperative transfusions. All personal health information and staff information was destroyed after data collection was complete.

Study participants were assigned study numbers sequentially, based on the order their names appeared on the OR list. Data were collected by one of the authors who was not affiliated with the hospital OR. A preoperative ID check was

performed on all patients enrolled in the study to confirm the presence, accuracy, and location of a hospital ID band. The accuracy of information on the ID band was assessed via a brief interview with each patient. We established a convenience sample of 50 ID bands for each major surgical specialty, with a goal of tracking a minimum of 400 patients.

A check was performed in all active ORs on an hourly basis to determine the position of each patient's ID band. An ID band was deemed to have been accessible if it could be accessed without unstrapping the patient's arm from the table, without disturbing the surgical drapes, and without having to ask the surgeon to pause, move, or adjust equipment. If the position of the ID band had been altered since the previous check, the new location of the ID band, the reason for the change, and the time of the change were recorded. The reason for the change in ID band location was provided by the attending anesthesiologist or the nurse. The interval of data collection and interactions with OR staff were standardized to ensure consistency. The OR staff were made aware that the study was taking place to allow study personnel access to the OR for data collection and because staff were required to provide information regarding ID band removal and replacements. Each patient was followed up in the PACU postoperatively to determine if she/he had been admitted to the unit without an ID band.

During the preoperative interview, the number of addressograph cards in each patient's chart was documented. To determine if any cards had been misplaced during the patient's transit through the OR, an updated addressograph card count was obtained postoperatively in the PACU. When a patient's chart was found to have fewer addressograph cards postoperatively, a second check to confirm the absence of the cards was performed 20–30 min later to ensure that no addressograph card was missed while being used by either a nurse or physician.

Blood products released from the blood bank or from the computerized OR remote release blood fridge were followed into the OR whenever possible. We observed the bedside check for each transfusion and noted the source of patient identification used. If blood was retrieved from the OR fridge, the patient identification information used to retrieve the blood unit was recorded.

Data analysis

Only complete data were used for data analysis. The preoperative check, one intraoperative check per hour of surgery, and a postoperative check were required on the patient's tracking sheet for data to be entered into the database. The reason was noted whenever data were incomplete. Summary data in the form of medians and interquartile rankings are reported to present the frequency that patient identification and transfusion practices followed routine

³ *Stainsby D, Cohen H, Jones H, et al. Serious Hazards of Transfusion: Annual report 2003. Manchester (EN): SHOT Steering Group; 2004. 88 p. Report No.: 0953278964.*

hospital transfusion policies. When groups were compared, a Wilcoxon 2-sample test was used to determine if differences between medians were statistically significant ($P < 0.05$).

Results

Using the hospital OR list, 1049 patients undergoing elective surgery were identified as being eligible for the study. Of these 1049 patients, 794 were assessed preoperatively for ID band location and accuracy, and 426 patients were successfully tracked from the preoperative check through to the postoperative check. Data from these 426 patients were used to evaluate intraoperative ID band accessibility and band repositioning. The reasons for excluding patients from the study are presented in Table 1. Overall, 75% of exclusions were due to missed preoperative checks or procedures running beyond the daily study time-window. Since a single investigator was collecting data, it was not possible for every patient identified as a potential study participant to be assessed preoperatively.

Three patients (of 794) had incorrect information on their ID bands. One patient had an incorrect date of birth on his ID band due to incorrect registration in the hospital. The other two patients also had incorrect birthdates on their ID bands, but they had knowingly been registered incorrectly by the hospital to ensure that their hospital information matched their provincial health card information, which was also incorrect.

During the intraoperative phase, 44.4% of patients (190/426) had accessible ID bands. ID band accessibility varied between surgical specialties (Fig. 1). The number of intraoperative checks performed on each patient was used to estimate procedure time, since the checks were performed consistently once per hour. More intraoperative checks were performed during procedures where the ID band was inaccessible (median 2, interquartile range 1–3) compared with procedures where the ID band was

Fig. 1 The variation of patient identification bands according to surgical specialty, either accessible or inaccessible intraoperatively. Data are expressed as the percentage of patient identification bands classified as being accessible

Table 2 Frequency of intraoperative removals of patient's ID bands according to surgical specialty

Service	Total	ID band removed
CV surgery	52	26.92% ($n = 14$)
Neurosurgery	50	10.00% ($n = 5$)
ENT/Dentistry	49	4.08% ($n = 2$)
Gynecology	38	5.26% ($n = 2$)
Plastic surgery	42	2.38% ($n = 1$)
Urology	47	2.13% ($n = 1$)
Orthopedics	48	2.08% ($n = 1$)
General surgery	54	1.85% ($n = 1$)
Ophthalmology	46	0.0% ($n = 0$)

CV cardiovascular, ENT ear, nose and throat, ID patient identification

Table 1 Reasons for exclusion of patients from the study

Reason for data exclusion	Frequency
Missed preoperative check	40.93% ($n = 255$)
Procedure extended beyond data collection time period	34.35% ($n = 214$)
Missed intraoperative check (procedure < 1 h)	8.51% ($n = 53$)
Procedure/equipment prevented data collection	4.82% ($n = 30$)
Procedure cancelled	0.48% ($n = 3$)
MD refused to assist with data collection	0.48% ($n = 3$)
Patient in isolation (MRSA)	0.16% ($n = 1$)
Other	10.27% ($n = 64$)

MRSA methicillin-resistant *Staphylococcus aureus*

accessible (median 2, interquartile range 1–2; $P < 0.0001$). Intraoperatively, 6.3% (27/426) of ID bands were removed from patients. All ID band removals occurred within the first hour of the procedure. There was an uneven distribution of patient ID band removal across surgical specialties (Table 2). Eighty-five percent (23/27) of ID band removals occurred to facilitate intravenous or arterial line insertion. Other ID band removals occurred to ensure accessibility, to replace a soiled ID band, or because the ID band interfered with the operative procedure. Once removed, 59.3% of ID bands (16/27) were left off the patient for the remainder of the procedure, while 40.7% (11/27) were re-attached to the patient (Table 3). More intraoperative checks were performed for procedures where the patient's ID band was removed (median 4, interquartile range 2–5) compared with procedures where the ID band was not removed (median 2, interquartile range 1–3; $P < 0.0001$). Postoperatively, 0.5% of patients (2/426) arrived in the recovery

Table 3 Location of ID bands after intraoperative removal from patient

New ID band location	Frequency
On patient	
Forehead	25.93% (<i>n</i> = 7)
Shoulder	7.41% (<i>n</i> = 2)
Replaced to same	7.41% (<i>n</i> = 2)
Off patient	
OR Desk area	22.22% (<i>n</i> = 6)
Anesthetic Cart	18.52% (<i>n</i> = 5)
Patient chart	11.11% (<i>n</i> = 3)
Metal waste pan	3.70% (<i>n</i> = 1)
OR floor	3.70% (<i>n</i> = 1)

After removal, ID bands were relocated to various sites both on and off the patient

ID patient identification, OR operating room

area with no ID band, one of whom also arrived with no addressograph card.

The preoperative check showed that 60.7% of patients (482/794) had one addressograph card during the preoperative check. Thirty-eight percent of patients (304/794) had more than one addressograph card, and 1% of patients (8/794) had no addressograph card prior to their arrival in the OR. All of the patients who initially had no addressograph cards had a card generated before their procedures started. Postoperatively, 5.6% of patients (24/426) had one or more addressograph cards lost in the OR. Two patients had a postoperative addressograph card count of zero. Some missing addressograph cards either were recovered from the OR where the procedure had taken place or were found in/beside the shared addressograph card stamping machines in the OR hallway.

The transfusion of 77 units of blood products were observed in the OR. Of the 30 units retrieved from the remote release refrigerator, 33.3% (10/30) were retrieved using the patient's addressograph card (Table 4). A bedside check involving two staff members preceded all transfusions. The addressograph card was used to confirm patient identity in 97.4% (75/77) of observed bedside checks, and

the patient's anesthetic record was used in the other 2.6% (2/77) of bedside checks. The patient's ID band was never used in the bedside check. At the time of the bedside check, 16.9% of ID bands (13/77) were accessible but were not utilized. In one instance, the patient was awake during the bedside check, but the addressograph card was used and the patient's ID was not verbally confirmed. During the study period, no mistransfusions were observed.

Discussion

This study shows that patient ID band information was accurate for essentially all patients (99.6%). However, these bands were attached to the patient and accessible intraoperatively in only 44.4% of surgical cases. Patient ID band accessibility decreased conversely to increasing procedure duration. Another possible inference is that procedure complexity is the main predictor of ID band removal and accessibility. Supporting this concept is the observation that all ID band removals occurred within the first operative hour, regardless of the duration of the surgery. Also, the majority of ID band removals (85.2%, 23/27) occurred so that additional intravenous or arterial lines could be inserted. A multi-site study in the United Kingdom investigating the frequency of transfusions across hospital services found that general surgeries and cardiovascular surgeries were two of the top three surgical domains most commonly associated with blood transfusion.¹⁷ We found these services to be two of the three services with the lowest rates of ID band accessibility. Thus, the patients with the highest risk for ID band inaccessibility are also the most likely to receive blood transfusions during the intraoperative phase.

The inaccessibility and removal of ID bands relates directly to the ability of the staff at our institution to comply with hospital policy, i.e., a complete bedside check cannot be performed without an attached accessible ID band. The main issue with ID band removal is not the removal itself, but rather the lack of a policy outlining what to do with the ID band once it has been removed from the patient. Literature suggests that this is a common occurrence in many institutions; a recent study found that a majority of institutions had no patient ID policy or patient safety training program in place.¹⁸ Of the 77 transfusions documented in this study, none included a proper bedside check with the patient's ID band, and no bedside check used a fixed source of ID. Addressograph cards were used in 97.4% of bedside checks despite 16.9% of ID bands being accessible at the time of transfusion. Even when a patient was awake during the bedside check, staff opted to refer to the addressograph card rather than the actual patient. Bedside checks are known to be one of the most

Table 4 Patient ID used at OR blood fridge during collection of blood for transfusion

ID used	Frequency
Transfusion pick-up slip	46.67% (<i>n</i> = 14)
Addressograph card	33.33% (<i>n</i> = 10)
Addressograph sticker	13.33% (<i>n</i> = 4)
Anesthetic record	6.67% (<i>n</i> = 2)

ID patient identification, OR operating room

important steps in the transfusion process for ensuring patient safety; a hemovigilance report from Quebec, Canada found that 60% of ABO-incompatible transfusions were the result of absent or inaccurate pre-transfusion bedside checks.⁷ The frequency of inappropriate bedside checks being performed at our institution is concerning given the well-documented high prevalence of bedside check errors in IBCTs (see footnote 2),^{7–9,16,19} and the correlation between IBCTs and transfusion-related injuries (see footnote 2).^{2,8,20}

We found that addressograph cards were being used in place of ID bands to identify surgical patients intraoperatively. While ID bands are generated from addressograph cards, the ID band remains with the patient, whereas frequently the addressograph card does not. Several factors contribute directly to the limitations presented by addressograph cards: all cards appear superficially identical, no consistent hospital policy governs their use, and no system exists to track the number of addressograph cards for any given patient. If a patient enters the OR with multiple addressograph cards and one is forgotten or misplaced, there are limited means for staff to be aware of this issue. The mobility of addressograph cards and the frequency of different pre- and postoperative addressograph card counts make them a latent source of identification errors for surgical patients. Another potential source of error that we observed is the use of addressograph cards to both retrieve blood from the OR blood fridge and to “confirm” patient ID during the bedside check. We observed that in 39% of surgical cases, patients began the procedure with more than one addressograph card and/or had different pre- and postoperative addressograph card counts. When used as they are in our hospital’s patient ID system, addressograph cards are a potential source of unnecessary errors in the transfusion process. This is not the first report of potentially compromised transfusion safety as a result of addressograph card misuse; studies from the United Kingdom and Spain have shown high correlations between blood sample labeling errors and addressograph-generated labels.^{13,14}

Due to the frequent intraoperative inaccessibility of ID bands, we suspect that staff at our institution may disregard the ID band and refer directly to a conveniently accessible piece of mobile patient ID, which is usually the addressograph card. It seems that the problem with intraoperative patient identification at our institution is not a human factor problem, but rather a problem with the ID system we employ. The current patient identification scheme is ineffective in the OR setting, and given the appropriate combination of circumstances, leaves opportunity for mistransfusions to occur. Modifying the system will make it easier for staff to follow current safety guidelines and will reduce the likelihood of errors in the transfusion process.

No mistransfusions were observed during the study period. Thus, while the system in place at our institution is not ideal, we did not find direct evidence that it was harmful to patients. What we did find, however, was a system that left room for errors to occur. The actual frequency of IBCTs is likely higher than reported in the literature because of reluctance on the part of staff/institutions to report them and because the distribution of ABO blood types in the population means that two-thirds of IBCTs will be compatible and thus potentially undetected.^{8,20} For each detected IBCT, at least three near-misses—or more accurately termed near-hits—occur.³ It is important to eliminate as many factors contributing to IBCTs as possible, given that IBCTs leading to hemolytic transfusion reactions are the leading cause of preventable transfusion-related injury.^{2,7,19,20}

The OR environment presents many unique challenges to health care providers. Perioperative nurses²¹ and SHOT (see footnote 3) cite clinical urgency, inability of staff to check the patient ID bands, and the inability of patients to identify themselves as potential contributors to IBCTs occurring in the OR. Additionally, a recent study found that anesthesiologists distracted during bedside checks are more likely to miss transfusion-process errors than those who are not distracted.²²

As a result of our findings, we have recommended to our institution that ID bands not be used as the sole source of identification for surgical patients. A new ID source that is continuously accessible while on the patient should be implemented in the OR. Patient ID band studies based on transfusion medicine have shown reduced error rates when ID bands are read using radio frequency identification,²³ barcode,²⁴ or other technologies.²⁵ Furthermore, addressograph cards and other mobile patient ID cannot leave the OR at any point during the procedure and should never be used as patient identification. Each surgical patient should enter the OR with a maximum of one addressograph card securely attached to his/her chart. At our institution, such addressograph card management strategies will serve as interim solutions until the eventual phasing out of these cards is completed. Finally, an official policy regarding ID bands and patient ID, whether OR specific or hospital-wide, should be created. We recommend that this policy include the addition of ID band accessibility to the pre-surgical checklist to ensure that the patient ID is accessible prior to the commencement of all surgical procedures. Ensuring ID band accessibility and reliance of OR staff on this piece of ID is the simplest solution with the greatest yield. Issues of accessibility, reliance on addressograph cards, and use of mobile ID sources during the pre-transfusion check could all be eliminated.

There are several limitations of this study, one being that nurses and anesthesiologists were aware that the study was

being conducted. Consequently, our results may have been influenced by an observer bias or the Hawthorne effect, where the knowledge of being observed causes staff to perform better than they would have unobserved. Thus, we assume that the rate of ID band removal is likely equal to or higher than that reported in this study. It is also important to note that we observed elective surgical cases exclusively. Another important limitation is that observation bias may have been generated by the substantial amount of incomplete data. Furthermore, due to a less controlled environment, higher stress,²⁶ and the involvement of more staff members in the case, or the fact that some trauma patients arrive in the OR with no identification band, we expect that trauma/emergency surgeries would show increased ID band removal/inaccessibility and would generate more distractions for staff compared with elective procedures. In non-elective and emergency cases, the potential for more distractions is likely to increase the risk of errors being made.²²

This study is unique in its investigation of intraoperative transfusions and ID band accessibility. The related patient safety issue may not be specific to our institution as addressograph cards are used internationally^{13–15} and the ID band is the most widely used means of patient identification.¹⁸ An alternate/additional system of patient identification to the current ID band system could increase ID accessibility and decrease staff reliance on mobile patient identification perioperatively. These investigations were conducted from a transfusion medicine perspective, but accurate and accessible patient ID is crucial for many other clinical procedures, thus giving our results relevance beyond our field. In conclusion, due to intraoperative inaccessibility, the system of patient ID banding has inherent limitations as a means for providing consistent pre-transfusion checks in surgical patients. A consistently accessible ID source that is continuously affixed to surgical patients should be introduced in the OR.

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Competing interests None declared.

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