

## Mind Genomics: What Professional Conduct Enhances the Emotional Wellbeing of Teens at the Hospital?

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### Abstract

**Background:** Hospitalization causes known neurotic disturbances of varying degrees of severity among teens. There is only one measure, the drawing tool, and preparation programs found to impact teens' abilities to cope with the hospital produced negative emotional status. This study focused on what teens perceive that would make their hospital experience more 'tolerable,' and less disturbing for them. Messaging accorded conduct will create positive feelings and increase utilization and cooperation among teens.

**Method:** 157 teens ages 13-18 from the continental USA participated in the study. Mind Genomics, specifically, the rule developing experimentation was used. The experiment was conducted via a computer assigning ratings to a set of unique vignettes comprising several statements, allowing analyzing both an individual-level analysis and subgroup analysis using conjoint analysis.

**Results:** Three mindsets were identified: Segment 1 responds to statements about a medical staff which genuinely tries to help the patient and bonds with trust. Segment 2, responds to the communications from the medical staff. For respondents in this segment the exchange of information in a pleasant but frank manner is important. Segment 3 wants a mentor. Differences were found on mindsets by gender and age. A viewpoint identifier was used for typing individuals in the population into mindsets of the sample.

**Conclusion:** Identifying mindsets allows healthcare organizations to facilitate better emotional status and healing by approaching teens with suitable messaging and avoiding alienating messaging. The most prevalent feeling regarding hospital visits is not neutral but rather either a positive feeling or very negative feeling affecting the utilization of healthcare hospital services among teens. Data and the viewpoint identifier allow us to assign the belonging of a teen to one of the three mindsets. Findings direct strategies of messaging by public health organizations, professional societies and policymakers to relieve anxieties and other disturbances of teens regarding hospitalizations.

**Keywords:** Teens; Hospital; Mind-genomics; Mindsets; Emotional status

### Introduction

Hospitalization has long been accepted as a stressful experience for children and teens. Edelstone [1] long ago showed neurotic disturbances of varying degrees of severity relating to hospitalization in children and teens. The degree of disturbances, however, is unknown. Whereas the physiological status may be routinely measured, the emotional status is not [2]. The "Child Drawing Hospital" measure [2] was used in an experiment by Brewer et al, [3] who found an increase in anxiety scores in the non-intervention group. Health professionals may impact teens' abilities to better cope with the hospital produced negative emotional status.

Upon learning that they must undergo surgery, children and teens experience a range of emotions including fear, anger, guilt, and sadness [4,5]. It has been demonstrated that children who have support throughout their hospitalization recover more quickly and have fewer emotional problems (i.e., separation anxiety and sleep disturbances) compared to children who are not prepared or supported. Pre-surgical preparation programs allow children and their families the opportunity to preview the hospital experience in a supportive environment to reduce anxiety, increase knowledge, and enhance coping.

Mount Sinai hospital developed an innovative preoperative preparation program for children, teens and their families. The 'Meet Me' program at Mount Sinai seeks to provide comprehensive emotional and cognitive preparation for surgery. This program is led by a multi-disciplinary team of health care providers including a pediatric surgery nurse practitioner, a registered nurse, a social worker, and a child life specialist. The program utilizes a culturally-sensitive, multimodal preparation model to prepare children and families for the hospital experience, reduce their anxiety and promote their healing [5].

'Meet me' is designed to meet the particular needs of each child and his or her family. Younger children receive their own doll to "doctor," along with a play medical kit, and a coloring book about hospitals. With these toys, each child is guided by a highly skilled professional through each step of the hospital experience, to prepare him or her as completely as possible for, the actual experience of surgery. For teenagers, the program is customized to the individual's interests and questions. Bi-lingual sessions, are usually in person but may also be over the phone. Sessions tend to be more interactive using: a video about anesthesia, tour the admitting area, or simply discuss what they might expect during and after surgery.

Many adolescents, however, seek care at a variety of outpatient locations that may lack such comprehensive care [6-8]. The utilization patterns of children and adolescents at hospitals play a definitive role in the practicality of healthcare delivery. Previous studies showed that results regarding healthcare services utilization varied across data sets, also showing that black adolescents received less care than did white adolescents [9], and that between one sixth to one third of all adolescents do not see a physician within a year [6,8-10]. The content

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of visits varied and visits among adolescents were erratic, affecting the continuity and the quality of adolescent preventive care [11,12]. Lack of preoperative preparation may produce insecurity resulting in neurotic behaviors.

Since there is a crisis of shortage of health professionals across the world [13], it is essential to identify which groups of teens are mostly threatened and what messages may alleviate negative emotions, improving their hospital visit, utilization, and of course healing. Prior studies have not examined the role of patterns of messages which might play a role in understanding those perceptions of teens hindering their utilization of healthcare services. This study focuses on what teens perceive would make their hospital experience more 'tolerable,' making the hospital experience less disturbing for them.

## Methods

For the purpose of this study, we used Mind Genomics, specifically, the rule developing experimentation (RDE). The origins of Mind Genomics trace back to experimental designs applied to ideas and are based on Anderson [14], Bockenholt [15], Green et al [16], Green and Srinivasan [17], Moskowitz and Gofman [18] and Luce and Tukey [19]. The first use of Mind Genomics in health was presented by Gabay and Moskowitz [20]. RDE operates under the assumption that we learn a lot by looking at the simple aspects of daily life in order to understand which aspects are positive, which aspects are negative. We 'port' RDE into the hospital experience, to discover the reaction of the teenager: What are terrifying moments, what are not, and how to relieve the former?

RDE links together elements under one's control (the test stimuli), with responses assigned by a consumer or patient (ratings). The elements are combined into vignettes (sets of combinations of elements) which are specified by an underlying experimental design, figuratively a recipe book of combinations. While the combinations appear random, they are systematic. The experimental design ensures that the different elements appear multiple times (typically 5 x, when we deal with a popular design, the 6-silo/6-element design, otherwise known as a 6 x 6). Each element appears in several vignettes. The variation of combinations evaluating the same element in different vignettes, indicates that the performance of the element is probably due to the element itself, and not due simply to the accidental combination of that element with a few others in a fixed set of combinations.

Taken as a whole, the set of vignettes in the study for a single individual constitute an experimental design. The respondent is presented with different, sometimes conflicting amongst them and must integrate his or her impressions to several orthogonal, independent pieces of information. This both reduces biases of social desirability and reflects reality. Since people experience mixtures, combinations of messages, impressions, ideas, pictures, sounds, and so forth, the presentation of whole combinations of messages to respondents imitates some of the complexity of life, as the respondent is assaulted with the different ideas in daily life.

Individuals differ, not only in who they are, but also in the way they think. Their attitudes make a difference. RDE allows us to delve deeper into the mind of the respondent, by looking at the pattern of response to elements about teens at the hospital. This micro-level of information would be otherwise unobtainable, either from geo-demographics (who a person is does not predict behavior in many cases), nor from web behavior (we do not have the necessary information about the person's behavior with respect to this particular micro-area of teenager and hospital), nor from the respondent's attitudes (which are typically measured by responses to questions, rather than responses to stated

situations). RDE emerges with different groups of the populations, mind-set segments or even mind-genomes, based upon the pattern of responses to a defined personal experience.

## Sample

The sample comprised of 157 respondents, ages 13-18, recruited to participate by a company specializing in recruiting respondents for participating in studies conducted on the Internet. Panelists who fit certain criteria, such as being within a specific age range with hospital experience were recruited for the study. Exhibit 1 presents sample characteristics.

## Measures

The independent variables were elements organized by vignettes. The elements focus on the experience of the teen as they address thoughts and behaviors of a teen's fear and health care experience. They do not emerge from clinical issues, structural aspects of the staff-patient situation or policy decisions. Elements reflect the world from the mind of the teen, rather than from the mind of an adult in a hospital, a health care organization or a policy making organization (Table 1). For example: "Vignette A: Attitude of the staff in dealing with the patient: Medical staff approaches teenage patients cheerfully"; "Vignette B: What the medical staff does to make the teen patient feel comfortable: Medical staff constantly checks up on teenage patients and insure their comfort". Exhibit 2 presents the instrument by vignettes and their elements.

## The dependent variables: The rating

Two rating questions, one on the extent of satisfaction and the second on the feeling which best reflects the respondent, allowed respondents to evaluate their experience in a holistic manner. The first rating Question was: "How satisfied are you in the bedside manner based on this information?"

(1=Not satisfied with bedside manner ... 9=Very satisfied with bedside manner)". The second rating Question was: "Based on this screen ALONE: How do you feel when you read these messages? (1=Delighted, 2=Comfortable, 3=Content, 4=Uncomfortable, 5=Disappointed)".

## Procedure

Respondents received an email invitation with a link, entered the link into the Windows Explorer, and were led to the orientation page. The RDE interview opened with an orientation page (Exhibit 2). The RDE interview proceeded in a structured manner supplying the maximum amount of information in a well-controlled, cost-effective manner. Interviews were conducted using a computer, which linked respondents to a central server. The central server controlled the design of the test vignettes, created at the site of the respondent's computer. Each respondent rated a mixture of elements appearing as a whole set. Each respondent evaluated 48 different vignettes each comprising 3-4 elements, with an average of 3.75 elements per vignette. By this structure, each element appeared five times in the set of 48 vignettes, and was absent 43 times. Each vignette appeared in 30 of the 48 vignettes, and was absent from 18 of the vignettes. Only the combinations changed from respondent to respondent. The experimental design ensured that the 36 elements would be statistically independent of each other for each respondent, allowing us to use OLS.

## Analysis: Creating the vignettes by experimental design

Vignettes were constructed to permit analysis by ordinary least

		Total	Male	Female
	Base Size	157	80	77
	Constant	58	58	58
	Males			
D5	Medical staff shows patience to teenage patients which helps them to mature	5	8	2
F3	Medical staff develops bond with teenage patient to make it easy for them to vent	7	8	7
E3	Medical staff are divided through gender and assigned to their own gender	-7	-6	-8
	Females			
B1	Medical staff constantly checks up on teenage patients and insure their comfort	6	2	11
F6	Medical staff develop a teacher-student bond and help teenage patients who want to be medical staff themselves	7	4	10
E3	Medical staff are divided through gender and assigned to their own gender	-7	-6	-8
		Total Sample	Under Age 12-16	17 or over
	Base size	157	46	101
	Additive constant	58	50	67
	Ages 12-16			
F6	Medical staff develop a teacher-student bond and help teenage patients who want to be medical staff themselves	7	18	3
C2	Medical staff communicates with teenage patient to eliminate awkwardness	5	17	0
D5	Medical staff shows patience to teenage patients which helps them to mature	5	16	1
F3	Medical staff develops bond with teenage patient to make it easy for them to vent	7	15	4
C1	Medical staff continuously tries to understand teenage patient's needs through communication	4	15	-1
C5	Medical staff communicates and gives advice to teenage patients for their present and future lives	4	14	0
C6	Medical staff always speaks the truth to the teenage patient no matter how traumatizing as it will help in the long run	5	12	2
D1	Medical staff shows patience in trying to break the teenage patient's wall of apathy	2	11	-3
B1	Medical staff constantly checks up on teenage patients and insure their comfort	6	11	5
D6	Medical staff shows patience to teenage patients which creates mutual respect	3	10	-1
E6	Medical staff puts themselves into the teenager's shoes to understand them	1	10	-3
F4	Medical staff develops friendship with teenager so that teenager comes to them	2	10	-2
E3	Medical staff are divided through gender and assigned to their own gender	-7	-8	-7
	Age 17+			
B3	Medical staff genuinely tries to gain the teenage patient's trust	6	1	8
E3	Medical staff are divided through gender and assigned to their own gender	-7	-8	-7
D2	Medical staff are patient in trying to understand teenage patient's generation	-3	8	-8

**Table 1:** The strongest (most positive) and weakest (most negative) elements for the teen in the hospital, based upon gender and two age groups (younger, older), developed from the individual binary models.

squares regression (OLS) which was used to estimate coefficients for each element. Coefficients permitted the deconstruction of the vignettes into the part-worth contribution of elements. The deconstruction of each response yielded the unique contribution of each element in the combination. The deconstruction into part-worth was carried out at the individual respondent level, creating an individual set of numbers for each respondent. This showed the coefficients pattern which described the individual, and links elements to the ratings assigned by the respondent. To understand the 'typical' response of the total sample, we averaged the corresponding coefficients across respondents. The individual level models, also allowed us to look at any subgroup of respondents. Since the number of respondents is large it generated stable estimates of the mean part-worth for each element.

For any vignette we coded an element as being 'present' in the vignette by the number '1,' and 'absent' from the vignette by the number '0.' By means of the rating questions we understood how the respondent felt about the vignettes in terms of the extent of satisfaction with the experience and its associated feelings. Creating models or equations by relating the presence/absence of the elements, allowed us the move from ratings to binary ratings that presented the membership of respondents

in a group, rather than estimating the intensity of their feelings. We divided our 9-point scale into dissatisfaction or low satisfaction (rating 1-6), and into higher satisfaction (rating 7-9).

With 48 vignettes rated by each respondent we produced the frequency with which our teen respondents rated satisfaction, the frequency of the selected each feeling/emotion, and, finally, the association between the nine rating points and the feelings/emotions. This allowed segmentations based on gender, age and mindsets.

## Results

Fifty one percent were male teens. Forty percent were Asian Americans, 34% were Caucasians and 22% were African American. Seventeen percent were 14-15 years old, 18% teens were 16 years old, 33% were 17 years old and 31% were 18 years old. Seventy four percent had up to two siblings, 13% had 3 siblings and 13% had more than 4 siblings. Thirty eight percent were first child. Eighty five percent described the relationship with their family as close or closely knit. Forty eight percent lived in the suburbs, 55% were hospitalized up to 3 times in the past year. Eight percent had a severe chronic illness. Most

were hospitalized in a large corporate hospital. 56% were high achievers in school, 50% were popular within a group of friends and not with all their peers. Sixty two percent frequently experienced stress and 89% of the sample had 5-7 hours of sleep. Forty six percent preferred to play games and text their friends during the hospital visit. Seventy one percent described their experience as comfortable or fair, 12% described it as a friendly experience, 14% described it as uncomfortable and one percent described it as hostile.

Results of the frequencies on five feelings and their distribution of satisfaction on the 9-point scale were:

1. For low levels of satisfaction (ratings 1-3), a respondent selects either comfortable or uncomfortable
2. For high levels of satisfaction (ratings 7-9), a respondent typically selects comfortable, content,
3. For the highest level of satisfaction (9), the respondent selected 'delighted.'

We transformed the ratings on the 9-point scale, in accordance with previous procedures. Ratings of 1-6 will become 0, and ratings 7-9 will become 100. This binary scale represented that respondents either felt dissatisfied with the bedside manner as described by the vignette (original rating 1-6) or felt satisfied with the bedside manner as described by the vignette (7-9).

We created an equation relating the 36 elements to the respondent's ratings:  $\text{Rating} = k_0 + k_1 (A1) + k_2 (A2) \dots k_{36} (F6)$ . The foregoing equation begins with an additive constant,  $k_0$ , representing the estimated value of the rating assigned by the respondent in the absence of all elements. The additive constant,  $k_0$ , is estimated by the regression program because all 48 vignettes comprised a minimum of three and a maximum of four elements.

The additive constant, the estimated value of the dependent variable 'satisfaction' when all the elements are '0' was 58. The additive constant is the expected percentage of respondents who would rate the bedside manner 7-9 in the absence of the elements. The additive constant, 58, is quite high, telling us that 58% of our teen respondents are predisposed to be satisfied, even without messages.

The coefficients in the regression equation, is the incremental percent of respondents who rated a vignette 7-9 if the element were to be inserted into the vignette. Each of our 36 elements had a coefficient associated with it. Most elements generated impact values between a low of -5 and a high of +5, respectively. The low of -5 tells us that the insertion of this poor-performing element into a vignette will decrease the number of respondents who rate the vignette 7-9.

Looking at the performance of elements, we identified winning elements, patterns among winning elements, and patterns among losing elements. Winning elements focused on creating a bond between the medical staff and the teen patient. The teen respondents reacted to the creation of this 'emotional link.' In contrast, poor performing elements focused on positive efforts that seem to be without heart, without underlying feeling. If we were to step away from the data to recap the message- the teens expect a genuine emotional bond.

Testing for group membership we found gender differences. The strong performing elements are:

1. The males want the opportunity to mature (impact=+8 for males).
2. Females are fairly indifferent to it (impact +2).

3. Females want to be nurtured, either by having the staff check up on them (impact=+11 for females, males don't care), or have the medical staff develop a teacher-student bond (impact=+10 for females, males modest interested).

Since teen years are periods of transition from childhood to early adulthood, we tested for differences by age groups. We divided our 157 respondent into two groups, the younger group, ages 16 and lower, and the older group, age 17 and 18. The strong performing elements for these groups differ dramatically:

The additive constant was lower for the younger respondents meaning that the basic propensity is lower among these respondents in terms of finding the bedside manner satisfactory. Younger teens find many of the elements to satisfy them quite strongly, especially the notion of the medical staff acting as guides, and mentors. These elements perform quite well, +15 and above, suggesting that the younger respondents want guidance. The older respondents showed a greater propensity to be satisfied in the absence of elements (additive constant=67), but don't respond to the elements as satisfiers. Thus age has a great effect on the pattern of responses to the elements. Table 2 presents analysis results based on gender and age.

Next, we tested for mind-set differences that go beyond gender or age. We tested differences between response patterns of teens who say that they have had a comfortable experience in the hospital (53 of the 157 teens) versus the response pattern of teens who say that they have had an uncomfortable, i.e., unpleasant experience in the hospital (22 of the 157 teens). Surprisingly, the additive constant for those who said their experience was comfortable is 62, lower than the additive constant for their uncomfortable group (constant=72). We would not have expected this reversal. However, the real differences emerge in the impacts of the elements, and it is there where we see the effect of prior experience. The 53 respondents who felt comfortable show four elements which are strongly positive, specifically those elements which communicate mentoring, and truthfulness.

The 22 respondents who felt uncomfortable show no strong performing elements, and indeed found many of the elements to be quite negative.

The teen's previous experience played a role in how he or she responded to the messaging. What we believed to be positive messages, in fact, negatively affected the emotional status when given to teens who felt that they had had an unpleasant, uncomfortable experience. Thus respondents had different points of view.

Since the essence of RDE studies is the segmentation of respondents into homogeneous groups, based upon the patterns of reactions to the elements we segmented the sample population using 'cluster analysis.' We divide responses into groups based upon 'distance' or 'dissimilarity' between responses. We computed a measure of distance between the profiles of pairs of respondents, using as the data the 36 coefficients. Each pair of respondents generates a distance. The clustering program first placed respondents into two complementary and exhaustive segments (2-segment solution), and then into three complementary and exhaustive segments (3-segment solution), and so forth. Aiming at a parsimonious and interpretable segmentation, we selected a three segment solution.

The three segments for the teen ager in the hospital suggested radically different levels of likelihood to say 'satisfied' in the absence of the elements. Segment 1 was the least likely to be satisfied, at least at a base level, with an additive constant of 42. In contrast, Segment 3 had far more likelihood to be satisfied, with an additive constant of

		Tot	Seg1	Seg2	Seg3
	Base size	157	43	55	59
	Constant	58	42	56	71
	Segment 1 – Medical staff tries to help				
E1	Medical staff always have a smile on their face	1	18	-8	-3
B1	Medical staff constantly checks up on teenage patients and insure their comfort	6	18	8	-4
B4	Medical staff genuinely tries to help patients which makes teenage patients feel special	2	16	-1	-7
E2	Medical personal are assigned to one or two teenage patients at a time	-1	15	-15	0
B3	Medical staff genuinely tries to gain the teenage patient's trust	6	14	3	2
E4	Medical staff do not look down upon the teenage patients	1	12	-9	1
E6	Medical staff puts themselves into the teenager's shoes to understand them	1	10	-8	3
	Segment 2 – Medical staff communicates				
C6	Medical staff always speaks the truth to the teenage patient no matter how traumatizing as it will help in the long run	5	5	15	-5
A1	Wittiness helps medical staff seem more human	4	2	15	-4
C5	Medical staff communicates and gives advice to teenage patients for their present and future lives	4	3	15	-4
A3	Medical staff breaks the ice with teenage patients with wittiness	6	9	14	-4
D6	Medical staff shows patience to teenage patients which creates mutual respect	3	-1	13	-4
C3	Medical staff communicates with patients through technology	0	3	12	-15
C1	Medical staff continuously tries to understand teenage patient's needs through communication	4	7	10	-4
A4	Medical staff makes teenage patient forget he is in hospital through wittiness	2	1	10	-6
B6	Medical staff never quits in connecting to even the most unfriendly teenage patients	4	4	10	-2
	Segment 3 – Medical staff are mentors and friends				
F6	Medical staff develop a teacher-student bond and help teenage patients who want to be medical staff themselves	7	3	-8	25
F3	Medical staff develops bond with teenage patient to make it easy for them to vent	7	7	0	14
F2	Medical staff develop a permanent friendship with teenage patient that carries on even after their release	2	-3	-7	14

**Table 2:** The strongest (most positive) and weakest (most negative) elements for the teen in the hospital, based upon three mindset.

71. All constants referred to conditional probability of saying 'satisfied'. The very big differences emerged in the elements. Table 3 clearly reveals three different mindsets, and the fact that what appeals to one mindset may be irrelevant to the other mindsets, and actually may turn out to be a negative.

Segment 1 responds to statements about a medical staff which genuinely tries to help the patients. For Segment 1 it's a matter of bonding with trust.

Segment 2, in contrast, responds to the communications from the medical staff. It's the exchange of information in a pleasant but frank way which is important.

Segment 3 wants a mentor.

With our three radically different mind-sets, we identified any question, either about whom the respondent is, or what the respondent

reports in terms of attitude, which co-varies with membership in a mind-set segment. Exhibit 1 shows no co-variation. The self-profiling questionnaire showed that the three segments are quite similar in their profiles. There were no radically different patterns, except for birth order and segment membership. We can use these mind-sets to create appropriate experiences for the teen respondent, and appropriate and pleasing experiences for other medical situations. The mind-set segments and their importance may serve as guides for more positive medical experience. They motivate us to find ways to assign a person to a segment.

The belonging of teens to segments in the population, however, is challenging. Our traditional ways to find these mind-set segments in the population do not work. The 'big data' approaches, data mining, looking for patterns in a vast amount of unstructured data, don't work when we apply those same approaches to our small data set. We have

How satisfied are you in the bedside manner based on this information?									
1=Not at all									
2=Somewhat Not sure									
3=Very much									
Classification functions (52% correct)				New Person to be assigned to a mindset segment					
	Seg S1	Seg S2	Seg S3	P1	P2	P3	P4	P5	
Constant	-6.0	-6.5	-7.8						
Medical staff become friends with teenage patients through humor	1.7	1.9	-0.1	1	2	3	1	3	
Medical staff become temporary father/mother -figure to teenage patient	0.1	1.5	1.6	1	1	3	2	2	
Medical staff develop a teacher-student bond and help teenage patients who want to be medical staff themselves	2.7	1.4	3.9	1	2	3	3	2	
Seg1				-1.4	3.0	7.7	4.1	4.8	
Seg2				-1.7	1.7	8.0	2.6	5.1	
Seg3				-2.3	1.6	8.7	7.1	3.2	

**Table 3:** The discriminant function analysis for the teen in the hospital, showing how a three-point scale with three questions can identify a teen as belonging to one of three mind-set segments with respect to the hospital experience.

been using the epidemiological approach to identify belonging to a mindset. Rather than looking for external, often unrelated and not intuitively expected, variables which can ‘assign’ people to mindset segments, we embrace the medical model. From the set of elements originally used to create the segments, we create a short test of three or four simple questions, which will assign a new respondent to a segment. We will use data that is relevant to our segmentation, rather than hunt through massive arrays of variables in Big Data to look for the happenstance relation, one which we may find, or which may elude us. We created the ‘mindset identifier,’ using the raw material used to create the segments.

### Identifying the belonging of teens into mindsets

Since each respondent generated an equation or model relating the presence/absence of the 36 elements to the 9-point rating scale (question #1), we estimated the rating on the 9-point scale that would be achieved for each of the 36 elements, for each respondent, if that element was the only element in the vignette.

After completion of the recoding we applied discriminant function analysis (DFA) to the data, to create a set of three classification functions, one classification function for each segment. DFA correctly assigned 52% of the respondents to their segment, instead of a random 33%. The increase in correctness through the DFA is perhaps not the highest we could achieve; had we used 10+ terms in the classification function we could have achieved 65% correct classification. However, when developing the classification function, and ultimately the viewpoint analyzer (see below), it is prudent to be satisfied with fewer terms, even at the risk of less precision. The reason for that trade-off is simply application. It is a lot easier to assign a person by using three questions at the time of the hospital visit than by using 10 questions.

On the right side of Table 4 we see the section ‘New person to be assigned to a mindset segment.’ In this section we ‘solve’ the three classification functions for five different patterns of responses to the three questions. We show the pattern of responses in the first set of rows, then show the estimated value for each of the three classification functions, and finally show the segment to which a respondent will be assigned. The respondent is assigned to that specific segment whose classification function is positive, and the highest of the three estimated classification function. Thus person 1, P1, with ratings 1, 1, 1 for the three questions, belongs to no segment, because the three classification functions generate negative values. Person 2, P2, with ratings 2, 1, 2, is assigned to Segment 1.

Knowing that our teens divide into three segments on the basis of mind-set provides us with insight as to how their world organizes. The

viewpoint identifier allowed us to apply that insight. Since there are three mind-set segments and we do not know the mind-set segment to which a person belongs, we eliminated elements which did very poorly for any of the segments. With three questions, each having three possible answers, we have a total of 27 patterns. Each pattern maps to one of the three segments. Each segment has its own output page, with the requisite information.

### Linking emotions to elements

Each respondent was instructed to rate the vignette on two attributes, satisfaction and feelings the respondent was experiencing just at the moment of answering the question. The five feelings were delighted, comfortable (two positive), content (defined as a neutral feeling), uncomfortable and disappointed (two negative). We divided the full set of 7,536 vignettes (157 respondents x 48 vignettes/respondent) into three groups, representing vignettes associated with positive, with neutral, and with negative feelings, respectively. We ended up with similar coefficients for a single element. This is, rather than looking at people as the basis for creating the model, producing 157 individual models allowed us to create three ‘grand models,’ independent of person.

We created a single individual model for all of the vignettes associated with a positive feeling (56%), another model for all of the vignettes associated with a neutral feeling (33%), and finally a third model for all of the vignettes associated with a negative feeling (12%).

1. The majority of the emotions were positive.
2. The additive constant, basic predilection to be satisfied with the bedside manner, was highest when the respondent said he or she feels positive (constant=86). However, all the elements were similar. There was no discrimination among them.
3. The additive constant was lowest when the respondent felt negative (constant=37). There were a fair number of elements which drove increasing satisfaction.
4. With a momentarily happy respondent, everything seemed wonderful, with nothing really standing out. With a momentarily unhappy respondent, the additive constant was lower (37), but several elements stood out as driving satisfaction, primarily elements dealing with friendship and bonding that provides security.

### Discussion

Findings of this study stress skills of empathy, bonding, sincerity, mentorship and trust building among clinicians. These findings are in

		Positive	Neutral	Negative
	Percent of vignettes associated with the feeling/emotion	56%	33%	12%
	Additive constant	86	41	37
F4	Medical staff develops friendship with teenager so that teenager comes to them	2	-5	15
A6	Medical staff become friends with teenage patients through humor	0	-6	14
F5	Medical staff becomes a mentor that the teenage patient does not forget	0	-1	13
F3	Medical staff develops bond with teenage patient to make it easy for them to vent	-2	-5	12
D6	Medical staff shows patience to teenage patients which creates mutual respect	-1	-6	10
A2	Medical staff approaches teenage patients cheerfully	-1	0	10
C1	Medical staff continuously tries to understand teenage patient's needs through communication	1	-2	10

**Table 4:** Impact of elements from the Grand Model relating the presence/absence of element to the rating of ‘satisfied with the bedside manner.’ The elements were divided into three groups, depending upon the specific feeling selected in question #2.

accordance to previous studies on the effect of empathetic relationships on mutual empathy and empowerment among sick teens [21]. Dyregrov [22] stresses the importance of listening to opinions of teens on how, in the process of loss, as experiences when their health is endangered, they want to be approached. Also, the thin line between mentorship and parenting skills is important to keep in mind, and use to the help the teen patient.

Close support, while avoiding a parenting approach and messaging, is required with female teens during the visit to provide them with a sense of security and higher self-esteem. Such support repels male teens. This may be explained by gender differences that were found in coping strategies of female and male teens in previous studies. Behavioral avoidance was the most often represented and important coping category for the male subgroup [23].

Practical implications of this study call to decrease the anxiety of teenagers from hospital visits by legitimizing anxiety and discomfort among teens at hospitals and allowing them to ventilate as to what makes them anxious. Hospital staff members are to authentically show teens that they care. Caring from the viewpoint of most teenagers is not by mentorship but rather by speaking the truth to the teenage patient no matter how traumatizing the truth is. Also, by ensuring their comfort; by making them feel special; by developing a teacher-student bond and; by continuously trying to understand the teenage patient's needs through direct communication.

We identified mindsets that represent teens regarding their feelings towards hospital visits. These feelings affect their emotional status at the hospital. These mindsets allow healthcare organizations to effectively shape messaging (personal, digital) and to facilitate a better emotional status and healing through messaging. Healthcare providers are to enhance staff's belief in their ability to accord behaviors to the desired messaging before investing in adequate messaging by gender, age and mindsets.

We identified that the most prevalent viewpoint regarding hospital visit is not neutral but rather either positive or very negative affecting the utilization of healthcare services among teens. Effective messaging will create positive feelings and increase utilization and cooperation among teens.

These data and the viewpoint identifier can assist clinicians in assigning the belonging of a teen to one of the three mindsets by asking a few questions at the time of the initial interview. Findings of this study can direct strategies of messaging by public health organizations, professional societies and policymakers in better targeting teens to relieve their anxieties and other disturbances resulting in the optimized utilization of healthcare services for teens. The mindset identifier allows a better understanding of the mindset to which a teen belongs, and can therefore promote interactions that are consonant with the teen's mindset for the hospital experience.

Since teens in this study perceived hospitalization as an episode with no expectations for continued relationships, findings suggest that in order to protect teens no continuing dialogues with teens are to be conducted upon discharge, unless requested, as it may negatively affect teens' future visits.

To create the best fit of specific messaging by segment belonging, hospitals may use Mind Genomics to segment teens in their own geographic population taking into account cultural differences and special features of the population. Mind Genomics may also be developed to create wellness by segment belonging.

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