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# Identification And Correction Of Normalized Deviance In Healthcare Systems To Prevent Healthcare-Associated Infections And Improve Patient Outcomes

Elliana Sophia Barbell
elliebarbell@gmail.com

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# Identification and correction of normalized deviance in healthcare systems to prevent healthcare-associated infections and improve patient outcomes

Elliana Barbell

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Public Health.

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Yale School of Public Health
Department of Epidemiology of Microbial Diseases

Primary Adviser: Louise-Marie Dembry, MD, MS, MBA
Secondary Adviser: Rupak Datta, MD, PhD

**Abstract**

*Introduction*: In healthcare, normalized deviance is characterized by the steady transition away from standard practice toward variations in practice behaviors. This deviation presents minorly at first and is accepted to save time and increase efficiency. However, initial evaluations of innocuity do not represent actual safety. While the deviant practice may not cause immediate patient harm, its alignment with additional system weak points has the potential to lead to poor patient outcomes, including the development of healthcare-associated infections (HAI). One behavior that may influence HAI development and patient outcomes is hair removal during preoperative skin preparation.

*Methods*: An observational study of hair removal during preoperative preparation in holding was conducted to identify abnormalities in the preoperative hair removal process at an urban, specialty orthopedics hospital in the United States. 129 observations were recorded across a five-week period between June and July of 2021. A subsequent literature review on preoperative hair removal and normalized deviance was conducted to identify relevant literature and develop recommendations.

*Results*: 81 observations (62.79%) were found to have improper hair removal technique, compared to facility standard operating procedures and recommended practice. Improper technique was associated with variations between individual staff members in bivariate testing ($p$=<0.001), and there was a trend toward significance when evaluating the association between improper technique and holding unit ($p$=0.067). Scratches and abrasions to skin were also associated with improper technique and only observed when improper technique was used ($p$=0.003). Literature review identified 32 relevant articles for use in this study.

*Conclusion*: Infection prevention and healthcare epidemiology teams should be prepared to identify and correct normalized deviance through education, engagement, and training via interdepartmental coordination. Further research into the connection between normalized deviance and patient outcomes presents a pressing issue for the future of these fields.

**Acknowledgements**

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**Table of Contents**

List of Tables and Figures . . . . . 5

Introduction . . . . . 6

Methods . . . . . 10

Results . . . . . 12

Discussion . . . . . 18

Recommendations . . . . . 24

Conclusion . . . . . 30

References . . . . . 31

Appendix . . . . . 36

**List of Tables and Figures**

*Tables*

1. Table 1. Characteristics of observations performed at a Specialty Orthopedics Hospital between June and July, 2021 (n=129).
2. Table 2. Proper and improper hair removal technique using clippers, by specified characteristics (n=129).
3. Table 3. Top 11 most relevant articles identified from literature review.

*Figures*

1. Figure 1. James Reason's Swiss cheese model of system failures (1,2).

*Appendix*

1. Appendix 1. Hair removal data collection form.

## Introduction

In healthcare settings, both accuracy and efficiency are fundamental to maintaining a well-functioning system. To achieve this efficiency, healthcare personnel develop habits to increase the quality of care a patient receives as well as to maximize the number of patients who are able to receive care (3,4). However, when this aim for efficiency influences the operating patterns of how tasks are carried out, healthcare personnel run the risk of developing habits that diverge from standard practice, this is known as normalized deviance (5,6). Formally defined as the transition away from standard operating procedures during everyday activities, the behavioral phenomenon of normalized deviance was first described by Diane Vaughan, a prominent sociologist, in the wake of the Challenger space shuttle disaster (4,5). In healthcare, normalized deviance manifests as habits healthcare personnel use in an attempt to expedite or optimize everyday tasks (6,7). When these changes in how a task is carried out do not result in immediate or quantifiable harm, they are viewed as inconsequential and become further ingrained as normative behaviors. However, while some of these divergences can and do improve patient outcomes (known as positive deviance), normalized deviance can result in undue and unnecessary risks for both patients and staff (8).

The continuation of these deviations from standard practice results in distinguishable and identifiable variations in clinical practice across and between units (4). Healthcare personnel engaging in deviant behaviors may or may not be aware of the hazards associated with these habits. This awareness, or lack thereof, and subsequent acceptance of deviant behaviors leads to a progressive shift away from recommended safe and standard practice. This culminates in a “new normal” becoming established among healthcare personnel (3). These either conscious or unconscious deviations are seen as harmless at first, but over time and in conjunction with other decisions can lead to harm and substandard patient outcomes (3,4).

Infectious pathogens transmitted to patients in healthcare and medical settings leading to infections, known as healthcare associated infections (HAI), pose a significant risk to patients (9,10). The prevalence of HAIs in the United States is high: the Centers for Disease Control and Prevention reported that one of every thirty-one hospital patients, and one of every forty-three nursing home residents has developed an HAI (8). Surgical site infections (SSI) are a common and costly form of HAI among hospitalized, outpatient, and long-term care facility patients and residents (9).

Surgical site infections among admitted patients are associated with longer than expected lengths of stay and increased mortality of up to two to eleven times the expected level (11). The incidence of SSI is estimated to be between two and five percent for surgical inpatients, with evidence suggesting that these numbers are likely underreported based on inconsistencies in post-discharge follow-up for infection and patient outcome surveillance (11). Of these infections, *C. difficile*, *Staphylococcus aureus*, and *Escherichia coli* are among the most common; in total, it has been estimated that these infections each account for at least one-tenth of all reported HAIs (12). The financial ramifications caused by SSI incidence is substantial for both patients and healthcare systems. One incidence of SSI can increase inpatient stay by an average of 9.7 days and $20,000. Annually, this totals anywhere between an approximated $3.5 to $10 billion in avoidable costs (11). Thus, controllable extrinsic factors, such as staff behaviors, must be evaluated and ensured to be safe for patient care to minimize the potential for development of SSIs.

One such behavior that has the potential to influence pathogen transmission and patient outcomes is hair removal during preoperative skin preparation (13). The recommendations for standard practice regarding preoperative hair removal have been ever-evolving and may be decided based on surgeon preference or unit training rather than official guidelines, such as those put forth by the Association of periOperative Registered Nurses (AORN) and the Society for Healthcare Epidemiology of America (SHEA) (14). As

such, preoperative hair removal has remained an area of clinical practice susceptible to normalized deviance.

Historically, hair at the surgical site has been removed prior to surgery to facilitate suturing, and the erroneous belief that hair holds pathogens that may contaminate the sterile field and increase HAI risk (15). However, 2021 AORN guidelines recommend that hair only be removed from the surgical site when deemed absolutely necessary by the patient's surgeon and clinical team (13,16). Organizational guidelines also reinforce the recommendation against the use of razors, as well as recommend for removing hair as close to the time of surgery as possible when in a non-sterile environment outside of the operating room (17). These guidelines focus on decreasing and preventing detrimental outcomes that could come from such practices, such as SSIs caused by scratches, abrasions, or cuts to the skin made during this process that encourage proliferation of skin organisms (13,14,17).

Hair removal in these instances is rarely necessary but has rather become a comfortable habit supported by the false ideology of hair increasing infection risk. Studies on hair removal in neurosurgery, however, showed decreased rates of SSI for patients who did not have their scalp shaved prior to surgery, as compared to those patients whose scalps were shaved (14). These studies exemplify that with careful planning and awareness surgeries can be performed with hair left intact at the surgical site, resulting in decreased risk for SSI (14). In the early 2000s, the Centers for Medicare and Medicaid Services recommended no hair removal unless necessary and suggested a quality improvement bundle to improve patient care processes. This bundle recommended against the use of razors for hair removal in nearly all cases, instead recommending that clippers or depilatory creams be used, but monitoring of the bundle was discontinued in 2012 due to high compliance with removing razors from the preoperative hair removal process (9). With the cessation of monitoring for these recommendations and guidelines, leeway developed for normalized deviance to develop around these processes.

Although normalized deviance was first identified and has remained well studied in fields such as engineering, few studies have expanded upon the recognition that this behavioral phenomenon is also pervasive in healthcare (4). Limited research has been conducted on the association between normalized deviance and healthcare personnel decision making. With this limitation, a literature review was performed to assess and recognize the major themes present in studies thus far and to identify what further research is needed to promote progress. While further research will be needed to confirm an association between deviant behaviors in healthcare with the development of HAIs, this study may serve as a base and informational guide for supporting such studies, as it assesses the hypothesis that normalized deviance influences individual behavior regarding clinical patient care and impacts patient risk for HAIs.

## Methods

This study consists of two segments: an observational study and a literature review. The observational study focuses on hair removal practices in preoperative holding. The literature review focuses on the behavioral phenomenon of normalized deviance noted during these observations and was used in the development of recommendations on the correction of deviance once it is identified.

### *Hospital Observations*

*Setting*: Observations of preoperative preparations that included hair removal were conducted by a single observer (E.B.) at an urban, specialty orthopedics hospital in the United States. The facility has over 200 beds and performs over 30,000 procedures annually. The observer followed manufacturer guidelines and facility standard operating procedures and watched training videos to ensure hair removal technique was properly assessed. In total, 129 observations of non-sterile surgical site preparations were completed across three operating room holding units for five weeks between June and July of 2021. All observations occurred on weekdays (Monday through Friday) during daytime hours (8AM-5PM).

*Ethical Considerations:* This study was not considered to be research activity. It was conducted and included under quality assurance and performance improvement activities for the hospital. As part of routine departmental audits conducted for quality assurance, it was exempt from Internal Review Board review.

*Definitions*: Improper technique for clipper use during hair removal was defined as any use of the clippers not recommended by the instructions-for-use manual and facility standard operating procedures. This included, but was not limited to, dry clipping (i.e., using the clippers without first wetting the hair removal site), not pulling the skin taut to aid with hair removal, holding the clippers in an incorrect position or orientation (i.e., holding the clippers upside down), not having the clipper blades sit flat against the skin of the hair removal site, and having the hair removal process result in any scratches or abrasions to the skin.

*Data Collection*: Data was collected using a structured data collection form (Appendix 1) including the role of the staff member performing the hair removal, the hair removal site, tools and techniques used for the hair removal, whether the tool and technique were used correctly, and whether any scratches or abrasions to the skin were observed during the preparation. Deviation from the standard practices set by both AORN and hospital-specific policy for preoperative hair removal were also documented. Staff being observed and their unit leadership were aware and consenting of the observations.

*Data Analysis*: Analysis of hair removal data was conducted in SAS version 9.4 for Windows Statistical Software. Chi-Square and Fisher's Exact Test were used to determine if deviance from standard practice through improper hair removal technique was significant by holding unit, staff member, or observation of scratches and skin abrasions. A resultant two-sided *p*-value of $<0.05$ was considered statistically significant.

*Literature Review*

*Search and Selection Criteria*: Literature reviews on the topics of both hair removal during preoperative preparation and normalized deviance in healthcare were conducted in PubMed. Search terms included preoperative preparation, preoperative hair removal, normalized deviance, positive deviance, and deviance in healthcare. The search was restricted to articles published in the English language only. Literature published between 2000 and 2022 was preferred. This literature search also included searches for AORN, SHEA, and World Health Organization (WHO) recommendations on preoperative hair removal as a surgical site infection prevention tool.

*Data Extraction*: Outcomes and variables of interest from identified manuscripts included recommendations for hair removal technique, connection of preoperative hair removal to surgical site infections or exposure to pathogens, identification of normalized deviance in healthcare, and rationale provided for deviance from standard practices.

**Results**

Table 1 presents descriptive statistics of the study sample. Staff members remained on one holding unit throughout the entirety of the five-week observation period. Each unit was of a different size and bed capacity, leading to the variances seen between observation counts for each unit. Upper extremity surgical site areas included all sites from fingertip to shoulder (non-inclusive of shoulder surgical sites), and lower extremity surgical site areas included all sites below the hip (non-inclusive of hip surgical sites). Upper torso surgical sites included those from the shoulder to mid-back (including shoulder surgical sites), and lower torso surgical sites included all surgical sites from the mid-back to (and including) the hip.

Table 1. Characteristics of observations performed at a Specialty Orthopedics Hospital between June and July, 2021 (n=129).

| Characteristic | N (%) |
|---|---|
| Preoperative Holding Unit | |
| Holding X | 45 (34.88) |
| Holding Y | 64 (49.61) |
| Holding Z | 20 (15.50) |
| Staff | |
| Staff A | 17 (13.18) |
| Staff B | 11 (8.53) |
| Staff C | 20 (15.50) |
| Staff D | 3 (2.33) |
| Staff E | 62 (48.06) |
| Staff F | 2 (1.55) |
| Staff G | 14 (10.85) |
| Site Area | |
| Extremity (Upper) | 13 (10.08) |
| Extremity (Lower) | 61 (47.29) |
| Torso (Upper) | 15 (11.63) |
| Torso (Lower) | 40 (31.01) |
| Technique | |
| Proper Technique | 48 (37.21) |
| Improper Technique | 81 (62.79) |
| Scratches & Skin Abrasions | |
| Present | 12 (9.30) |
| Absent | 117 (90.70) |
| *Total* | 129 (100.00) |

As seen in Table 1, nearly half of observations were conducted on Holding Y (49.61% of observations), with the remaining half being split between Holding X (34.88%) and Holding Z (15.50%). The number of observations were similarly split between individual staff members conducting hair removal during preoperative preparations. Staff E was seen to conduct the most hair removals (62 removals, making up 48.06% of observations), and Staff D conducted the fewest (3 removals, 2.33% of observations). Hair removal was observed to occur most commonly on lower extremities and lower torsos (47.29% and 31.01% of observations, respectively), with hair removal from upper extremities and upper torsos occurring less frequently (10.08% and 11.63%, respectively). There were 12 observations that documented the presence scratches and skin abrasions following preoperative hair removal.

Table 2. Proper and improper hair removal technique using clippers, by specified characteristics (n=129).

| **Characteristic** | **Proper Technique N (%)** | **Improper Technique N (%)** | ***p**** |
|---|---|---|---|
| Preoperative Holding Unit | | | 0.067 |
| Holding X | 17 (37.78) | 28 (62.22) | |
| Holding Y | 28 (43.75) | 36 (56.25) | |
| Holding Z | 3 (15.00) | 17 (85.00) | |
| Staff | | | <0.001 |
| Staff A | 0 (0.00) | 17 (100.00) | |
| Staff B | 7 (63.64) | 4 (36.36) | |
| Staff C | 3 (15.00) | 17 (85.00) | |
| Staff D | 3 (100.00) | 0 (0.00) | |
| Staff E | 26 (41.94) | 36 (58.06) | |
| Staff F | 2 (100.00) | 0 (0.00) | |
| Staff G | 7 (50.00) | 7 (50.00) | |
| Scratches & Skin Abrasions | | | 0.003 |
| Present | 0 (0.00) | 12 (100.00) | |
| Absent | 48 (41.03) | 69 (58.97) | |
| *Total* | 48 (37.21) | 81 (62.79) | |

*$p$-value for analysis of variance by $\chi^2$ or Fisher's Exact Test.

Table 2 presents the variance of preoperative holding unit, staff member conducting the hair removal, and the presence of scratches and skin abrasions by hair removal technique. Among the 129 preoperative hair removals observed, 37.21% were conducted using proper hair clipper technique, while a majority (62.79%) were conducted via hair clipper using improper technique. Analyzing hair removal technique by preoperative holding unit, Holding Z was seen to have the highest level of improper technique, with 85% of observed hair removal being done improperly. Comparatively, Holding Y was observed to have the lowest level of improper hair removal technique, at just over half (56.25%) of hair removal on this unit being conducted improperly. There was a trend toward statistical significance for this analysis when comparing holding unit with hair removal technique; the *p*-value of 0.067 neared but did not reach the significant threshold of $p=0.05$. Results comparing hair removal technique by staff member were significant ($p=<0.001$), and the prevalence of proper and improper hair removal technique varied greatly between individual staff members (Table 2). Scratches or abrasions to the skin following hair removal were noted in 9.30% of observations (Table 1) and were only seen to occur following improper hair removal technique (Table 2). Scratches and abrasions to the skin were also determined to be statistically significant when compared with hair removal technique ($p=0.003$).

Table 3. Top 11 most relevant articles identified from literature review.

| Title | Author(s) | Year of Publication | Theme | Summary & Key Findings |
|---|---|---|---|---|
| The Normalization of Deviance in Healthcare Delivery | Banja | 2010 | Normalized Deviance | Persistent normalized deviance in healthcare takes a significant amount of time to develop, with multiple contributors leading to harmful outcomes. Deviations are commonly meant to increase efficiency, and they persist through lapses in surveillance. Recommendations for management include education, encouragement, and continued monitoring. |

| | | | | |
|---|---|---|---|---|
| When Doing Wrong Feels So Right: Normalization of Deviance | Price, et al. | 2018 | Normalized Deviance | Over time, deviance in healthcare is accepted as trivial if harm does not occur from previous circumstances. The non-occurrence of harm in the past does not ensure that a deviant behavior will not lead to harm in the future. Normalized deviance can be resolved via systems changes instead of placing guilt on individual staff members. |
| The Normalization of Deviance: Do We (Un)Knowingly Accept Doing the Wrong Thing? | Prielipp, et al. | 2010 | Normalized Deviance | Pressures for economic and timely efficiency on anesthesia professionals lead to the potential for normalized deviance in medical decision making. The use of standard protocols and engineering controls for the expected safe behavior can correct this deviance. |
| Violations and migrations in health care: a framework for understanding and management | Amalberti, et al. | 2006 | Normalized Deviance | Violations in healthcare are common and dangerous yet difficult to study, leading to sparsity in available data. Violations tend to occur until they are deemed to be more harmful than helpful. Both conversations and flexibility are needed to manage them once recognized. |
| What methods are used to apply positive deviance within healthcare organizations? A systematic review | Baxter, et al. | 2016 | Positive Deviance | Positive deviance has been used to improve system functionality, but the identification and implementation process is unclear. Future utilization of positive deviance to improve healthcare delivery will require increased organization and research including improved methods, especially of the later steps of positive deviance, to be conducted. |
| People, systems, and safety: resilience and excellence in healthcare practice | Smith & Plunkett | 2019 | Quality and Safety, Positive Deviance | Safety theory can be subdivided into three categories, each with distinct threats and solutions. Acting within these categories, healthcare personnel can work to promote the development of a |

| | | | | |
|---|---|---|---|---|
| | | | | safer clinical workplace through embracing changes seen in positive deviance. |
| The Swiss cheese model of safety incidents: are there holes in the metaphor? | Perneger | 2005 | Quality and Safety | Expert perceptions of the “Swiss cheese model” on safety vary greatly. Confusion on perceptions of safety lead to the potential misuse of the theory and model when referring to the occurrence of harmful events. This variance in perception among those most impacted by the topic exemplifies the need for an updated and clarified model. |
| Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update | Anderson, et al. | 2014 | SSI Prevention | SSI prevention and surveillance recommendations for infection prevention and healthcare epidemiology teams are outlined. Details are provided for determining quality of evidence for surveillance data, recommendations given for antimicrobial prophylaxis, and recommendations for no hair removal prior to surgery are outlined (use of clippers or depilatory creams acceptable when hair removal is necessary). |
| Guideline Implementation: Preoperative Patient Skin Antisepsis | Cowperwaite & Holm | 2014 | Preoperative Preparation | AORN guidelines on preoperative skin antisepsis and their importance for nursing are defined. Hair at the surgical site should be left in place unless removal is necessary (e.g., will impede the procedure or suturing). Patients should bathe before the procedure using regular or antiseptic soap, and antiseptic solutions used during skin preparations should be used as recommended by instructions-for-use manual. |
| Is There a Relationship between Preoperative Shaving (Hair Removal) and Surgical Site Infection | Jose & Dignon | 2013 | Preoperative Hair Removal | Patient SSI risk increases with hair removal via shaving as compared to patients whose hair has been left in place. It is recommended that, if hair removal is deemed |

| | | | | |
|---|---|---|---|---|
| | | | | necessary, hair clippers or a depilatory cream be used instead of a razor to decrease risk of SSI. |
| Preoperative hair removal to reduce surgical site infection | Tanner & Melen | 2021 | Preoperative Hair Removal | Comparison of no hair removal with hair removal via razor, depilatory cream, and clippers found that there is evidence for fewer SSIs when hair is left in place at the surgical site compared to being shaved with a razor. Evidence also supports removing hair with clippers or a depilatory cream if hair removal is necessary to prevent SSIs, as compared to hair removal when shaving with a razor. Evidence suggests the possibility of a slight reduction in patient SSI risk if hair is removed closer to the time of surgery (day-of hair removal), rather than the day before the procedure. |

The literature review on normalized deviance and preoperative hair removal yielded 32 relevant articles for use. Among the 32 articles identified as most relevant and useful for background knowledge and information during the literature review, the 11 articles included in Table 3 proved to be the most useful when developing the discussion section of this paper. These articles focus on varying topics, including normalized deviance, positive deviance, quality and safety, SSI prevention, preoperative preparation, and preoperative hair removal. Summaries and key findings from these articles are included in Table 3, and further information from the literature review was used as evidentiary support for all findings.

**Discussion**

Preoperative hair removal, for many surgeons and clinical teams, is a habitual and routine practice. Deemed a small part of preoperative preparation, it can be overlooked or overshadowed. However, continually deviating the ways in which preoperative hair removal is conducted until it no longer matches the product instructions-for-use manual or facility standard operating procedures presents a larger issue. Several studies have demonstrated the association between hair removal with skin abrasion and SSI risk (14,18). Discontinuing deviant behaviors known to be associated with harmful patient outcomes is crucial, but they must also first be identified so that a correction plan may be developed.

*Improper Hair Removal Technique*

Overall, scratches or abrasions to the skin during preoperative skin preparation were noted to be wholly due to improper technique while using clippers for hair removal (Table 2). Examples of this included using the clippers in an incorrect position or orientation, dragging the clipper blade backward against the skin instead of gently pressing it forward, and not pulling the skin taut while clipping.

Deviation during preoperative hair removal may occur for a myriad of reasons. When clipping hair from the surgical site, healthcare personnel may attempt to reposition or reorient the clippers to quickly remove hair from a difficult-to-reach area instead of taking a longer time to remove it slowly or potentially rotate the patient. Alternately, healthcare personnel performing the hair removal may not know that the clippers must be used in only one direction and with a specific technique, owed to an absence of formal training.

In follow-up conversations with unit healthcare personnel responsible for conducting preoperative skin preparations, it was learned that many of these personnel were taught the responsibilities of their role by peers and coworkers. Education and training were frequently conducted upon hire and not regularly repeated or refreshed, despite staff holding intermittent roles on other units or there being any changes in organizational guidelines. Due to the nature of how this training was conducted amongst peers, habits and

patterns of practice were passed between coworkers. Over time and without formal training to guide competency validation via a formal review process, these changes to recommended practice became the norm.

*Preoperative Hair Removal*

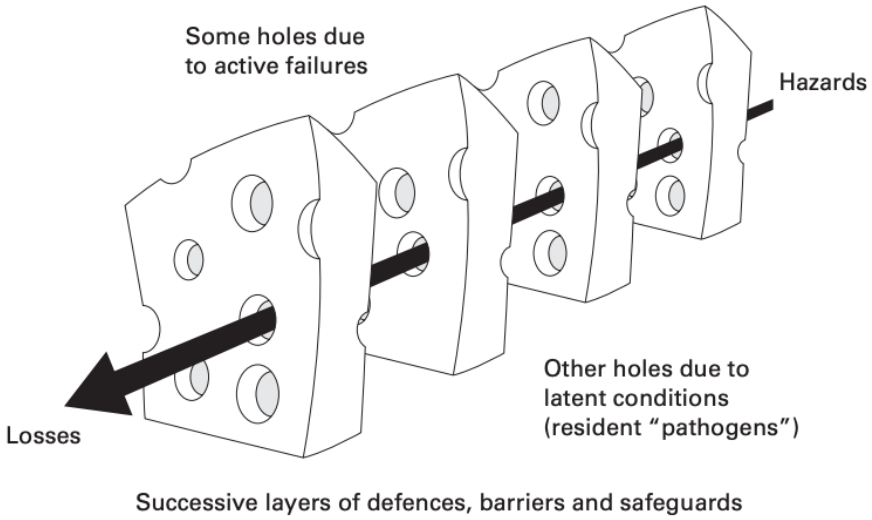
A 2019 systematic review update conducted by Judith Tanner and Kate Melen identified with moderate certainty that hair removal via razor does increase the risk for SSI as compared to the standing recommendation of no hair removal (18). An additional review by the World Health Organization found that either no hair removal or hair removal with clippers resulted in significantly lower risk for SSI than shaving. No changes in risk for SSI were identified when comparing hair removal via clippers and depilatory creams, respectively (15). While most healthcare settings have transitioned away from using razors because of the risk for causing abrasions or other trauma to the skin prior to surgery, it is still recommended that hair not be removed from the surgical site unless deemed to be medically necessary, such as if it will directly interfere with the procedure or with wound care and suturing (13,15). Thus the use of clippers or depilatory creams is recommended for use if hair removal is necessary in order to minimize the potential risk of surgical site or other healthcare-associated infections (14,18).

However, the primary recommendations made in these studies do not consider each form of hair removal with the inevitable variation in proper and improper use of the hair removal tools. Taken alone, each form of hair removal (i.e., razor, clipper, depilatory cream) comes with its own associated risks. For this reason, it is important that staff members are trained on how to properly use their institution's chosen hair removal tool. This training is crucial, since, when used improperly in situations marked by normalized deviance, clippers too have the potential to cause patient harm similar to other forms of hair removal through skin injuries such as abrasions (Table 2).

*Risks of Normalized Deviance*

The slow transition from the recommended standard practice to a new hazardous behavior represents normalized deviance. Normalized deviance is regularly deemed negligible by staff and over time may have larger ramifications, especially when it affects medical decision making (6). The potential for future harms is magnified when hazardous deviant behaviors overlap with other "weak points" in the healthcare system (1). The alignment of these deviances are discussed by James Reason in the Swiss cheese model for system failure (Figure 1) (1,2). In this model, Reason explains that one deviant behavior alone is not likely to result in direct nor immediate patient harms. However, the alignment of several weak points in a system's defenses against patient harms through the continuous occurrence of hazardous deviant behaviors at each defensive layer can lead to system failures and harm. These harms may come about partially by chance, such as the development of an SSI made possible through entry via skin abrasions from preoperative hair removal, or as a direct cause of other aligned system failures, such as through an engineering failure also aligning with deviant behavior.

Figure 1. James Reason's Swiss cheese model of system failures (1,2).




Courtesy of J T Reason, J Carthey, M R de Leval (2).

*The Development of Deviance*

Identifying and selecting the safest products for patient care to prevent system failures alone still does not wholly ensure patient safety. To fully protect and promote patient health, consistent and proper use of tools and care items must become the norm. Otherwise, behaviors will continue to deviate from those recommended in standard operating procedures. The continuation of these behaviors leads to them becoming ingrained as habit among staff potentially unaware of the potential for harmful consequences (3).

Rasmussen explains this as the theory of migration to boundaries. This theory proposes that staff will naturally engage in and normalize deviant behaviors in their tasks to a certain degree until they reach a point marked by a "boundary" which, either consciously or unconsciously, they deem too damaging to cross (3). Many of us do this in our everyday lives without noticing. Consider, for example, driving to work. Imagine you are driving a route you are familiar with, on an empty road, at a time of day when few other drivers are expected to be out. You come upon a yellow traffic light. In this situation you may be more likely to speed through the light than if it were mid-morning during rush hour with many other cars visible at the intersection. The way that we weigh our acceptability of risk, for both ourselves and others, has an incredible impact on public safety. And, in a healthcare setting, it also impacts patient safety when these risks are weighed with regard to medical decision making.

Through the identification of plausible consequences and an assessment of benefits to be gained from changing behavior from the original standard, healthcare personnel determine whether they will modify their behaviors. Over time, these varying behaviors then become deeply rooted as part of their regular practice, forming habits shared among peers. New staff members do not wish to become outliers or outcasts when just starting in their roles, therefore trust of coworkers and adoption of these deviant behaviors becomes the expectation, further perpetuating the practice of normalized deviance within a unit. As this deviant behavior persists without imminent negative consequence, other staff members, either

through observation during peer-led-training or peer-pressure, also begin to conduct their tasks in this deviant way (3).

*Positive Deviance*

Not all deviance is harmful, however, and other forms of deviance can be utilized to benefit a healthcare system's functionality to improve patient outcomes. By first identifying staff members or units exceeding expectations through innovative solutions to patient care obstacles, the deviant ways in which these individuals or units operate to solve these problems can be adopted into regular processes (19,20). Through the recognition of these high-performing staff members, positive deviance can result in changes to practice for improved patient outcomes. Utilization of positive deviance, when properly identified, can advance care practices across departments and improve outcome and process measures, such as preoperative preparation and HAI prevention (21).

*Importance of Infection Prevention in Correcting Normalized Deviance*

Because of the individualized ways in which normalized deviation originates, its identification and consequent correction varies greatly between differing circumstances (22). When normalized deviance is identified as a hazardous practice rather than an occurrence of positive deviance, infection prevention teams must be prepared to act through notifying impacted units and aiding them through providing relevant data, information on updated research and literature, and evidence-based recommendations. Acting on behalf of both patient and staff safety, the infection prevention team can act as an intermediary between departments and units affected by the deviance by identifying areas for improvement. The impacts that one instance of normalized deviance can have across a healthcare system reinforces the urgency with which it must be addressed.

In turn, the most effective and efficient way to prevent errors or harms from occurring is to control and correct normalized deviance within a healthcare system as it is identified. While infection prevention

teams by themselves cannot correct occurrences of normalized deviance, they are able to notify, support, and assist other teams in this correction process by providing content expertise. Through the identification of the existence of normalized deviance within a healthcare system's culture, infection prevention teams can begin motivating and initiating these preliminary discussions on its correction.

**Recommendations**

Work toward minimizing and resolving deviance should focus on bringing clinical practice back to the recommended standard. This process involves several components, including interviews and meetings with key stakeholders, an educational arm, a training support module, and the use of engineering controls. What follows is a basic, step-by-step guide that infection prevention teams may follow when aiming to reduce or eliminate normalized deviance in their institutions.

1. *Rounding and Interviews*

   Following the identification of normalized deviance, the infection prevention team should round on the impacted floors or units. During these rounds, team members can speak with healthcare personnel, learn what they would like changed, what they struggle with in their role, and how those struggles potentially relate to the deviant behaviors. Through these discussions, important qualitative information and ideas for improvement can be gained. Engaging affected healthcare personnel from the get-go is imperative to ensure that they do not become passive bystanders or move toward opposing process changes later on.

2. *Interdepartmental Meetings and Planning*

   Setting a series of interdepartmental meetings with the goal of alerting others to the presence of deviance will provide insight on the development of a program for proposed changes to stop the deviant behaviors via the provision of data and guidance on training development. Setting new quality improvement goals for monitoring relevant processes and outcomes are essential measures of success and goals for these meetings.

   In this phase of the implementation, team leaders should be tasked with identifying healthcare personnel who they believe may either be champions or opponents of practice changes from the new program. Staff members who alerted the infection prevention team or leadership of the

deviance could serve as powerful supporters and proponents of these changes, as they recognize that they are needed. Comparatively, identifying those who may oppose the program and its changes gives leadership and the infection prevention team the time and ability to further explain the motivations behind the changes being made, exactly what will be happening, and when it can be expected to happen. In these conversations, healthcare personnel who may be opposed and outspoken against the changes can have space to voice their concerns and be assured of their necessity. In time, and with these conversations, these staff members have the potential to become strong advocates for the program, providing much needed insight and a voice for others (23,24). Engaging these staff members with small steps and giving them a specific role in the change program's implementation will help to encourage participation, even if they are not yet wholly convinced of all changes being made.

Additionally, in this stage the infection prevention team should outline the proper way to perform the expected behavior and explain how the deviant behavior varies from the evidence based expected behavior, supported by current research or up-to-date instructions-for-use manuals. This information should be shared with department leaders. The process for updating institutional policies and standard operating procedures should also be started in this phase and relevant personnel informed of who is responsible for each of these steps. Department leaders should take responsibility for communicating clear expectations to the front-line staff and provide them with the support necessary for making such changes.

3. *Education*

Well-designed educational modules to clearly explain what the changes in practice will entail, why these changes are occurring, what will be expected of staff with the changes, and how they can expect to be supported during this time will help to reduce confusion and improve overall acceptance of the new program (23). Educational modules may be designed and delivered in a

format that best suits the needs and infrastructure of the healthcare system that it will be implemented in. Remote or virtual delivery formats likely provide staff members with the most flexibility in completing educational modules. Further, all education materials should be written and designed to be comprehensive, meet the needs of adult learners at all levels, and be fully accessible for users with audio and/or visual processing disabilities.

4. *Training*

After meeting with team leaders from impacted departments and deploying educational modules, hands-on training for affected personnel will be necessary (23). In the case of hair removal during preoperative preparation, training may include how to prepare the skin for hair removal, how to hold the clippers, and the safest way to remove hair while avoiding abrasions to the skin. Dedicating time to hands-on training is essential, as it gives staff the opportunity to go through their new workflows, become used to new practices and procedures, and to ask any questions that may arise in this process. Individuals' competency, or potential lack thereof, with the task being trained should be documented when training is completed, and the needs for improvement should be addressed via subsequent follow-up training and continued compliance monitoring as described in Step 6.

5. *Open Feedback*

Maintaining a space for open communication between healthcare personnel and leadership from all teams and departments involved in enforcing these changes is crucial (6,24). This open line of communication will serve to collect feedback on how the implementation of the program has been accepted and identify any barriers to implementation that should be addressed early on. Subsequently, infection prevention teams can help team leaders decide whether any additional changes are required, if there is lingering confusion among staff members, or if the original deviant behaviors appear to have persisted.

6. *Repeat*

   Normalized deviance takes root when variances in practices go unchecked over time, allowing them to take hold, become habitual, and influence the practices of others. Thus, continuing regular education of what is included in standard operating procedures and clinical practices will ensure that all healthcare personnel are aware of standard practice, serving to reduce harmful normalized deviance. Such continued education may take place upon hire, return to unit, or as an annual or biennial course with other certifications repeated at that time. Repeated trainings and education sessions should parallel previous training sessions in consisting of a mix of hands-on and virtual or remote learning modules. Teams may also choose to implement additional periodic competency validations; this validation may be undertaken through observations of regular tasks or during educational periods to ensure that deviance does not recur. The identification of champions to serve as a local resource for front-line staff should also be maintained, for this peer-to-peer support is essential for maintaining motivation and continued interest in these programs.

Infection prevention teams should aim to identify the root causes behind why this deviance is occurring and use this information to help unit leadership motivate change, inform new processes, and provide data and evidence to help engage bystanders. Providing stakeholders, such as unit or departmental leaders, with recommendations on continued assessment of these deviant behaviors will give valuable insight into potential leverage points or places for improvement.

In this process, it will be important to anticipate probable challenges and develop strategies around these potential obstacles to success. Staff are not likely to be receptive to change if honest and convincing reasoning behind the new program is not explained with sufficient detail and motivation (23,24). Preparing for these conversations will be an important part of developing any normalized deviance reduction program (24). As described in the guide above, this preparation may include rounding on

affected units to observe how workflows would change, hosting one-on-one or small group meetings to garner feedback and opinions before implementing large-scale changes, and planning alternate courses of action should the original program not prove to be feasible. After implementation is complete, teams may wish to consider a sustainability phase, consisting of continually maintaining the open line of communication with healthcare personnel, as well as conducting follow-up observations or audits to monitor how the implemented changes have impacted performance and outcome measures. This sustainability phase may be owned solely by the unit implementing the change program, or as a joint endeavor by both the unit and the infection prevention team, with each department taking on tasks respective of its own skill set, expertise, and levels of leadership engagement.

*Engineering Controls*

Specific engineering controls may also be implemented to reduce normalized deviance in healthcare systems. Engineering controls are implemented to streamline or remove a hazard from the immediate workplace setting; these controls place a barrier that must be acknowledged and consciously overridden to complete a task outside of the desired standard practice pattern (25).

For the case of preoperative hair removal, one such control may consist of requiring the surgeon to place an order via the electronic medical record (EMR) requesting hair removal for the patient. This can be conducted as an addition to the pre-admission order set of one question asking whether preoperative hair removal is necessary and/or requested for this specific patient. This question may read "*Does the patient require hair removal at the surgical site?*" with answers in the form of radio buttons. The first answer listed should be "*No*", as this is the desired answer based on standing AORN and SHEA guidelines (25). If a surgeon clicks the second listed answer option of "*Yes*" on this question, a pop-up may appear reminding them of the risk of SSI associated with preoperative hair removal.

Through engaging surgeons and the patient's clinical team in such a way, opposition to the implementation of such measures can be reduced. Framing these changes as an opportunity for the furthering of education and patient safety is imperative. This will create a positively framed viewpoint for the messaging surrounding the new process and its involved changes rather than it being presented as a new and additional burden. This control also provides early notice to staff on the holding unit and operating room as to whether hair removal will need to be conducted prior to sterile skin preparation. This allows these teams to plan daily schedules accordingly, optimizing the efficiency of how preoperative preparations are conducted and aiding in ensuring that procedures remain on schedule.

*Limitations*

This study has several limitations. First, there is a limited sample size of 129 observations; therefore, researchers were unable to conduct follow-up analyses of normalized deviance correction programs due to time constraints. Second, the study was further limited to a single healthcare system with a restricted, short period of observations. Third, this project did not have the scope to consider HAI development in observed patients and directly correlate patient outcome measures with deviant processes used during preoperative hair removal.

## Conclusion

### *Summary of Findings*

Normalized deviance of healthcare personnel behaviors in clinical care can be either harmful or beneficial for patient outcomes. When observing hair removal during preoperative skin preparation, evidence was found that variations in hair removal technique were associated with the individual staff member performing the hair removal, as well as leading to scratches and abrasions to patients' skin following the hair removal process. Normalized deviance away from standard operating procedures and recommendations during such patient care activities alone may not result in immediate patient harms, but it creates weak points in the healthcare system that can later cause potentially serious harm. These negative consequences may not be realized until later with regards to development of an SSI, for example. When deviance is identified as a harmful behavior, units must follow steps toward correction via education, staff and leadership engagement, and training to redress the issue and improve future patient outcomes.

### *Relevant Recommendations for Further Research & Program Development*

Future research on normalized deviance in healthcare systems must focus on several aspects of this behavioral phenomenon's broad impact. Additional or future studies could expand upon this study by also observing other aspects of the patient care experience for deviance and subsequently tracking patient outcome measures such as HAI development. Researchers may wish to focus on the potential to leverage positive deviance for system and patient outcome improvement, the potential correlation between normalized deviance and process or outcome measures, or on further program development recommendations for the prevention and correction of normalized deviance.

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## Appendix

Appendix 1. Hair removal data collection form.

Observer Name:_____ Unit (circle one): Holding X Holding Y Holding Z

| **Date** | **Time of Hair Removal** | **Prep Staff Name/Role** (if possible) | **Hair Removal Site** | **Setting of Hair Removal** | **Tool Used** | **Co-Interventions Used?** | **Technique Used** | **Correct Tool and Technique** | **Comments** |
|---|---|---|---|---|---|---|---|---|---|
| *12/30/21* | *14:00* | *Name / Role* | *Knee* | *Holding, OR, etc.* | *Clipping, Shaving, Depilation. Other (comment)* | *Y/N (Comment if Y, e.g., shaving cream)* | *Correct technique, holding clippers in incorrect orientation, etc.* | *Y/N* | *Were any scratches or abrasions noted, etc.* |
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