High Attendance Rate of Family Members During Physician Rounds Is Predictive of Worse Clinical Outcomes: A Historic Cohort Study

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ABSTRACT **Background:** The prognosis of long-term clinical outcomes for each patient is of utmost importance.
Objectives: To evaluate the association between rates of family attendance during rounds and long-term outcomes.
Methods: We conducted a historic cohort study.
Results: We followed 200 consecutive patients for a median of 19 months. Within the group of patients that had family members present in > 75% of rounds, the 30-day re-hospitalization rate was tenfold higher (P = 0.017). The overall prognosis (including median survival length) of patients who had the highest rates of family attendance (> 75%) was significantly worse compared to patients who had lower rates (P = 0.028). High rates of family attendance were found to correlate with other established risk factors for long-term mortality, including advanced age (r = 0.231, P = 0.001) and in-hospital delirium.
Conclusions: High family attendance during physician rounds in an internal medicine department is associated with worse patient prognosis.

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KEY WORDS: family members, internal medicine, long-term mortality, physician rounds, prognosis

Face-to-face communication, fact sharing, and bilateral questioning between the medical team members (both physicians and nurses) and a patient's family is one of the pillars on which internal medicine stands. Arguably, such communication improves history taking and better understanding the life-milieu from which the patient comes. Family attendance during physician rounds could also impact the professional staff's understanding of the family's involvement and feelings toward the patient's prognosis. One approach that facilitates improvement of this communication is the assimilation of family-centered rounds into the daily routine of the internal medicine department. Data regarding the significance of family members during the physician rounds within an internal medicine ward are extremely rare. It is common for department staff to request that families exit the department during physician-round hours. Nevertheless, this situation is not necessarily the case in other clinical disciplines.

This approach was indeed studied in the pediatric medicine world [1,2]. For example, Oshimura and co-authors [3] showed that presence of family members during the daily physician rounds was associated with shorter duration of hospitalization and improvement of the discharge process. In a broad review within intensive care units, Davidson and colleagues [4] showed that when given the opportunity, 85–100% of the families preferred to participate in the physician rounds. Allen and associates [5] showed that assimilating family-centered rounds within an intensive care unit setting improves communication and satisfaction and shifts the team's time away from family communication events outside of rounds, condensing most of those activities within the rounding structure. In addition, critical care nurses and physicians were principally satisfied with the process. Therefore, family-centered rounds are advocated by pediatric medicine authorities [6] and critical care medicine task force guidelines [7]. Kang et al. [8] showed that family-centered, multidisciplinary rounds were effective in reducing anxiety and uncertainty among family members of critically ill patients. Others even stressed that family-centered rounds, associated with bedside teaching is beneficial for all stakeholders, including physicians, students, and families [9]. However, Wacht and colleagues [10] showed that most staff members in the emergency department oppose family presence during resuscitation, primarily due to concern about family criticism, added pressure on the staff members, fear of lawsuits, and fear of hurting the feelings of the families.

Despite the potential benefits, data regarding the possible significance of family-centered physician rounds are lacking within internal medicine wards. We aimed to address this question in an internal medicine department in which family member attendance during physician rounds is encouraged.

PATIENTS AND METHODS

The present study was a historic cohort of all patients admitted between 1 January 2017 and 31 December 2017 for a period ranging from 3 to 7 days in an internal medicine department at the Sheba Medical Center, a tertiary hospital in central Israel. A time span of 3 to 7 days was set according to the average hospitalization dura-

tion in our department, thus omitting patients who were experiencing long-term hospitalization and becoming less acute in nature.

The present study was conducted in a department in which family members are invited to attend the daily physician rounds. During the daily round, the physician notes in the electronic medical record whether family members were present. We categorized the patients according to the presence of family members in the daily physician rounds to three groups: Group A included patients with no family member attendance during the whole index hospitalization. Group B included patients with family member attendance recorded between 1 to 74% of all physician rounds, and group C included patients who had family members present in more than 75% of all physician rounds. The outcomes measured included all-cause mortality within the hospitalization (short-term), all-cause mortality during follow-up period (long-term, median 19 months, range 0.07–20 months), re-hospitalization within 90 days, and incidence of delirium during hospitalization.

Other data that were collected and registered as possible confounders included age, gender, marital status, number of children, weight, height, body mass index, primary diagnosis, Norton score at admission, and a list of common, chronic co-morbidities. We also collected laboratory data including hemoglobin level, white blood cell count, urea and creatinine concentration, glucose, sodium, calcium, aspartate aminotransferase, alanine transaminase, and C-reactive protein levels.

Table 1. Family member attendance during hospitalization according to specific co-morbid illnesses

Co-morbid illness	Family member attendance rate in patients with illness	Family member attendance rate in patients without illness	*P*-value
Coronary artery disease	7900%.	72.50%	0.324
Atrial fibrillation	82.50%	71.30%	0.103
Congestive heart failure	77.80%	73.30%	0.518
Type 2 diabetes	78.20%	72.10%	0.336
Anemia	85.40%	71.70%	0.073
Inflammatory bowel disease	5000%.	7500%.	0.256
Asthma	55.60%	75.40%	0.182
Chronic obstructive pulmonary disease	8000%.	73.30%	0.411
Hypertension	77.90%	67.20%	0.104
Chronic kidney disease	74.30%	74.50%	0.974
Hypothyroidism	79.20%	73.90%	0.576
Stroke	68.20%	76.30%	0.276
Malignancy	81.40%	71.60%	0.150
Dementia	80.80%	72.30%	0.228

DATA ANALYSIS

The study sample size was based on the anticipated rate of attendance during hospital stay (defined as 3–7 days) and the assumed association between this parameter and the outcomes. Accordingly, we used the effect size for calculating our sample size [11]. To evaluate the association between the rate of attendance (as a categorical value) and clinical outcomes, which are continuous values, we used the coefficient r, 0.3 was considered a moderate effect. When evaluating the association between the categorical value of attendance and dichotomous categorical outcomes, we used the Cohen's d coefficient, 0.5 was considered a moderate effect. The values dictated a minimal number of patients of 84 regarding continuous parameters and a minimum of 128 study participants for the dichotomized, categorical parameters. The study size was planned to achieve statistical significance of 5% and 80% power. The actual study size was 200, more than was needed for achieving the above parameters.

Categorical parameters were described using frequency and percentiles. Continuous parameters examined for normal distribution using histograms and Q-Q plots. We described continuous parameters with normal distribution using the average and standard deviations. We described mean and interquartile range (IQR) for those who had an abnormal distribution. Comparisons of dichotomous, categorical values were made using the Kruskal Wallis test or the Mann-Whitney test according to the pattern of distribution.

The main parameter, the rate of family attendance during physician rounds, was divided into three categories: category A: nil attendance; category B: 1 to 74% attendance and category C: over 75% attendance. The association between this parameter and continuous parameters was conducted using ANOVA or the Kruskal Wallis test and using the square-chi test or the exact Fisher's test for categorical parameters.

A multivariate analysis was done using the Cox regression test for long-term outcomes and a logistic regression for short-term outcomes. All statistical analyses were two-sided and the value of $P < 0.05$ was considered as statistically significant. All data were plotted into a spreadsheet by Microsoft Excel™ 2007 Version 12.0.6787.5000 (Microsoft® Corporation, Redmond, WA, USA) and then analyzed using IBM Statistical Package for the Social Sciences statistics software, version 23 (SPSS, IBM Corp, Armonk, NY, USA).

RESULTS

The study included 200 patients, 108 men (54%) and 92 women (46%). The median age was 77.6 years (IQR 67–86). The median Norton scale upon admission was 17 (IQR 13–19) and the median modified Morse score was 9 (IQR 5-16). Sixty-two patients (31%) were married at the time of their hospitalization. The median hospitalization length was 3 days (IQR 3–4). The median follow-up duration was 19 months (range 0.07–20). Table 1 de-

scribes the rate of family member attendance during physician rounds according to the presence or absence of specific co-morbid illnesses. No co-morbid illness was shown to be significantly associated with an increase or decrease in the rate of family member attendance during the hospitalization. Nevertheless, there was a trend for increased rate of attendance in patients who had chronic illnesses compared to those free of disease. The trend was not evident for patients presenting with inflammatory bowel diseases and for those with asthma. These findings could be related to the fact that these two conditions are characteristic for younger patients. This explanation did not consider that stroke patients had lower attendance rates compared to patients without this diagnosis (a trend, without statistical significance). Table 2 summarizes both background characteristics and clinical outcomes found to be associated with increased rates of family attendance (both trends and significant findings). Similarly, incidence of delirium was too low to be included in the multivariate analysis model.

In a univariate analysis model, a weak positive correlation was found between higher attendance rates of family members during physician rounds and older age (r = 0.231, P = 0.001) [Figure A1]. A weak negative correlation was found with higher Norton score upon admission (r = -0.329, P < 0.001) [Figure A2]. There was a higher rate of family member presence during physician rounds among patients who experienced delirium throughout the hospitalization. Gender was not correlated with the rate of family member attendance during physician rounds. However, marital status was associated with attendance. Married patients had family members present during 43.3% of physician rounds, while widows and widowers had a higher rate (55.78%, P < 0.0001) and divorced patients had the lowest rate (19.5%, P < 0.0001).

Within the group of patients who had family members present during more than 75% of the physician rounds, the 30-day re-hospitalization rate was tenfold higher (P = 0.017) compared with the rest of the patients. This relation was valid in a multivariate analysis standardized for hypertension. However, there was no statistically significant difference between family member attendance during physician rounds and the 90-days re-hospitalization rate.

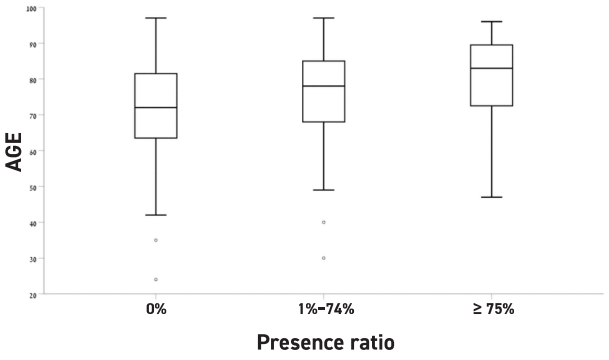
The all-cause mortality during the hospitalization was low: 16 patients died during the index hospitalization, rendering this outcome incompatible for entering the multivariate analysis model. We found a statistically significant increase in the long-term mortality rate for patients who had family members present during more than 75% of the physician rounds. As illustrated in Figure 2, the median survival in this group was 11.3 months compared with other patients, in which the median survival rate was too low to reach the median throughout the follow-up period. In a multivariate analysis model, standardized for age and gender, long-term mortality was not significantly increased. However, when considering family member presence as a continuous variable, long-term mortality was indeed increased in a statistically significant manner even in a multivariate analysis (P < 0.05).

Table 2. Background characteristics and clinical outcomes found to be associated with increased rates of family attendance

Background characteristics
Higher burden of chronic diseases
Older age
Disability (according to Norton score)
Widows
Clinical Outcomes
30-day re-hospitalization rate
Long-term mortality

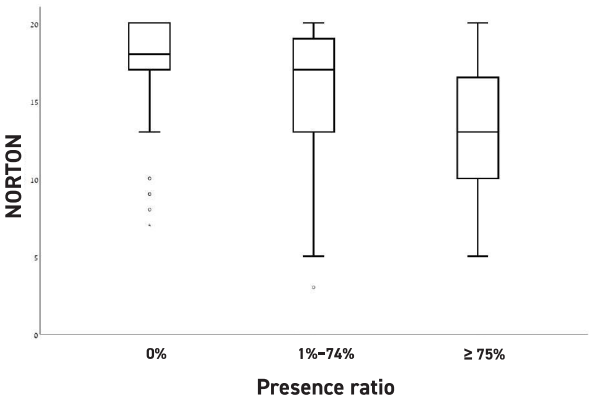
Figure 1. Family member attendance during physical rounds

[A] A statistically significant correlation between older age and higher rate of family member attendance during physician rounds



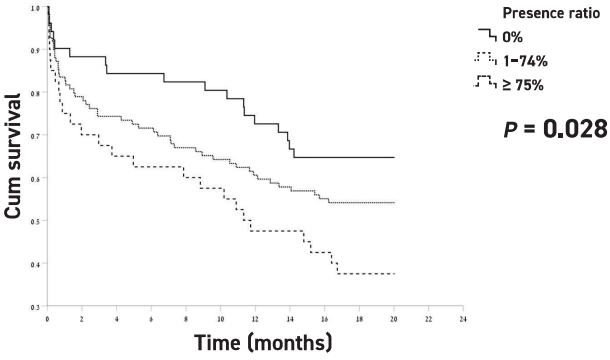
R = 0.231, P = 0.001

[B] A statistically significant correlation between lower Norton score on admission and higher rate of family member attendance during physician rounds



R = -0.329, P < 0.001

Figure 2. The long-term mortality rate is higher within patients who had the highest rate of family members' presence during physician rounds (over 75% of rounds).



DISCUSSION

Family-centered rounds, a practice that is well embedded and studied in pediatric wards and partly in intensive care units, is still an entirely unmapped territory within the realm of internal medicine. It is a custom, worldwide, to ask family members to wait outside the department during physician rounds. This long-standing practice has several advantages: the physicians and nurses can better concentrate and communicate on their patients and with each other while keeping the families worries and stress outside the clinical arena. In addition, the round can be completed faster and in a more efficient manner. Nevertheless, several disadvantages are potentially associated with this practice:

Many patients cannot fully deliver the complete clinical scenario relating to the circumstances of their hospitalization; some present with dementia, some experience delirium, and many are unaware of their cause for hospitalization (e.g., cases of syncope, seizures, hypoglycemia, dyspnea that necessitated sedation and endotracheal intubation).

The information the family members know regarding chronic illnesses and treatments is invaluable. Not only in cases of elderly patients but also for young adults who are not fully aware of their health status.

Both cognitive and emotional reactions of family members are important for the attending physician to recognize. These reactions not only help understand the patient's past but also help develop a treatment plan. The attitudes of family members toward changes in the patient's health status (new needs, new debilitation) are paramount for discharge planning.

When left outside, family members accumulate worries and intense emotions, sometimes unrelated to the actual status of the patient. Such worries and stress are easily dissolved while attending the round and speaking with the physician in real-time. The short- and long-term prognoses should be communicated to the patient as soon as these are consolidated by the physician. The presence of family members serves as an emotional resource and comfort for the patients while physicians are delivering bad news.

Delaying updating the family members until after the end of physician rounds may cause queues outside the physician's door, prolonging their working hours and further frustrating the worried family members.

The present study is the first of its kind, to the best of our knowledge, aimed at evaluating the role and prognostic significance of family member attendance during the daily physician rounds. One might anticipate that family members may have a positive influence on the patient's clinical outcomes. Family members may enrich the clinical data the physician gathers during the round and may increase attentiveness of the medical team to changes in the patient's clinical status, both direct and indirect.

Our results illustrate a different perspective on family members present during physician rounds. We found that increased family member attendance was associated with negative clinical outcomes and increased long-term mortality and 30-day re-hospitalization rates. In addition, increased family attendance during physician rounds was associated with other well-known negative prognostic markers: older age and increased incidence of in-hospital delirium events.

In-hospital delirium has been an important negative prognostic marker for various clinical outcomes. Patients with delirium experience prolonged hospitalizations, functional and cognitive decline, and higher risk for institutionalization. Most importantly, delirium carries a significant increase in short- and long-term mortality risk, even after adjusting for baseline differences in age, co-morbid illness, or dementia [12-14].

Indeed, low in-hospital mortality rate was not statistically significant for family members being present during the physician rounds. However, the correlation found between family members being present and increased age in-hospital delirium and 30-day re-hospitalization rates strengthens the value of family members presence as a negative prognostic marker. There is a correlation between the severity of a patient's clinical status and the desire for family members to be present during the physician rounds.

It is important to note that no specific co-morbid illness was found to be independently related to the family member presence rates [Table 1], although there was a trend for higher family attendance when chronic illnesses were present. Therefore, it is safe to assume that the patient's general condition was of higher importance than the existence of a specific disease.

The present findings do not demonstrate a definitive causal relationship between family member attendance and prognosis, but at the present time our results do not give reason to encourage such attendance.

STUDY LIMITATIONS

The present study was conducted in a single internal medicine department with a relatively small number of participants.

CONCLUSIONS

Family attendance during physician rounds in an internal medicine department is associated with worse patient prognosis. Further research is warranted to clarify the role and significance of family member presence during physician rounds in internal medicine departments.

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Capsule

Protection spanning viral variants

Despite the success of the early generations of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccines, viral evolution and immune evasion have made the development of next generation broadly protective vaccines essential. **Zhao** et al. used the evolutionary history of the SARS-CoV-2 S protein to develop S_{pan}, a vaccine antigen that carries amino acid residues that are consistent across SARS-CoV-2 strains. When administered to mice, S_{pan} elicited a more broadly neutralizing antibody response than a wild-type S protein vaccine. S_{pan} also conferred substantial protection against challenge with the Beta, Delta, and Omicron variants despite Delta and Omicron arising after S_{pan} was designed.

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Capsule

Mapping vaccine-induced immune signatures

Most studies examining vaccine-induced immune responses have largely focused on one vaccine at a time, which provides a limited understanding of the advantages and disadvantages of various formulations. Looking for a more systemic overview, **Hagan** and colleagues analyzed the human transcriptional responses to 13 vaccines against various pathogens from previously published datasets. Many of these vaccines triggered expression from some common gene signatures linked to the induction of innate immunity and plasmablasts, although the effect of each vaccine was different. After the authors controlled for the magnitude and kinetics of each vaccine's distinct immune response, they were able to use machine learning to develop a common time-adjusted signature that could predict antibody responses to the vaccines.

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Eitan Israeli