Expressions of Gratitude and Medical Team Performance

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abstract

BACKGROUND AND OBJECTIVES: Exposure to negative social interactions (such as rudeness) has robust adverse implications on medical team performance. However, little is known regarding the effects of positive social interactions. We hypothesized that expressions of gratitude, a prototype of positive social interaction, would enhance medical teams' effectiveness. Our objective was to study the performance of NICU teams after exposure to expressions of gratitude from alternative sources.

METHODS: Forty-three NICU teams (comprising 2 physicians and 2 nurses) participated in training workshops of acute care simulations. Teams were randomly assigned to 1 of 4 conditions: (1) maternal gratitude (in which the mother of a preterm infant expressed gratitude to NICU teams, such as the one that treated her child), (2) expert gratitude (in which a physician expert expressed gratitude to teams for participating in the training), (3) combined maternal and expert gratitude, or (4) control (same agents communicated neutral statements). The simulations were evaluated (5-point Likert scale: 1 = failed and 5 = excellent) by independent judges (blind to team exposure) using structured questionnaires.

RESULTS: Maternal gratitude positively affected teams' performances (3.9 ± 0.9 vs 3.6 ± 1.0; P = .04), with most of this effect explained by the positive impact of gratitude on team information sharing (4.3 ± 0.8 vs 4.0 ± 0.8; P = .03). Forty percent of the variance in team information sharing was explained by maternal gratitude. Information sharing predicted team performance outcomes, explaining 33% of the variance in diagnostic performance and 41% of the variance in therapeutic performance.

CONCLUSIONS: Patient-expressed gratitude significantly enhances medical team performance, with much of this effect explained by enhanced information sharing.

WHAT'S KNOWN ON THIS SUBJECT: Exposure to benign negative social interactions, such as rudeness, has a robust adverse effect on medical team performance. However, little is known regarding the effects of positive social interactions on medical teams or teams more generally.

WHAT THIS STUDY ADDS: Expressions of gratitude enhanced the effectiveness of medical teams. Although expressions of gratitude stemming from a senior colleague were not recognized as such, those stemming from patients or their families were impactful, boosting information sharing and enhancing performance outcomes.

ARTICLE

Recent evidence reveals that social interactions in medicine have robust implications on the performance of medical teams and their members.[1,2] These interactions need not be extreme in nature. In fact, studies reveal that being exposed to rudeness, a benign form of incivility, has adverse consequences on both individual and team diagnostic and treatment performance, accounting for more of the variance in such outcomes than the presence or absence of computerized order entry systems or practitioner sleep deprivation combined.[1,2] Nevertheless, given the intense and high-stakes environments in which medical teams operate, rudeness may be difficult to prevent or constrain. After all, it is precisely in such contexts that individuals' self-regulatory resources are most rapidly depleted, making it difficult for practitioners and patients alike to avoid remarks that others might perceive as rude, if not threatening or abusive.[3]

But what if efforts were made to encourage patients and medical staff to consciously engage in more positive interpersonal relating, such as expressing gratitude? Given that rudeness, a mild form of incivility, depletes the cognitive resources required for effective team work among medical professionals,[1,2] might expressions of gratitude, a widely prevalent form of civil behavior, have restorative effects, resulting in enhanced team performance?

On the one hand, the likelihood of any beneficial effect may be small, in that expressions of gratitude are typically brief and subtle forms of positive interaction, suggesting that medical staff will likely pay little if any attention to them. Moreover, role-specific expectations may lead the same individual to infer gratitude and draw positive inferences from gratitude statements expressed to them by a person filling 1 role (eg,

patient or the patient's family member) but not if gratitude is expressed to them by someone filling a different role (eg, supervisor or expert).[4,5] Finally, even if gratitude is inferred by medical staff, it may have no net positive effect on performance if, as suggested by the affect-as-information theory, it drives the gratitude recipients to feel overconfident and rely on more automatic modes of information processing when conditions require more reflective thinking.[6,7]

On the other hand, psychologists have consistently demonstrated that positive communication and interpersonal interactions have a positive impact on individual affect.[8–10] In turn, positive affect has been shown to improve individual performance by enhancing individuals' problem solving and decision-making abilities[9,11–15] and by facilitating thinking that is more flexible,[16] creative,[17,18] integrative,[19] open,[20] forward-looking and high-level,[21] and efficient.[19] Such effects could potentially drive enhanced team diagnostic and treatment performance to the extent that they lead medical staff to more efficiently integrate ideas voiced by others as well as better anticipate, recognize, and respond to the information and/or assistance needs that those in other roles may have at any given point in time.[9,22]

Accordingly, the current study was designed to examine whether and how expressions of gratitude stemming from individuals representing different roles affect the performance of ICU teams. We examined 2 main dimensions of medical team performance, namely diagnosis (requiring the ability of the team to integrate and synthesize disparate pieces of information in a timely manner), and treatment (requiring the ability of the team to identify the correct protocol for addressing the problem diagnosed, adjusting the intervention to meet

situational constraints, and executing procedures in a timely and error-free manner). Additionally, and consistent with research demonstrating that patient-focused communications motivate practitioners better than those focused on the practitioners themselves,[23] we tested the degree to which maternal gratitude would have different effects on team diagnosis and treatment compared with gratitude stemming from an authority figure (ie, expert). Finally, as depicted in Fig 1, we examined the degree to which the effect of gratitude on team performance could be explained by its effect on 2 main synergistic team processes, namely information sharing and workload sharing. In summary, we sought to offer some initial insights into the degree to which expressions of gratitude link to medical team performance and explicate the mechanisms underlying any such possible effects.

METHODS

For a detailed description of the procedures and measures used, please refer to the Supplemental Information.

Participants

Applying the same experimental design that was used to study the effects of incivility,[1,2] 43 NICU teams, each comprising 2 physicians and 2 nurses, were recruited from among the various NICUs operating in Israel's hospitals. The study was approved by the Ethics Committee of Tel Aviv University and by the Chaim Sheba Medical Center Institutional Review Board. All participants gave informed consent before taking part.

Settings

Teams were offered the opportunity to join a full medical simulation training day at the Israel Center for Medical Simulation (MSR) at Chaim Sheba Medical Center. The espoused purpose of the exercise was to train teams in debriefing techniques,[24] as
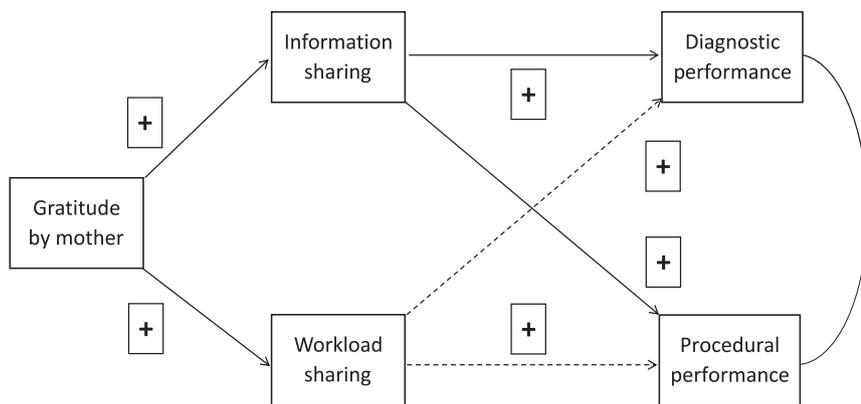
FIGURE 1
Hypothesized path model of the effect of maternal gratitude on team performance, mediated by team processes. The solid line represents supported by data and the dashed line represents the nonsignificant path.

a means by which to facilitate team learning and enhance performance.

Procedure

Four teams were recruited for each simulation day. NICU teams participated in a training workshop, including simulations of acute care of term and preterm newborns (advanced medical manikins). Participants were informed that a foreign expert would observe them and that they would interact with actors posing as parents. Teams were randomly assigned to either exposure to gratitude (in which the expert expressed gratitude to the team and/ or a mother of a preterm infant expressed gratitude to NICU teams, such as the one that saved her child) or the control (neutral statements regarding the increasing use of debriefings as a team learning tool and the need to complete study questionnaires) presented in a video clip at the beginning of the day. For the exact protocol used in each condition, please see the transcript in the Supplemental Information. After signing informed consent forms in which it was indicated that the purpose of our study was to enhance the understanding of how contextual factors influence medical outcomes, participants were briefed on the debriefing exercise to occur after the conclusion of each of the simulations

during the day. Regardless of condition, the day comprised 4 emergency scenarios in neonatal medicine, which represented a diverse set of acute clinical situations used to challenge the teams' diagnostic performance as well procedural skills. The social interaction (gratitude or neutral statement) occurred before the beginning of the series of scenarios. The scenarios occurred in random order. In each scenario, the participants were told that the NICU manikin lying in the incubator was their patient and that the patient's vitals would appear on the monitors immediately after the start of the simulation. Additionally, the participants were provided with the neonate's medical history. They were also informed that they may encounter professional actors playing parents of their patient and, if so, were asked to interact with and respond to them as they would in real life. Additionally, participants were asked to work as a team and received 20 to 25 minutes to discuss and develop a treatment plan for each clinical scenario. Specifically, the team was required to identify the acute deterioration in the infant's condition and respond promptly by providing the appropriate resuscitative treatments while trying to diagnose the underlying medical condition. On

the basis of conventional protocol, the main actions required from the medical team were detailed for each scenario and distributed to independent judges (senior neonatologists and veteran nurses) to facilitate their monitoring and evaluation. The scenarios involved diagnostic and manual intervention skills and required that members engage with one another in making and executing therapeutic decisions. After each simulation, the team entered a separate room for a reflexivity-based debriefing (ie, self-reflection and debriefing). Before the start of the reflexivity exercise, the judges were asked to complete a questionnaire in which they graded the participants' performance. Aside from the manipulations noted above (ie, gratitude versus control conditions), the procedures were identical to that used in our previous research on the implications of incivility in medical teams.[1,2]

Measures

Two independent NICU staff (1 senior doctor and 1 experienced nurse) who were blinded to the experimental intervention observed each team's performance in each of the simulation scenarios from an adjacent control room with 1-way mirrors and multiple video monitors that allowed for close-up observation and monitoring of the patient's vital signs. Before serving in that capacity, all judges had a day-long training program used to emphasize the monitoring and assessment of the team (rather than individual members) as the unit of analysis. To enhance interrater reliability, as part of this training, descriptors and examples of indicative behaviors were presented to the judges and discussed by them to ensure that all had a common understanding of their meaning and application. For each scenario, using the same 5-point Likert scales (1 = failed; 5 = excellent) used in our research on incivility in medical teams,[1,2] judges

independently rated each team's performance along items relating to parameters separated into 2 broad aspects of team performance, namely diagnostic performance and treatment (procedural) performance. The judges also assessed teams' engagement in prosocial behavior on the basis of the same measures used to tap information sharing[25] and workload sharing[26] in our previous rudeness research.[1,2] Judges were provided with workbooks in which the parameters of each scenario were detailed, with space in the margins intentionally left blank to allow them to record their observations as they monitored team processes and performance. Agreement between each team's 2 raters on each of these measures was sufficient ($R_{wg} > 0.75$) to justify the aggregation of judges' ratings by team.

Manipulation Check

To test the validity of the manipulation, we conducted analysis of variance (ANOVA), with gratitude conditions as the independent variable and perceived gratitude of the confederate (assessed on the basis of a modified measure adapted from related measures in previous research[27–29]) as the dependent variable.

Statistical Analysis

Because judges assessed team (rather than individual team member) processes and performance, all analyses were conducted at the team level by using SigmaPlot version 11.0 (Systat Software Inc, San Jose, CA) and Minitab version 16.2.2 (Minitab Inc, State College, PA) unless otherwise indicated. A power analysis based on data from a previous study[1,2] and assuming a desired power of 80% with α of .05 (2-sided test) revealed that samples of at least 9 teams per condition would be required to capture moderate effects. Because each team's performance in each of the scenarios was rated by 2 judges, we assessed R_{wg} as a measure

of agreement among multiple raters. Comparisons of the different performance scores in the gratitude and control groups were done by using nonparametric tests: Kruskal-Wallis 1-way ANOVA on ranks for multiple comparisons and Mann–Whitney rank sum test on medians for comparison of 2 groups. Statistical significance was set at .05. Multivariate analyses were conducted by using MPlus (version 7.2; Muthén & Muthén, Los Angeles, CA), which is specifically designed to test path models and assess the degree to which the effect of an exogenous variable on some endogenous variable may operate through some intermediary mechanism (ie, magnitude and significance of indirect effects). Because indirect effects have a skewed distribution, we used a 2000 iteration resampling approach (Monte Carlo method) to estimate indirect effects and their 95% confidence intervals (CIs).[30]

RESULTS

To ensure that our randomization process of assigning teams to conditions was appropriate, we first tested whether the age and cumulative experience (in medicine and neonatology) of the team's members was distributed equally across the conditions. We conducted an ANOVA with the conditions (eg, control, gratitude by expert, gratitude by mother, and gratitude by both) as the factor and the age or team experience (ie, number of years in medicine or neonatology) as the dependent variable. The results showed that there were no significant differences between the conditions, indicating that the randomization process had been successful (Table 1). Examination of the ANOVA-based manipulation checks presented in Table 1 indicated that the manipulation was effective with respect to maternal gratitude (control = 4.5 ± 0.6 versus maternal = 4.8 ± 0.4; $P < .001$) but not expert-based

gratitude ($P > .10$). When the manipulation involved both mother and expert, it was effective in generating higher perceptions of maternal gratitude (4.7 ± 0.4) relative to those in the control group ($P < .05$) but not of expert gratitude. Given the nonsignificant manipulations involving the expert, we focused our statistical analyses on the effects of maternal gratitude only.

Our findings regarding the direct impact of maternal gratitude on team processes and performance outcomes are displayed in Table 2. The findings reveal that maternal gratitude had positive direct effects on overall therapeutic and procedural performance (for both outcomes: control = 3.6 ± 1.0 versus maternal = 3.9 ± 0.9; $P < .05$ for therapeutic and $P < .01$ for procedural) as well as on the team processes of information and workload sharing (for both outcomes: control = 4.0 ± 0.8 versus maternal = 4.3 ± 0.8; $P < .05$) but not on diagnostic performance.

A preliminary examination of the effects of the gratitude manipulation over the course of the day reveals that the expression of gratitude had its greatest impact on performance at the outset, with groups exposed to maternal gratitude manifesting significantly higher mean procedural and general therapeutic scores in the first simulation after the intervention compared with the groups exposed to a neutral mother (3.7 ± 0.8 vs 2.9 ± 1.1 [$P = .007$] and 3.7 ± 0.9 vs 3.0 ± 0.9 [$P = .03$], respectively). Moreover, whereas the gratitude-exposed groups manifested a moderate and relatively steady improvement in performance over the remaining 2 simulations, the pattern for the groups in the "mother-neutral" (ie, control) groups was much less stable, with performance improving for simulation rounds 2 and 3 before dropping precipitously in the final simulation.

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TABLE 1 Demographic Characteristics and Manipulation Checks Used to Assess the Effects of Gratitude in the Different Intervention Groups

Evaluated Measure	Control	Expressions of Gratitude			P
	Neutral Greeting, $n = 38$	Mother and Expert, $n = 40$	Mother Only (Expert-Neutral), $n = 42$	Expert Only (Mother-Neutral), $n = 43$	
Age, mean ± SD, y	37.0 ± 8.2	36.3 ± 7.6	37.6 ± 7.4	35.5 ± 5.5	.56
Male sex, %	17.9	22.5	13.9	27.9	.42
Occupational experience, mean ± SD, y	9.0 ± 9.3	8.1 ± 9.2	10.0 ± 9.4	7.1 ± 6.9	.49
Experience in neonatology, mean ± SD, y	6.9 ± 8.6	6.2 ± 8.6	7.7 ± 8.1	4.6 ± 5.5	.34
Manipulation check: expert, mean ± SD (median)	4.6 ± 0.6 (4.9)	4.8 ± 0.4 (5.0)	4.6 ± 0.5 (4.8)	4.5 ± 0.6 (4.8)	.13
Manipulation check: mother, mean ± SD (median)	4.5 ± 0.6 (4.7)[a]	4.8 ± 0.4 (5.0)[b]	4.7 ± 0.4 (4.8)[a,b]	4.4 ± 0.6 (4.6)[b]	<.001

All comparisons of years were done by using 1-way ANOVA on means. Comparison of sex distribution among groups was done by using the χ2 analysis. All the comparisons for the manipulation checks were done by using Kruskal-Wallis 1-way ANOVA on ranks because the distribution was not normal. The manipulation checks analyses were also conducted at the group or team level, and the results were equivalent.

[a] Multiple comparisons between all pairs of groups revealed (by using Dunn's method) that the significant differences ($P < .05$) were between the group exposed to expression of gratitude from both the expert and the mother and the control group.

[b] Multiple comparisons between all pairs of groups revealed (by using Dunn's method) that the significant differences ($P < .05$) were between the groups exposed to expression of gratitude from the mother or both the mother and the expert and the group exposed to expression of gratitude from the expert only.

Finally, we tested the mediating processes through which mothers' gratitude might influence team diagnostic and therapeutic performance. As shown in Fig 1, we tested a path model in which information sharing and workload sharing were both posited to mediate the effects of maternal gratitude on these 2 team performance outcomes. Although not shown in the figure (for sake of simplicity), but reported in Table 3, the model also included the remaining direct (nonmediated) effects of maternal gratitude on both team performance outcomes.

The findings presented in Table 3 indicate support for the mediating role of only 1 of these 2 team processes, namely information sharing, in explaining the effects of maternal gratitude on both outcomes. More specifically, the indirect effect of gratitude via information sharing on diagnostic performance was 0.209 (95% CI = 0.018 to 0.395; $P = .03$), and on procedural therapeutic performance was 0.197 (95% CI = 0.017 to 0.385; $P = .04$), Further evidence of the mediating role of information sharing is the fact that the direct effect of maternal gratitude on these same outcomes contained a 0 in the CI and was not statistically significant in a model that included information sharing as a mediator. In terms of the magnitude of these effects, 40% of the variance in team information sharing was explained by maternal gratitude, and consistent with the findings in our earlier rudeness research, information sharing served as a robust predictor of both team performance outcomes, explaining 33% of the variance in diagnostic performance and 41% of the variance in therapeutic performance. The indirect effect of gratitude via workload sharing was not statistically significant.

DISCUSSION

Gratitude is omnipresent in social life, yet we know little about its consequences on those being thanked, no less on the performance of the teams of which they may be members. Indeed, the current study represents 1 of the first to examine the impact of gratitude from alternative sources on medical team performance and the mechanisms potentially underlying such a link.

Our findings reveal that members of medical teams may be more sensitive to parental gratitude than to gratitude expressed by medical experts or authority figures. Indeed, whereas medical team members exposed to maternal gratitude reported sensing gratitude on the part of that agent at a level higher than that of those in the control group (the group unexposed to any gratitude), experts' gratitude as sensed by those in the expert manipulation condition was not

TABLE 2 Effects of Exposure to Expressions of Gratitude From the Mother of a Preterm Infant on Medical Team Performance

Evaluated Measure	No Gratitude From Mother[a]	Gratitude From Mother[b]	
	$N = 22$	$N = 21$	P (Versus Control)
Diagnostic score	3.6 ± 1.0 (4.0)	3.8 ± 1.0 (4.0)	.21
Therapy plan	3.6 ± 1.0 (4.0)	3.9 ± 0.9 (4.0)	.08
Procedural score	3.6 ± 1.0 (4.0)	3.9 ± 0.9 (4.0)	.008
General therapeutic score	3.6 ± 1.0 (4.0)	3.9 ± 0.9 (4.0)	.04
Confidence in diagnosis	3.7 ± 1.1 (4.0)	3.8 ± 1.1 (4.0)	.38
Information sharing	4.0 ± 0.8 (4.0)	4.3 ± 0.8 (4.2)	.03
Workload sharing	4.0 ± 0.9 (4.0)	4.3 ± 0.8 (4.5)	.02

Assessments of performance and analysis were all done at the team level, thus N is the number of teams and not of participants. Data are presented as mean ± SD (median). All comparisons were done by using the Mann–Whitney rank sum test because the distributions were not normal.

[a] This control group includes the neutral group and the expert's gratitude group.

[b] The gratitude condition includes the mother and the mother and expert.

TABLE 3 Standardized Coefficients for Mediation Model Explaining the Effects of Gratitude From the Mother on Different Aspects of Medical Teams Performance

	Information Sharing		Workload Sharing		Diagnostic Performance		Procedural Performance	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Gratitude by mother	+0.264[*]	0.016 to 0.488	+0.298[*]	0.024 to 0.534	−0.046	−0.304 to 0.197	+0.149	−0.090 to 0.375
Information sharing	—	—	—	—	+0.614[**]	0.375 to 0.853	+0.557[**]	0.327 to 0.795
Workload sharing	—	—	—	—	+0.221	−0.015 to 0.454	+0.626	−0.037 to 0.469

N = 43 teams. —, not applicable.
[*] $P < .05$; [**] $P < .01$.

significantly higher than that of those in the control group. We suggest 2 possible explanations for this difference. First, the difference may stem from higher salience being attributed to gratitude for some behaviors than for others. More specifically, gratitude expressed for behaviors more central to the identity of those being thanked (eg, saving a child's life) may be more salient to the targets of the gratitude expression than those more distant (eg, participating in a training program) and thus may be more readily recognized and coded as expressions of gratitude. Second, consistent with previous research on motivating hand hygiene,[23] the difference may have something to do with the source, with gratitude expressed by patients or their family members implicitly deemed more genuine and/or salient than gratitude expressed by colleagues or authority figures in the profession. Indeed, in the same way that individuals at work often take the assistance provided by their supervisors for granted and as part of the supervisory job,[5] so might medical team members take expressions of gratitude from those more senior to them for granted and thus fail to recognize it as such.

However, to the extent that gratitude is recognized (as in the case of the mother), gratitude expressions appear to be positively associated with enhanced team processes and outcomes, explaining a large proportion of the variance in such outcomes. More specifically, we found evidence that compared with teams in the control condition, those in the maternal gratitude condition demonstrated enhanced diagnostic and treatment outcomes. Although the difference in outcomes (0.3 on the 5-point Likert scale) was statistically significant and the proportion of variance in outcomes explained (33% and 41% of variance in diagnostic and treatment outcomes, respectively) reveals robust clinical significance, these effect sizes were somewhat smaller than those of rudeness found in our earlier studies on these same outcomes.[1,2] This is not surprising given the strong and consistent evidence that negative stimuli generate more robust effects than do positive ones.[31]

Moreover, our mediation analyses provide us with insight as to the mechanisms underlying this effect, highlighting the critical role played by team information sharing. Although gratitude had a robust and significant impact on workload sharing, our findings reveal that when included in a model along with information sharing, it is the latter (also influenced by gratitude) that affects both team diagnostic and procedural performance. Team member information sharing has been shown to be critical not only for team members to be able to anticipate each other's responses to dynamic contingencies and allow for more effective coordination of response but also for team learning and capability development.[32–34] The findings presented here go beyond this, suggesting that team information

sharing also boosts the accuracy and efficiency of team diagnostics.

Receiving gratitude may generate the intensification of prosocial team processes, such as workload and information sharing, for 2 main reasons. First, when individuals are thanked by others for a particular action, they often experience stronger feelings of social worth and the need to give back, which, in turn, motivates them to engage in further such actions.[35] This reciprocity need not be direct.[36] That is, an individual thanked for providing assistance may reciprocate by next providing feedback to a colleague or helping a different patient, with the result being an upward spiral of prosocial behavior within the team as a whole.[36] Second, when directed at the team, expressions of gratitude often signal to team members that they have collectively made a positive difference in other people's lives, which, in turn, can bond members to one another and intensify members' sense of pride in and dedication to the team.[37] Studies reveal that team identification is a robust predictor of individuals' helping behaviors in teams[38–40] because team identification drives individuals to perceive their team's collective norms, goals, and interests as their own.[41]

With the findings of our study, we do not suggest that providers should seek to elicit expressions of gratitude from patients and families. However, they could suggest that providers take time to interact more with their patients and families to find out their

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experiences and emotional responses to care. This may improve the patient experience and may also increase the likelihood that teams will be exposed to a performance-enhancing expression of gratitude. With our findings, we also suggest that, following a practice increasingly adopted by airlines, medical systems might similarly leverage smartphone "push" technologies to allow patients to more easily communicate their appreciation to the teams caring for them.

CONCLUSIONS

Whereas expressions of gratitude stemming from a senior colleague or authority figure in medicine may not be recognized as such, those stemming from a patients or the patient's family members appear to be both recognized and impactful, boosting critical team processes and, in turn, enhancing team diagnostic and treatment performance outcomes. Medical personnel may not realize the tremendous effects that the expression of gratitude from family members may have on their own functioning. After all, their professional credo obligates them to make every effort to offer the best care possible, regardless of (and even despite) the response of family members. However, our findings indicate that although gratitude expressed by patients and their families may not necessarily boost the motivation of medical personnel to provide high-quality care, it does boost their collective ability to do so. Accordingly, although the encouragement of gratitude and other small, positive interpersonal gestures may demand nothing short of culture change on the part of the medical community and those they serve, our findings suggest that the benefits may well be worth the effort.

ABBREVIATIONS

ANOVA: analysis of variance
CI: confidence interval
MSR: Israel Center for Medical
    Simulation

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