Does Cues on Mother's Face Convey the Condition of the Child in a Critical Care Unit - A Prospective Cross-Sectional Study Done in the Paediatric Intensive Care Unit, MGM Hospital, Warangal

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ABSTRACT

BACKGROUND

Face is the index of mind. All human beings tend to express various emotions through different facial expressions. Parents of children who are critically ill, experience both positive and negative emotions simultaneously as they may feel love, affection and sometimes sad, angry, and helpless.

METHODS

We observed facial expressions of mothers of children and recorded vital data of these children in our Paediatric Intensive Care Unit (PICU). 107 children were observed, and vitals recorded simultaneously by two different observers from time of admission to 72 hours at fixed time intervals, using Hamilton's scoring system.

RESULTS

107 critically ill children were observed. Glasgow Coma Scale (GCS), AVPU scale, peripheral temperature, capillary filling time (CFT), seizures at admission, were co-related with facial expressions of the mother at the time of admission, at 12 hours, at 24 hours, at 48 hours and at 72 hours. We found that facial expressions of the mothers changed from fearful/sad to happy as the vital data of the child improved with time interval.

CONCLUSIONS

At '0' hour of admission, irrespective of the categorization of the GCS score, AVPU scores, peripheral temperature, and capillary filling time, 78 mothers were fearful, and 29 mothers were sad, amounting to a total of 107. None were happy, irrespective of the child's clinical condition, as, the child being admitted, is in itself a stressful condition. There was a good increase in number of happy mothers in co-relation with child's improvement. Hence by observing the mother's face, we can definitely predict the clinical condition of the child and expressions on the mother's face is a reflection of the clinical condition of the child.

KEYWORDS

Cues, Mother's Face, Critically Ill Children

BACKGROUND

In the evolutionary hierarchy, human beings among primates have evolved to be the species with superior emotional intelligence than other beings on this planet. Humans express a lot of emotions in different situations, the expression of these emotions can be simple and complex depending on the situation they are in, people around them, level of emotional intelligence, level of education, and relationship that they have with the other person in suffering. Thus, assessment of one's own emotional state is complex and challenging. Various methods have been used for assessing emotions including questionnaires, physical measures of facial muscles etc. Communication between parents and clinicians is widely acknowledged as a crucial component of high-quality care for children with serious paediatric illnesses. Parents rely on this communication skills of the doctors and treating staff to understand their child's medical condition and can more effectively participate in the decision making for their child's care once they are informed. These interactions occur, however, in a context of high parental stress and often outright distress. To improve parent-clinician interactions in these circumstances, clinicians need to understand the strong and seemingly contradictory feelings that parents experience in such situations so that clinicians can help parents participate more actively in shared decision making.[1-5] Parents of children with life-threatening illnesses experience heightened positive and negative emotions simultaneously, as they may love and feel proud of their child while at the same time feel sad and angry regarding their child's health prognosis.[6]

Differences among individual parents regarding how they communicate emotions to clinicians (or researchers) are unknown; nevertheless, clinicians on a daily basis make assumptions about the emotional experiences of parents based on a variety of behavioural and interpersonal cues combined with consideration of individual and situational factors. Because these assumptions about parental emotions may not correspond to parents' subjective emotions, the ensuing quality and effectiveness of communication and palliative care support may suffer.[7] Measuring an individual's emotional state is complex and challenging. Multiple methods have been developed for assessing emotion, including self-report questionnaires, physiological measures, facial measures, and observer ratings. No "gold standard" exists.[1] Facial expressions are significant to non-verbal communications as they provide varied information such as emotional state, attitudes, personality and age. The analysis of facial expression plays a major role in recognizing the emotional status of any individual. It is said that "Face is the index of the mind". By keenly observing one's face one can understand the emotional and mental state of any person and what that person is feeling and thinking to some extent. This keen observation of the facial expressions helps the clinician and other medical personnel in assessing the further actions and responses of the parents and attendants, in improving their communication skills to convey the child's condition in a better way. Especially while treating critically ill children, most of the parents are in denial of the child's condition, and are not ready to accept things. Such

situations demand lot of empathy and sympathy from the treating team. In such situations if we are able to assess the mental status of the parents, by observing their facial expressions, the doctor knows how much the parents are aware and in acceptance of the situation. With this simple observation, communication becomes easier, parents get confidence in the treating doctor, which is crucial for a parent –doctor relationship. These steps might as well decrease untoward responses from parents and attendants like physical attacks, destruction of hospital property to vent out their anger, sadness and helplessness. All human beings tend to express various emotions through different facial expressions by articulation of facial muscles. Broadly, emotions can be categorized into six categories – happiness, surprise, sadness, anger, fear and disgust.[8]

Facial expressions play an important role in expressing internal emotions and intentions and are one of the most significant non-verbal ways in daily emotional communication.[9] Parents of children who are critically ill, experience both positive and negative emotions simultaneously as they may feel love, affection and at times feel sad, angry and helpless.

Facial expression is initiated by the contractions of distinct facial muscles that caused temporary deformation of facial surface including the geometry and texture characteristics. Action Unit (AU) defined in the Facial Action Coding System (FACS) is a component of facial expression triggered by different facial muscle that lies below facial skin. The Facial Action Coding System (FACS) is a comprehensive, anatomically- based system for measuring nearly all visually discernible facial movement. FACS describes facial activity on the basis of 44 unique action units (AUs), as well as several categories of head and eye positions and movements.[10] In this study, conducted at paediatric intensive care unit, MGM HOSPITAL, we determined if the facial expressions of the mother and condition of the child can be attributed to each other, by observing the expression on the mother`s face when her child is admitted in a critical care unit.

Objectives
1. To assess if mother's facial expression of the mother gives a clue towards the child's clinical condition admitted in Paediatric Intensive Care Unit (PICU) during the time period of November 2019 to April 2020.
2. To assess if facial expressions of the mother change with improvement or deterioration of child's health.

METHODS

Ethical committee approval has been taken for the study, the IEC certificate has been attached along with the submitted article. IEC NO. Is ECR/840/Inst/TG/2016/RR-20. This is a prospective cross-sectional observational study. Mothers of critically ill children and children admitted in Paediatric Intensive Care Unit (PICU) of Mahatma Gandhi Memorial Hospital, Warangal, from November 2019 to April 2020 were included in the study.

Exclusion Criteria

- Mothers of stable children
- Mothers who are psychiatric patients
- Unwilling mothers
- Critically ill children admitted with attendants other than the child`s mother

In this study we observed facial expressions of mothers of critically ill children admitted in our PICU and recorded vital data of these children. 107 children and mothers were observed simultaneously by two different observers from the time of admission to 72 hours of admission at certain fixed intervals. Willingness to participate in the study has been obtained from mothers by informed verbal consent. These mothers were completely unaware when their facial expressions were being monitored by an observed and scored to avoid any participant bias. A standardized scoring system called Facial action coding system (FACS)[11] was used

to score the facial expressions of the mother and six types of major emotions were taken into consideration.

Statistical Analysis

All the data was expressed in numbers, coefficient of correlation and analysed using Microsoft Excel with Windows 7 using Microsoft SPSS. P value was also taken into consideration and a value of less than 0.05 was considered to be significant.

RESULTS

When Glasgow Coma Scale (GCS) scores[12] were taken for co-relation with mother's facial expression, the results were as in Table 1.

	GCS			Facial Expressions				
	Mild	Moderate	Severe	Fearful	Sad	Angry	Disgusted	Happy
At admission	78 (73 %)	13 (12 %)	16 (15 %)	78 (73 %)	29 (27 %)	0 (0 %)	0	0
6 Hrs	87 (81 %)	12 (11 %)	8 (8 %)	50 (47 %)	49 (46 %)	1 (1 %)	0	7 (6 %)
12 Hrs	90 (84 %)	13 (12 %)	4 (4 %)	20 (19 %)	63 (59 %)	1 (1 %)	1 (1 %)	22 (20 %)
24 Hrs	96 (90 %)	7 (6 %)	4 (4 %)	6 (6 %)	58 (54 %)	2 (2 %)	3 (3 %)	38 (35 %)
48 Hrs	97 (91 %)	7 (6 %)	3 (3 %)	6 (6 %)	39 (36 %)	2 (2 %)	6 (6 %)	54 (50 %)
72 Hrs	97 (91 %)	7 (6 %)	3 (3 %)	4 (4 %)	31 (29 %)	2 (2 %)	9 (8 %)	61 (57 %)
	Chi square	DF	P value	Conclusion at 5 % L.O.S				
	28.5	10	0.0015	Reject H0				
Table 1. Glasgow Coma Scale VS Mother's Facial Expressions								

	AVPU				Facial Expressions				
	Alert	Verbal	Pain	Unresponsive	Fearful	Sad	Angry	Disgusted	Happy
At admission	69 (64 %)	9 (8 %)	23 (22 %)	6 (6 %)	78 (73 %)	29 (27 %)	0 (0 %)	0	0
6 Hrs	85 (79 %)	3 (3 %)	17 (16 %)	2 (2 %)	50 (47 %)	49 (46 %)	1 (1 %)	0	7 (6 %)
12 Hrs	89 (83 %)	6 (6 %)	10 (9 %)	2 (2 %)	20 (19 %)	63 (59 %)	1 (1 %)	1 (1 %)	22 (20 %)
24 Hrs	94 (88 %)	4 (4 %)	8 (7 %)	1 (1 %)	6 (6 %)	58 (54 %)	2 (2 %)	3 (3 %)	38 (35 %)
48 Hrs	97 (91 %)	0 (0 %)	10 (9 %)	0 (0 %)	6 (6 %)	39 (36 %)	2 (2 %)	6 (6 %)	54 (50 %)
72 Hrs	97 (91 %)	0 (0 %)	10 (9 %)	0 (0 %)	4 (4 %)	31 (29 %)	2 (2 %)	9 (8 %)	61 (57 %)
	Chi square	DF	P value	Conclusion at 5 % L.O.S					
	49.608	15	0.000013	Reject H0					
Table 2 AVPU VS Mother's Facial Expressions									

	CFT		Facial Expressions				
	< 3 Sec	> 3 Sec	Fearful	Sad	Angry	Disgusted	Happy
At admission	99 (93 %)	8 (7 %)	78 (73 %)	29 (27 %)	0 (0 %)	0	0
6 Hrs	105 (98 %)	2 (2 %)	50 (47 %)	49 (46 %)	1 (1 %)	0	7 (6 %)
12 Hrs	107 (100 %)	0 (0 %)	20 (19 %)	63(59 %)	1 (1 %)	1 (1 %)	22 (20 %)
24 Hrs	106 (99 %)	1 (1 %)	6 (6 %)	58 (54 %)	2 (2 %)	3 (3 %)	38 (35 %)
48 Hrs	106 (99 %)	1 (1 %)	6 (6 %)	39 (36 %)	2 (2 %)	6 (6 %)	54 (50 %)
72 Hrs	106 (99 %)	1 (1 %)	4 (4 %)	31 (29 %)	2 (2 %)	9 (8 %)	61 (57 %)
	Chi square	DF	P value	Conclusion at 5 % L.O.S		
	20.17	5	0.001157	Reject H0		
Table 3. Capillary Filling Time VS Mother's Facial Expressions							

	Peripheries		Facial Expressions				
	Warm	Cool	Fearful	Sad	Angry	Disgusted	Happy
At admission	96 (90 %)	11 (10 %)	78 (73 %)	29 (27 %)	0 (0 %)	0	0
6 Hrs	103 (96 %)	4 (4 %)	50 (47 %)	49 (46 %)	1 (1 %)	0	7 (6 %)
12 Hrs	107 (100 %)	0 (0 %)	20 (19 %)	63(59 %)	1 (1 %)	1 (1 %)	22 (20 %)
24 Hrs	106 (99 %)	1 (1 %)	6 (6 %)	58 (54 %)	2 (2 %)	3 (3 %)	38 (35 %)
48 Hrs	106 (99 %)	1 (1 %)	6 (6 %)	39 (36 %)	2 (2 %)	6 (6 %)	54 (50 %)
72 Hrs	106 (99 %)	1 (1 %)	4 (4 %)	31 (29 %)	2 (2 %)	9 (8 %)	61 (57 %)
	Chi square	DF	P value	Conclusion at 5 % L.O.S		
	29.49	5	0.000018	Reject H0		
Table 4. Peripheral Temperature VS Mother's Facial Expressions							

	Temperature			Facial Expressions				
	< 99 Deg F	99 - 101 deg F	>101 deg F	Fearful	Sad	Angry	Disgusted	Happy
At admission	42 (39 %)	49 (46 %)	16 (15 %)	78 (73 %)	29 (27 %)	0 (0 %)	0	0
6 Hrs	43 (40 %)	46 (43 %)	18 (17 %)	50 (47 %)	49 (46 %)	1 (1 %)	0	7 (6 %)
12 Hrs	52 (49 %)	44 (41 %)	11 (10 %)	20 (19 %)	63 (59 %)	1 (1 %)	1 (1 %)	22 (20 %)
24 Hrs	44 (41 %)	55 (51 %)	8 (8 %)	6 (6 %)	58 (54 %)	2 (2 %)	3 (3 %)	38 (35 %)
48 Hrs	69 (64 %)	34 (32 %)	4 (4 %)	6 (6 %)	39 (36 %)	2 (2 %)	6 (6 %)	54 (50 %)
72 Hrs	53 (49 %)	51 (48 %)	3 (3 %)	4 (4 %)	31 (29 %)	2 (2 %)	9 (8 %)	61 (57 %)
	Chi square	DF	P value	Conclusion at 5 % L.O.S				
	34.95	10	0.000127	Reject H0				
Table 5. Axillary Temperature VS Mother's Facial Expressions								

When chi square and p value were calculated for mild, moderate, severe grades of GCS, of the child, in correlation with facial expressions of the mother, mostly it was observed to be significant this proves when the child was improving or deteriorating with reference to GCS, mothers' expressions were ranging from happy to angry, sad and fearful accordingly. When Alert, Verbal, Pain, Unresponsive (AVPU) scores were taken for co-relation with mother's facial expression, the results were as in Table 2.

AVPU scoring vs. mother's facial expression table shows that children's responsiveness was improving from 6 unresponsive and 23 children with response to painful stimuli at admission, to almost 97 children becoming alert, the count of mothers becoming happy was also improving from 0 to 61 by 72 hrs of admission. This shows that as children were improving from critical conditions facial expressions of the mothers were also co relating accordingly. When peripheral temperature of child was taken for co-relation with mother's facial expression and when Capillary Filling Time (CFT) of child was taken for co-relation with mother's facial expression, the results were as in Table 3 and 4.

Tables 3 & 4 show that as number of children with CFT < 3 secs & warm peripheries were increasing the number of happy mothers was also increasing. 106 (99 %) children had warm peripheries by 72 hours and 61 (57 %) mothers were happy. that means almost 50 percent of the mothers were happy. chi square and p value were also statistically significant. When axillary temperature of child was taken for co-relation with mother's facial expression, the results were as in table 5. As we observe in this table, there is trend of improving trend of fever from high grade fever to low grade fever, accordingly we could observe that facial expression of mothers was also improving from no happy mothers at admission to 61 happy mothers by 72 hrs. Only 3 children had high grade fever even by 72 hrs., which was co relating with 4 fearful mothers. Chi square value and p value calculated for axillary temperature were also significant.

DISCUSSION

107 children's Glasgow Coma Scale scores (GCS) and AVPU scale were co-related with facial expressions of the mother.

At '0' hour of admission, 78 (73 %) mothers were fearful, 29 (27 %) were sad. As per GCS, mild cases were 78, (73 %) moderate cases were 13 (12 %) and severe cases were 16 (15 %) of the total cases. AVPU scores showed that 69 (64 %) cases were alert, 9 (8 %) cases were verbally responsive, 23 (22 %) cases were responsive to pain, 6 (6 %) cases were unresponsive. As time progressed, by 72 hours of admission, fearful mothers were 4, (4 %) sad were 31 (29 %), angry were 2 (2 %), disgusted were 9 (8 %) and happy were 61 (57 %). This shows that as number of children was improving from severe to mild GCS scoring, the number of happy mothers was also increasing. When chi square test was done it was 28.5 with mild, moderate and severe categories of GCS and 49.6 with AVPU scores, showed statistically significant p value of 0.0015 and 0.000013 between the child's clinical condition and the facial

expression of the mother respectively, as illustrated in Tables 1 & 2

At admission, when extremities were examined, 96 (90 %) children had warm peripheries and 11 (10 %) children had cool peripheries. When CFT was examined, 99 (93 %) had CFT < 3 seconds and 8 (7 %) children had CFT > 3 seconds. 78 mothers were fearful, 29 mothers were sad and there were no angry, disgusted or happy mothers. when we have observed axillary temperature in co-relation with mother's facial expression we observed that at admission 42 (39 %) children had temperature below 99 F, 49 (46 %) children had temperature between 99F and 101F, 16 (15 %) children were observed to have temperature more than 101F.

As the time passed, by 12 hours of admission, the number of fearful mothers and their expression changed to either sad or to happy. By 48 hours and 72 hours of admission, number of fearful mothers decreased to 4 and happy mothers increased to 61, (57 %) in co-relation to warm peripheries, improving axillary temperature and improved CFT in the children. The observed chi-square value for CFT, peripheral temperature and axillary temperature were 20.17, 29.49 and 39.45 respectively. the p values were as follows for CFT, peripheral temperature and axillary temperature 0.00115, 0.000018, and 0.000127 as illustrated in tables 3 4 and 5.

CONCLUSIONS

At '0' hour of admission, irrespective of the categorization of the GCS score, AVPU scores, peripheral temperature, Axillary temperature and capillary filling time, 78 mothers were fearful and 29 mothers were sad, amounting to a total of 107. None of the mothers were happy, irrespective of the child's clinical condition, as, the child being admitted, is in itself a stressful condition for the mothers.

In 6 hours and 12 hours' timeframe, most of the mothers were fearful or sad, since then condition of the child did not improve much within such a small interval of time since admission, this was in correlation with the values observed, But by 24 hours, 48 hours and 72 hours, we observed good increase in number of happy mothers in co-relation with child's improvement. The number of children that deteriorated or showed no improvement, also co-related with the number of sad, angry and disgusted mothers. Though the mothers were not knowledgeable about the significance of GCS,AVPU SCORING and CFT we could observe a significant change in expression of the mothers in co-relation with these parameters, because they indirectly indicate improving general condition of the child, like in the child was becoming responsive to verbal stimuli, eventually alert and aware and the mothers were physically witnessing the improvement in their children's condition thus the change in her emotion and facial expression. This change was very significantly and predominantly observed in GCS, AVPU and axillary temperature correlation. Statistically significant in CFT and peripheral temperature assessment.

Humans have always used various methods of communication right from very early age of development.

Even newborn babies express pain, discomfort and hunger by changes in facial expression and cry. A very observant mother knows what the baby wants, jus by observing how her baby is crying. Emotion and facial expression have been our communication since the time we did not know any language skills. Facial expressions are a way of communication, when an individual cannot or do not want to communicate by verbal methods. It is a method of showing what is going on in their minds, how they are feeling right at the moment, what and who influence them. Especially family members, close relatives and close peers have a great understanding of each other by facial expression and can always communicate their mental status and emotion without any verbal communication. IN our study we have tried to assess the expression of the mother when her child was critically ill and it has changed with condition of the child. Hence by observing the mother's facial expression, we can definitely predict her emotion and the clinical condition of the child. Expressions on the mother's face is a reflection of the clinical condition of the child.

In a PICU setting, the mother's facial expressions give a clue to, how well she is aware of her child's clinical condition and thus indirectly helps in improving the clinician's approach, communication, and counselling skills and in gaining parents confidence in the treating doctor and staff and thus helps in better management and outcomes.

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