

Body positioning of intensive care patients: Clinical practice versus standards*

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Objective: The routine turning of immobilized critically ill patients at a minimum of every 2 hrs has become the accepted standard of care. There has never been an objective assessment of whether this standard is achieved routinely. To determine if immobilized patients in the intensive care unit (ICU) receive the prevailing standard of change in body position every 2 hrs. To determine prevailing attitudes about patient positioning among ICU physicians.

Design: Prospective longitudinal observational study. E-mail survey of ICU physicians.

Setting and Participants: Convenience sample of mixed medical/surgical ICU patients at three tertiary care hospitals in two different cities in the United States. Random sampling of ICU professionals from a directory.

Main Outcome Measures: Changes in body position recorded at 15-min intervals.

Results: Seventy-four patients were observed for a total of 566 total patient hours of observation, with a mean observation time per patient of 7.7 hrs (range, 5–12). On average, 49.3% of the observed time, patients remained without a change in body position for >2 hrs. Only two of 74 patients (2.7%) had a demonstrable change in body position every 2 hrs. A total of 80–90% of respondents to the survey agreed that turning every 2 hrs was the accepted standard and that it prevented complications, but only 57% believed it was being achieved in their ICUs.

Conclusions: The majority of critically ill patients may not be receiving the prevailing standard of changes in body position every 2 hrs. This warrants a reappraisal of our care of critically ill patients. (Crit Care Med 2002; 30:2588–2592)

KEY WORDS: critically ill patients; postoperative care; body positioning; nursing strategies

By the very nature of their condition, critically ill patients in the intensive care unit (ICU) are usually relegated to strict bedrest, if not complete immobilization by pharmaceutical or mechanical means. The complications of immobilization have been well documented in the medical literature and include decubitus ulcer (1–3), venous thromboembolism, and pulmonary dysfunction such as atelectasis, retained secretions, pneumonia, dysoxia, and aspiration (4–7). In an effort to prevent these known and quite common complications, one of the nursing strategies in the care of critically ill patients has been to turn them from the supine

position every 2 hrs. The medical literature has since shown some convincing data demonstrating the beneficial effects of body position changes in postoperative care (8), and the routine turning of patients every 2 hrs has become the nursing standard of care for all immobilized and critically ill patients (2, 9). However, no studies to date have tested whether patients actually receive this accepted standard. The purpose of this study was to assess prevailing attitudes about turning in the critical care setting and to determine whether critically ill, immobilized patients are in fact turned every 2 hrs.

MATERIALS AND METHODS

To assess professional opinion regarding patient turning, we conducted an electronic mail survey. Intensive care specialists from an international directory were sent a questionnaire with three questions, requiring only single-letter responses (Yes or No). The questionnaire contained the following questions. 1) Do you agree that the standard of care is to turn immobile ICU patients approximately every 2 hrs? 2) Do you agree that turning immobile ICU patients every 2 hrs may reduce the risk

for complications (deep vein thrombosis, pressure sores, atelectasis, etc.)? 3) Do you believe that patients in your ICU are receiving this turning care >50% of the time? Survey recipients were asked to send a reply e-mail with three letters to indicate their responses (e.g., YYY, YNN). Nonresponders were sent a reminder.

In addition, we performed a prospective longitudinal observational study of the turning of patients in the ICUs of three major hospitals. Hospital A was a 450-bed county facility in Phoenix, AZ, with an 11-bed multidisciplinary ICU. Hospital B was a 536-bed facility, also with 11 multidisciplinary ICU beds. Finally, hospital C was a 344-bed institution with 14 multidisciplinary critical care beds. Hospitals B and C are located in Honolulu, HI. Each hospital had a similar nurse/patient ratio of 1:1–2. All three hospitals are accredited by the Joint Commission on Accreditation of Healthcare Organizations and are university-affiliated tertiary care facilities with formalized critical care services and assigned medical directors. Directors of each ICU provided approval for the study to be conducted.

Only ICU patients who had an expected length of stay of >18 hrs and who were unable

*See also p. 2607.

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to turn themselves in bed were included. Common reasons for immobility were decreased level of consciousness, use of sedatives or paralytics, and chemical or physical restraints. Patients were excluded if they were able to turn spontaneously or were on specialty beds providing continuous lateral rotation (automated turns). Staff nurses and other ICU personnel were unaware of the nature of the study to prevent any change of nursing care that may have resulted from their knowledge of the observation.

Various members of a team consisting of a volunteer nurse, a medical resident, a medical student, and two paid research coordinators performed the observations. Each member of the research team used identical methods of observation and data recording. Patients were observed at 15-min intervals for a minimum of 5 hrs. Patients who were observed for <5 hrs were discarded from the database. An equal amount of day and night shifts were sampled at each institution. The periods of observation were continuous. Furthermore, if a patient was temporarily transferred out of the ICU for a procedure (e.g., radiograph, computed tomography scan) or was undergoing a procedure in the unit, these times were not included. Blinding of the nature of the study was maintained by encrypting data collection, and, if asked, ICU personnel were told that observers were "evaluating monitor function." Data were recorded utilizing a code consisting of two numbers corresponding to a clock representative of the plane of the patients shoulders as viewed cephalad; for example, flat was as-

signed 9-3 and a 30-degree rightward elevation with the same degree of leftward declination was assigned 10-4. Only position changes along an axis in the coronal plane were considered and recorded. Data were stored and analyzed using Microsoft Excel (Seattle, WA) and SPSS (SPSS, Chicago, IL).

RESULTS

In the survey of ICU specialists, 392 surveys were sent by electronic mail, and replies were obtained from 72 people, a response rate of 18.4%. A total of 60 of those replying (83%) agreed that the standard of ICU care was turning the patient every 2 hrs (Table 1). To the question of whether this standard may prevent complications, 65 (90%) again agreed. As to whether this standard is being achieved the majority of the time in their ICUs, the respondents were divided. Only 41 (57%) felt that the standard of turning every 2 hrs was achieved; the remaining 30 (42%) felt that this standard was not practiced in their ICU. There was one person who answered affirmative to the first question but did not respond to the latter two questions. Eighty-four percent of all returned surveys were from practitioners in the United States, and the international sample was too small to show any statistical difference in responses.

A total of 74 patients were observed in three separate ICUs. Table 2 shows the total observation times by site and per patient. Patients were observed for an average of 7.7 hrs each (SD, 1.6 hrs), with a median of 8 hrs, and 77% of patients were observed for >7 hrs. A total of 566 patient hours of observation were included in the analysis.

To assess changes in body positioning, we analyzed data based on the time per patient for which there was no change in body position. To be sure our results were not skewed by what time we began recording patient body position, we assumed that a change in body position had occurred immediately before the beginning of the observation period for all patients. If patients were out of the room or had procedures performed, a similar method of initial 2-hr satisfactory period was employed. Thus, no turns were expected during the first 2 hrs of observation, and therefore, our results are the most conservative estimates of time without position change.

If patients received no change in body position after remaining in one position for >2 hrs, the time after the 2-hr mark was considered time left in a position in which a change should have occurred. If a patient remained in one position for <2 hrs, this was considered to be within the limits of the standard of care. A summary of these data are shown in Figure 1. Ninety-seven percent of patients did not receive the minimum standard of body re-

Table 1. Critical care survey results (72 respondents)

| Question | Yes, % (n) | No, % (n) | No Response, % (n) |
|---------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------------|
| Do you agree that the standard of care is to turn immobile ICU patients approximately every 2 hrs? | 83 (60) | 17 (12) | 0 |
| Do you agree that turning immobile ICU patients every 2 hrs may reduce the risk for complications (DVT, pressure sores, atelectasis)? | 90 (65) | 8 (6) | 1 (1) |
| Do you believe that patients in your ICU are receiving this turning care >50% of the time? | 57 (41) | 42 (30) | 1 (1) |

ICU, intensive care unit; DVT, deep vein thrombosis.

Table 2. Observation hours

| | Total Hrs | Individual Patient Observation Hours | | | |
|--------|-----------|--------------------------------------|--------|--------|-----|
| | | Mean | Median | Range | SD |
| Site A | 146.75 | 7.3 | 5.75 | 5-12 | 2.9 |
| Site B | 169.50 | 7.7 | 8 | 7.25-8 | 0.6 |
| Site C | 249.75 | 7.8 | 8 | 6-8 | 0.5 |
| Total | 566.00 | 7.7 | 8 | 5-12 | 1.6 |

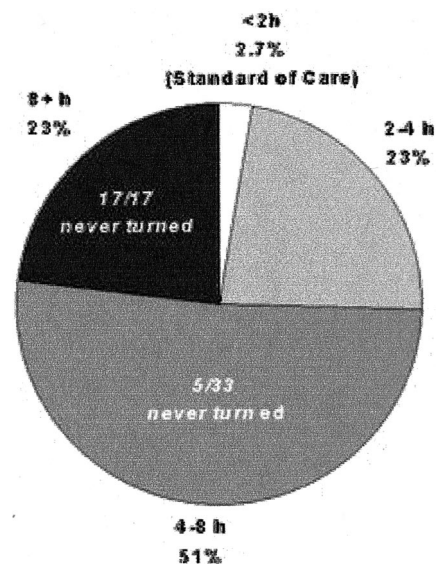


Figure 1. Hours without change in body position (n = 74). The insert indicates the number of patients with no turns during observation.

positioning every 2 hrs. Fortunately, 23% of patients only missed required turns by 1 or 2 hrs. However, about half of observed patients were supine for 4–8 hrs. Finally, another 23% of patients were not repositioned by staff for >8 hrs, and 100% of these 17 patients were supine the entire study observation period. Combining this finding with data from other groups shows a total of 28% of all patients were similarly supine throughout all observation periods.

DISCUSSION

Patients in ICUs are often immobilized due to a number of factors related to the nature of their illness. The many short- and long-term complications of immobilization have been clearly delineated and studied, and they include significantly increased risks for decubitus ulcer (1–3), venous thromboembolism, and pulmonary dysfunction (4–7). For the critically ill, these complications carry significant comorbidities that increase the physiologic burden to an already severely challenged patient population. To prevent these complications, it would be logical simply to turn immobilized patients. Conceptually, this has served to establish standards of care. From nursing texts (9), published guidelines (2), and from the results of our physician survey, it seems that the standard of turning every 2 hrs is the accepted standard and expected goal.

The results of our study demonstrate that this nursing standard is not met in the majority of cases. In fact, in >566 patient hours of observation, only two patients had a change in body position every 2 hrs. We have demonstrated in three representative sites that the highest risk, critically ill patients are infrequently turned. From the data in our survey, at least half of all ICU physicians suspect that the turning standard is not achieved in their institutions as well. It implies that most critically ill patients may not be receiving the standard of care and, as such, are at an increased risk for the many complications of immobilization. At a minimum, these complications may increase length of stay and hospital costs. At worst, these complications may contribute to increased mortality.

Implication for Previous Specialty-Bed Studies. The results of our study are particularly compelling when considered in the light of numerous studies that have assessed the efficacy and benefits of specialty rotational beds in preventing

the complications of immobilization. These studies have demonstrated that there are significant positive outcomes in relation to mortality, length of stay, nosocomial pneumonia, and skin breakdown (10–16) when patients are randomized to specialty beds. However, the control groups used in these studies are worth examining.

In their methodology, the published protocols call for the patients to be randomized to a “conventional hospital bed” (10), manual turning every 2 hrs (11–14, 16), or specialty beds. Yet, there is no indication that the performance of the control, manual turning, was monitored or assessed. In three particular case studies, we have been informed that the control groups were in fact not monitored for compliance (personal communication).

These studies have shown compelling and convincing evidence that automated bed technology is clearly superior to conventional treatment. As it is not readily apparent from these studies that the manual turning of patients was strictly monitored or enforced, we believe our study at least calls into question the definition of conventional or routine care. Our data suggest that perhaps the conventional treatment in most ICUs is indeed prolonged immobilization, and therefore, the specialty bed–study results are not surprising. The general assumption in these studies was that the control group was receiving the nursing standard of turning every 2 hrs. Extrapolating from our results, the specialty-bed studies may have in fact been comparing these specialty beds with a control group that was not turned adequately. The specialty beds merely assured that the standard of care was being met (or exceeded). As a result, positive study conclusions may actually represent the difference between being turned or not, rather than specialty-bed turning vs. manual turning. We present this data not as an indictment of these clearly important studies, but rather to point out what may be an overlooked and systematic lapse in the current care of critically ill patients.

Interestingly, of all the studies we reviewed utilizing specialty beds, only one did not show any significant benefit of specialty beds. Traver et al. (17) studied 103 ICU patients randomly assigned to standard turning or turning by an oscillating bed. He included turning every 2 hrs as part of the protocol and documented the degree to which this was being done. The control group was manu-

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ally turned every 1–2 hrs 67% of the time, and when compared with the specialty beds, there was no significant difference for length of stay, duration of ventilation, or prevalence of pneumonia. This suggests that when stress is placed on repositioning patients to the standard of care, and it is achieved in at least the majority of patients, specialty beds may offer no significant benefit. Whether or not the beds themselves confer any intrinsic or additional benefit beyond simply achieving the standard of care would have to be decided by more rigorous studies with valid control groups.

Study Limitations. The response rate to our survey was admittedly quite low. We utilized an e-mail survey to improve the ease of response for recipients and thereby the response rate. Nonresponders were sent reminders. Despite our efforts, the response rate remained low. We believe, however, that there is no selection bias of this smaller sample that would preclude drawing conclusions from the data for trends.

Other limitations of our study stem primarily from its observational nature. Despite our attempts to blind caregivers to the nature of our study, it is possible that our intention was known and the data do not accurately reflect the reality of care rendered. Any unblinding, however, would be expected to actually increase adherence to prevailing standards of care, and this did not seem to be the

case. To reduce sampling error, we have made particular effort to include a variety of observational settings: day and night shift, medical and surgical specialty, and different types of hospitals with varied geographic locations. We have no reason to believe that this represents an isolated phenomenon exclusive to shifts, specialties, or these three institutions. Finally, it is possible that the patients we observed were indeed turned adequately before or after our observation period. Therefore, all observations for less than five consecutive hours were discarded because we felt that this would eliminate the possibility that our data were due to an inadequate sampling of hours per patient.

A caveat to keep in mind is that there has never been overwhelming data from randomized, controlled trials that have proven the benefit of the current nursing standard of care. Such a study would not be possible ethically given that the nursing standard has already been established. However, in essence, such outcome studies have already been inadvertently performed if one accepts that in the specialty bed studies, their control (standard care) population was similar to that which we discovered in this study (i.e., unturned). Their intervention was ultimately the turning of patients, and the results were clearly beneficial.

CONCLUSIONS

If turning patients manually accomplishes the same results as specialty beds, it would seem reasonable to simply mandate this practice. But this is already an established standard of care and, as such, should be uniformly achieved. A recent survey of nursing personnel regarding patients in a long-term-care facility revealed a prevailing opinion that the goals for turning are not realized (18). The results of our survey of intensive care specialists are also quite enlightening. Of those responding, the majority (83%) agree that the standard is turning every 2 hrs. Furthermore, 90% also believe that this standard helps to prevent the complications of immobilization. However, the respondents were less confident that the goals were met with any regularity. Only half of the critical care specialists believed that the standard is achieved at least 50% of the time. So, despite turning every 2 hrs being an expected standard and accepted as beneficial and necessary for proper care of patients, it is a goal that

remains elusive, even when part of a rigorous protocol as in the previously mentioned study by Traver et al (17).

There has been some investigation into reasons why turning is not performed. In the survey study by Helme (18) of nursing personnel at long-term-care facilities, the chief reason given by nurses aides for not performing turning routinely was a lack of specific assignment to the task and a lack of time and staff. Head nurses and directors of nursing also acknowledged these problems, adding that excess paperwork also prevented them from adequately monitoring compliance with policies. Given the way in which our present healthcare climate attempts to stretch the already thinly spread nursing resources, it is no surprise that many important nursing duties are overlooked for more pressing concerns.

Although educational programs have been noted to effect changes in performance, they are often ineffective and require even more time and personnel. A parallel can be drawn with hand-washing policies. Hand washing has been shown to decrease nosocomial infection rates (19, 20), yet compliance rates have been reported to be abysmally low (19, 21). Furthermore, although educational programs can improve compliance, these noted changes are short lasting (19, 20). It is not unreasonable to assume that the same might occur with behavioral educational programs targeted at improving compliance with a 2-hr turning standard.

Given our data and its implications for the care of critically ill patients, a reanalysis of our conception of the benefits of automated beds seems warranted. It is likely that the use of specialty beds is necessary to consistently ensure that the turning standard is achieved. One might expect that greater usage may bring the price of this expensive technology down or that the additional cost of using more of these beds would be offset by benefits with regard to length of stay, length of mechanical ventilation, or decreased complications. In fact, there is some evidence that with increased use of continuous lateral rotation therapy, costs may actually decrease due to decreased length of stay (22). In this age of shrinking nurse/patient ratios, in which scarce personnel resources are stretched to the limit, and the failure of behavioral educational programs, the institution of automated bed technology may be the most economic and reliable way to guarantee

that critically ill patients achieve a simple but clearly beneficial intervention. Furthermore, specialty beds may possess unknown mechanisms of action yet to be discovered that could improve outcomes. We feel that our findings warrant a reappraisal of care of immobilized critically ill patients.

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