Quality of Care of Children With Chronic Diseases in Alexandria, Egypt: The Models of Asthma, Type I Diabetes, Epilepsy, and Rheumatic Heart Disease

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ABSTRACT. *Objectives.* **To evaluate the quality of care delivered to children suffering from index chronic diseases using specific indicators of health care delivery and to study the predictors of suboptimal quality of care (SQC) and its outcome on children.**

Design. **Over a 9-month period, guidelines for optimal care were formulated. A specific questionnaire for every studied chronic disease was prepared in collaboration with the clinicians in charge of the diseased children (66% pediatricians and pediatric specialists and 34% adult specialists). The clinicians were asked to write the details of daily practice, ie, how these children were managed on a routine basis as well as in an emergency situation. A cross-sectional study was conducted over a 4-month period and included 953 children suffering from bronchial asthma (BA), childhood epilepsy (CE), type I diabetes mellitus (IDDM), and rheumatic heart disease (RHD). A systematic random sample of children was selected from children visiting the ambulatory settings of all children's hospitals. Every fourth child was selected on 2 randomly chosen days each week, while all diseased children admitted in the hospital settings of the children's hospitals during the study were included.**

A general form describing the impact of the diseases on the child was prepared. A network of clinicians was created in all children's hospitals; seminars were held during which the content validity of the questionnaire was tested. Items were evaluated for their internal consistency using the Cronbach α.

According to the degree of adherence to the recent therapeutic guidelines concerning selected indicators of the quality of care specific to every disease, children were categorized as receiving optimal quality of care or SQC. These indicators were: the use of inhaled bronchodilators in acute asthmatic attacks in mild asthma and the use of the prophylactic drugs (inhaled sodium cromoglycate or inhaled beclomethasone) in moderate to severe chronic BA in between acute asthmatic attacks; compliance with antiepileptic drugs in epileptic children; regular performance of self-monitoring of blood glucose and/or urine testing in diabetic children; and compliance with prophylactic antibiotics in children suffering from RHD.

The records of the outpatient clinics for ambulatory and hospitalized cases were reviewed to assess the degree of compliance with the prescribed management before the index visit.

Sociodemographic characteristics and health care system-related predictors of SQC were analyzed via stepwise logistic regression analysis.

The impact of illness on the child was assessed by 7 items which were: dependence on parents in domestic activities, level of activity compared with peers, mood compared with peers, level of socializing, degree of discomfort attributable to illness, level of physical disadvantage, and urinary incontinence. Factor analysis with Varimax rotation was performed on items related to the impact of illness.

Parental satisfaction with care was rated as excellent, very good, fair, or poor. Information on school outcome was obtained by asking the caretakers whether the child was able to attend school regularly despite his sickness. Scholastic achievement was also rated as excellent, very good, good, and acceptable. Parents were asked whether the child had ever repeated a grade because of his sickness.

Setting. **Ambulatory and hospital settings of all children's hospitals in Alexandria, Egypt.**

Results. **Only 52% of mild asthmatics were given inhaled bronchodilators during acute attacks and 6.84% of moderate to severe asthmatics were taking prophylactic drugs (inhaled sodium cromoglycate and/or inhaled beclomethasone) between acute attacks. Similarly, only 53 of 134 (39.6%) of diabetic children were regularly performing self-monitoring of blood glucose and/or urine testing. In contrast, in epileptic children, 121 of 173 (69.9%) were judged as being compliant by their managing clinicians and more than two thirds 82/123 (66.7%) of children with RHD were compliant with the secondary prophylactic antibiotic.**

Predictors of SQC were younger age of the child (in BA and CE), lower maternal education (in BA and IDDM), charged medication (in BA, IDDM, and RHD), suburban residence (in moderate to severe BA), lower paternal education (in CE), and management in health facilities other than university hospital (in IDDM).

Regarding the outcome of chronic diseases on children, factor analysis revealed 2 factors (physical and psychosocial impact) that explained 41.5% of variance with moderate adequacy (Kaiser-Meyer-Olkin test of sampling adequacy = .67). Dependence on parents in domestic activities, urinary incontinence, physical disadvantage,

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and the degree of discomfort attributable to illness were all aggregated into the physical impact factor, whereas the level of socializing, mood, and the level of activity compared with peers were aggregated into the psychosocial impact factor.

There was a strong association between the severity of psychosocial impact and the quality of delivered care in CE and RHD, as well as between the parental satisfaction with care and the quality of delivered care for the 4 index diseases. However, there was no significant association between the severity of physical impact or school performance parameters and the quality of delivered care (apart from grade repeating in RHD).

Conclusions. **With respect to the declared primary goal of the study, the most interesting findings could be summarized as follows:**

- **Cultural and economic factors are the primary predictors of SQC for childhood chronic diseases.**
- **Noncompliance to medication reflects the quality of delivered care in terms of defective health education rather than problems in the availability of medications in the local market as in many other developing countries or problems in the access to pharmacy or health services.**
- **Parental satisfaction with care seems to be a reliable marker of the quality of health care delivery regardless of the educational level of the community. Therefore, it could be used as a sensitive marker for the quality of health care even in developing countries.**
- **Chronic diseases have a profound impact on children, especially those belonging to the lower socioeconomic levels of the society, their scholastic performance, and the health care system.**
- **Regular monitoring of the health system performance is warranted, along with emphasis on health education programs for caretakers of children with chronic diseases.** ***Pediatrics*** **2000;106(1). URL: http://www.pediatrics.org/cgi/content/full/106/1/e12;** ***quality of care, chronic diseases, outcome.***

ABBREVIATIONS. BA, bronchial asthma; CE, childhood epilepsy; IDDM, insulin-dependent (type I) diabetes mellitus; RHD, rheumatic heart disease; SQC, suboptimal quality of care; MOH, Ministry of Health Hospitals; SHIH, Students' Health Insurance Hospital; AED, antiepileptic drugs.

Alexandria, the coastal Egyptian city on the Mediterranean, is a model for populations of comparable epidemiologic profiles, where the host countries face both diseases of underdevelopment (primarily communicable diseases) and diseases related to modern life (chronic or noncommunicable diseases). Children constitute 44% of the population in the Eastern Mediterranean region, where the World Health Organization immunization program and infection control campaigns and the shift from rural lifestyles to more urbanized and industrialized patterns have succeeded in reducing mortality from communicable diseases.[1] Furthermore, as a result of advances in technology and enhanced medical knowledge, children with chronic diseases that were previously fatal in early childhood now survive to be young adults. Chronic childhood illnesses have, therefore, become one of the primary health priorities that warrant intensive research. These diseases vary widely in their nature and severity, and together account for a significant share of health care utilization and expenditures, apart from their influence on the child's behavior, daily activity, normal growth, and their interference with scholastic achievement.[2–5]

Despite their heterogeneity, chronic conditions share certain common features, which can be summarized as follows:[6–8]

- They represent a challenge for both the health system and the families, because of their duration, burden of clinical morbidity, and related impact on daily life.
- They test the capacity of both the health care providers and the family to integrate updated technical knowledge and participatory approaches.
- They form a model of health care delivery to assess the practicability of an equitable balance between rational use of limited resources, while respecting the fundamental rights of children to receive the care they deserve.
- They represent an opportunity to promote integrated strategies of care across disciplines, as well as between the hospital and ambulatory settings.

The goal of prevention and treatment of chronic diseases in children is to diminish the impact of illness and prevent dysfunction. Therefore, assessment of the quality of health care provided to these children is of crucial importance. Quality of care is defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." Quality assessment activities may examine whether: 1) efficacious health services are being provided (process quality), 2) observed outcomes are what would be expected (outcomes), and 3) practices are consistent with professional standards (guidelines adherence).[9] Low-income children are not only at higher risk for a number of health problems but also represent the vulnerable group most frequently subjected to inequity in health care that may affect their long-term growth and development. The present work, therefore, sought to assess the quality of health care delivered with reference to 4 index chronic diseases—bronchial asthma (BA), childhood epilepsy (CE), type I diabetes mellitus (IDDM), and rheumatic heart disease (RHD)—and the extent to which the care complies with recent therapeutic guidelines. We also studied the risk factors for suboptimal quality of care (SQC) and described the outcome of suboptimal care on sick children.

METHODS

Setting

The Egyptian health care system consists of public (funded by the government) or private health services. The latter—which is not considered in our context—consists of private clinics or pediatric wards in private hospitals and is primarily provided to the higher socioeconomic levels that can afford higher quality and more costly medical services.

Public hospitals providing outpatient and inpatient services for the majority of children in our community include the University Hospital, 3 Ministry of Health Hospitals (MOH) delivering medical care to preschool and children not attending regular schools

(uninsured), and the Student's Health Insurance Hospital (SHIH) providing medical care to schoolchildren.

The University Hospital includes all pediatric subspecialties with separate outpatient clinics, wards, and staff but with common emergency services for pediatric emergencies. It also includes an intensive care unit for critical conditions.

The Ministry of Health Pediatric Hospitals are general hospitals with general outpatient clinics, wards, and a staff of general pediatricians. Severe and/or complicated cases who need special care are referred to the University Hospital.

The school health insurance system in Alexandria consists of health clinics in schools, health units in districts, and one SHIH for more specialized or inpatient services.

The SHIH includes all pediatric subspecialties with separate outpatient clinics, wards, and staff of internal medicine specialists but with a common emergency services. University staff act as consultants in the health insurance system.

Regarding the cost of medical care in the University Hospital and MOH, inpatient or emergency services are free of charge, whereas in the ambulatory setting, parents have to purchase the prescribed medication. In the health insurance system, inpatient services, bronchodilators inhalers for acute asthmatic attacks, antiepileptic drugs (AEDs) for CE, and prophylactic antibiotics for RHD are provided free of charge. There are no facilities to provide prophylactic management for BA or self-monitoring of blood glucose and/or urine testing. Diabetic patients have to perform these tests in their local health units or in the SHIH.

Design

Over a 9-month period, guidelines for optimal care were formulated. A specific questionnaire for every disease was prepared in collaboration with the clinicians in charge of the diseased children (66% pediatricians and pediatric specialists and 34% adult specialists). The clinicians were asked to write the details of daily practice, ie, how these children were managed on a routine basis as well as in an emergency situation. A cross-sectional study was conducted over a 4-month period (January 1999 through April 1999) during which 953 cases were recruited from the ambulatory and hospital settings of all specialized children's hospitals in Alexandria. A systematic random sample of children was selected from children visiting the ambulatory settings of the public children's hospitals. Every fourth child was selected on 2 randomly chosen days each week, while all diseased children admitted in the hospital settings of the children's hospitals during the study were included.

A general form describing the impact of the diseases on the child was prepared. A network of clinicians was created in all children's hospitals; seminars were held during which the content validity of the questionnaire was tested. Items were evaluated for their internal consistency using the Cronbach α.

The Questionnaire

The questionnaire was a full 30-minute interview of the parents (primarily the mothers). Informed consent was obtained before starting the interview. The response rate was 100%. The high response rate was attributable to the fact that these children are managed in crowded public hospitals where their caretakers (primarily the mothers) were usually not given enough time to talk about their children's conditions. Therefore, through these interviews, mothers were given an opportunity to discuss their problems and difficulties with their sick children. The questionnaire included information about: demographic variables, diagnostic procedures performed, drugs taken by the patients on a routine basis and in the emergency situations, their mode of administrations, and interval between doses. Clinicians used medical records to determine the details of drug prescription.

The details on the quality of health care will not be described in this context. However, some indicators specific to every disease were selected according to the recent guidelines and these were:

- The use of inhaled bronchodilators in acute asthmatic attacks in mild asthma and the use of the prophylactic drugs (inhaled sodium cromoglycate or inhaled beclomethasone) in moderate to severe chronic BA in between acute asthmatic attacks.[10,11]
- Compliance with AEDs in epileptic children.[12]
- Regular performance of self-monitoring of blood glucose and/or urine testing in diabetic children.[13]
- Compliance with prophylactic antibiotics in children suffering from RHD.[14]

The records of the outpatient clinics for ambulatory and hospitalized cases were reviewed to assess the degree of compliance with the prescribed management before the index visit. Compliance with management was assessed according to the specific disease:

In CE, compliance was judged by the number of tablets consumed within a certain period relative to the dose prescribed. AED withdrawal is considered justified in our material only when freedom from seizures has been achieved for a sufficiently long period (2 years).[12] Therefore, any abstinence of intake of AED—as recorded in the medical records within a period <2 years of being seizure-free—was unjustified in our study and also classified as being noncompliant with management.

In RHD, a child was considered compliant if he had received at least 11 long-acting penicillin injections for the last 6 months (or 22 injections during the last year) for the intramuscular mode of administration (a 2-week regimen is considered standard practice in Egypt for secondary antibiotic prophylaxis).[15] For the oral route, a child was considered to be compliant if he had received daily doses of penicillin for the last 6 months, as determined by the duration and the number of tablets consumed.

According to the degree of adherence to the recent therapeutic guidelines concerning the former indicators of the quality of care, children were categorized as either receiving optimal quality of care (coded as 0) or SQC (coded as 1). Risk factors or predictors of SQC (as a dependent variable) were analyzed via stepwise logistic regression analysis.

The impact of illness on the child was assessed by 7 items: dependence on parents in domestic activities, level of activity compared with peers, mood compared with peers, level of socializing, degree of discomfort attributable to illness, level of physical disadvantage, and urinary incontinence. Regarding the former information, caretakers were asked to tick an answer: never = 0, sometimes (mild/moderate) = 1, frequently (severe) =2, or cannot be assessed = 3.

Parental satisfaction with care was rated as excellent, very good, fair, or poor. Information on school outcome was obtained by asking the caretakers whether the child was able to attend school regularly despite his sickness. Scholastic achievement was also rated as excellent, very good, good, and acceptable. Parents were asked whether the child had ever repeated a grade because of his sickness.

To obtain a proper assessment of the impact of illnesses on the child's activity and behavior, the present analysis was performed on the age category >3 years of age or as judged by the mother about the child's orientation and awareness, whereas for scholastic achievement, we analyzed data for children within school age (6–15 years of age).

Statistics

Validity of the Questionnaire

The following items of validity were examined:

1. Content validity was established by reviewing the literature and validation of item representation and clarity by the team of researchers.
2. Construct validity was determined by factor analysis with varimax rotation.[16]

Reliability

The Cronbach α reliability coefficient was used to test the internal consistency of the 10 items describing the impact of the diseases on children and their school performance.

Data Analysis

Comparison among the 4 diseases according to the collected variables was performed. Sociodemographic variables were presented as percentages of patients. Proportions were compared simultaneously by the χ^2 test. Fisher's exact test was used when χ^2 test was not valid.

Stepwise logistic regression analysis with backward elimination using the Wald statistic was then performed to study the predictors of poor or SQC for each disease.

Factor analysis with Varimax rotation was also performed on items related to the impact of illness. Factor analysis is a statistical technique used to reduce a large number of variables to a smaller number of factors. If the correlation between the variables is small, it is unlikely that they share common factors. The Kaiser-Meyer-Olkin measure of sampling adequacy is an index for comparing the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. Measures >.5 are considered acceptable to proceed with the factor analysis. The total variance, explained by each factor, is called Eigen value. Only factors that account for variances >1 (Eigen value: >1) should be included. The factor loadings are the standardized regression coefficients in the multiple regression equation with the original variable as the dependent variables and the factors as the independent variables. They indicate how much weight is assigned to each factor. Factors with large coefficients for a variable are closely related to the variable.[17] A factor loading of >.40 was used as a cutoff point for inclusion of the item. From this analysis, 2 factors emerged: factor 1 (physical impact) and factor 2 (psychosocial impact). The scores of the items loaded on each factor were combined into a total score with the higher score denoting unfavorable conditions. The median was taken as a cutoff level between 2 categories: the median and above were considered risky and categorized as 1, compared with the remaining below the median value, which was taken as reference category.

The analyses were conducted using statistical packages EpiInfo, Version 6.04 (Centers for Disease Control and Prevention, Atlanta, GA) and SPSS, Version 9 (SPSS, Inc, Chicago, IL). The .05 level of significance was used as a cutoff value for statistical significance and all tests were 2-sided.

RESULTS

The study included 953 children 10 months of age through 15 years of age with a mean age of 7.5 ± 4.5 years. Paternal illiteracy rate varied from 14.9% to 37.0%, with a high percentage of workers as occupation in comparison to technical or professional ones. Up to two thirds of mothers were illiterate and >80% were housewives (Table 1).

In reference to the indicators of the quality of care:

- Only 52% of mild asthmatics were given inhaled bronchodilators during acute attacks. Of moderate to severe asthmatics, 6.84% were taking prophylactic drugs (inhaled sodium cromoglycate and/or inhaled beclomethasone) between acute attacks. Therefore, a total of 364 of 440 asthmatic children (82.7%) were receiving SQC.
- Similarly, only 53/134 (39.6%) of diabetic children were regularly performing self-monitoring of blood glucose and/or urine testing. Therefore, 81 of 134 (60.4%) were receiving SQC.
- In contrast, in epileptic children, 121 of 173 (69.9%) were judged as being compliant by their managing clinicians, ie, 52 of 173 (30.1%) were receiving SQC.
- More than two thirds 82 of 123 (66.7%) of children with RHD were compliant with the secondary prophylactic antibiotic, ie, 41 of 123 (33.3%) were receiving SQC.

Table 2 shows the health care system-related predictors of the quality of delivered care. SQC was significantly higher in asthmatic and epileptic children managed in MOH and in asthmatic children purchasing medications on their own expenses (charged medication).

Predictors of SQC were younger age of the child (in BA and CE), lower maternal education (in BA and IDDM), charged medication (in BA, IDDM, and RHD), interaction between suburban residence and moderate to severe BA, lower paternal education (in CE), and managed in health facilities other than university hospital (in IDDM; Table 3).

Factor analysis of the impact of the 4 chronic diseases on sick children reduced all the studied parameters into 2 factors: factor 1 (physical impact) and factor 2 (psychosocial impact; Table 4).

There was a strong association between the severity of psychosocial impact and the quality of delivered care in CE and RHD (P = .001 and .009, respectively), as well as between the parental satisfaction with care and the quality of delivered care for the 4 index diseases. However, there was no significant association between the severity of physical impact or school performance parameters and the quality of

TABLE 1. Sociodemographic Characteristics of the Study Population (n = 953)

Characteristics*	Asthma (n = 440)		Epilepsy (n = 229)		IDDM (n = 134)		RHD (n = 150)	
	No.	%	No.	%	No.	%	No.	%
Age								
≤5 y	259	58.9	101	44.1	19	14.2	2	1.3
>5 y	181	41.1	128	55.9	115	85.8	148	98.7
Sex								
Male	260	59.1	138	60.3	58	43.3	72	48.0
Female	180	40.9	91	39.7	76	56.7	78	52.0
Residence								
Urban	191	43.4	90	39.3	90	67.2	68	45.3
Semiurban	231	52.5	91	39.7	35	26.1	39	26.0
Rural	18	4.1	48	21.0	9	6.7	43	28.7
Paternal illiteracy rate	163	37.0	20	14.9	70	30.6	41	27.3
Maternal illiteracy rate	225	51.1	50	37.3	94	41.0	95	63.3
Paternal occupation								
Unemployed	33	7.5	1	.7	35	15.3	11	7.3
Workers	304	69.1	86	64.2	131	57.2	120	80.0
Clerical, technical, professional	103	23.4	47	35.1	63	27.5	19	12.7
Maternal occupation								
Housewife	378	85.9	109	81.3	192	83.8	131	87.3
Workers	23	5.2	5	3.7	21	9.2	12	8.0
Clerical, technical, professional	39	8.9	20	14.9	16	7.0	7	4.7

* χ^2 test was highly significant for all characteristics.

TABLE 2. Health Care System-Related Predictors of the Quality of Delivered Care (n = 870)

Predictors*	BA		CE		IDDM		RHD	
	No. (440)	% SQC	No. (173)	% SQC	No. (134)	% SQC	No. (123)	% SQC
Health facility								
Health insurance	70	61.4	55	14.5	95	64.2	72	37.5
University	73	84.9	64	35.9	38	52.6	26	23.1
MOH	297	87.2	54	38.9	1	0	25	32.0
Time to reach facility (h)								
≤1	156	84.0	46	19.6	43	60.5	74	28.4
>1	284	82.0	127	33.9	91	60.4	49	40.8
Waiting time (min)								
≤30	421	82.9	137	32.8	122	61.5	77	36.4
>30	19	78.9	32	12.5	12	50.0	43	27.9
Medication								
Free	104	68.3	107	33.6	115	60.9	96	29.2
Charged	333	87.1	59	22.0	16	62.5	19	57.9
Disease duration (y)								
≤1	69	97.1	70	40.0	48	75.0	17	41.2
>1	371	80.1	103	23.3	86	52.3	106	32.1

A line beside percentages indicates significant difference between them using χ^2 test.
* Only cases that could be assessed for quality of care were included.

TABLE 3. Multivariate Analysis* of Sociodemographic and Health Care System-Related Predictors of SQC Delivered to Chronically Diseased Children

Predictors†	Adjusted OR and (95% Confidence Interval)
BA	
Age of the child (y)	.84 (.77–.92)
Maternal education (y)	.93 (.87–.98)
Interaction between suburban residence and moderate/severe degree of asthma severity	5.67 (1.66–19.39)
Charged medication	2.26 (1.12–4.55)
CE	
Age of the child (y)	.88 (.80–.98)
Paternal education (y)	.84 (.75–.95)
IDDM	
Maternal education (y)	.87 (.81–.94)
University hospital	.13 (.03–.54)
Charged medication	4.76 (1.00–23.24)
RHD	
Charged medication	3.86 (1.26–11.79)

* Multiple logistic regression estimates include terms for: age (years) and sex of the child, residence, years of paternal or maternal education, paternal occupation, health facility, duration of the disease, time to reach the health facility, time parents had to wait in the facility before consultation (in minutes), and charged medication. In BA, the model was adjusted for the degree of asthma severity. In CE, the model was adjusted for the diagnostic category of epilepsy.
† Reference categories are: urban residence, clerical, technical and professional paternal occupation, school health insurance hospital, shorter duration of disease <1 year, shorter time to reach health facility (≤1 hour), free medication, mild asthma (in BA), and generalized epilepsy (in CE).

TABLE 4. Factor Analysis of Impact of Index Chronic Diseases on Children*

Item	Factor Loadings	
	Factor I Physical Impact	Factor II Psychosocial Impact
Reliant on parents in domestic activities	.70	
Urinary incontinence	.67	
Physically disadvantaged	.68	
Discomfort (great deal of pain or bother)	.44	
Socially withdrawn		.63
Less active than peers		.61
More depressed than peers		.54
Eigen value	1.81	1.09
Percent variance	25.9	15.6
Cumulative percent of variance	25.9	41.5

* Number of cases that could be assessed = 781; Kaiser-Meyer-Olkin test of sampling adequacy = .67.

delivered care (apart from grade repeating in RHD; Table 5).

DISCUSSION

Our results reflect the problem of inequalities in health that exist in many developing countries where good quality of care is provided only to the higher socioeconomic levels of the society. Although clinicians were acquainted with the up-to-date clinical guidelines, they were facing many constraints that stopped them from providing optimal care, such as patients who could not afford costly preventive, diagnostic, or even therapeutic measures or doubtful efficacy of certain brands of drugs within the local market.

Because children must rely on adults to finance, seek, and monitor their health care, the cultural background of the situation manifested by the low parental educational levels cannot be overlooked, nor can the predominance of workers as parental occupation in comparison with the technical and professional ones. In fact, Medical anthropologists classify the determinants of compliance to preventive or therapeutic management into 2 primary domains:

1. Patient factors, such as health beliefs; patient's personal, social, and cultural identity; and health knowledge.
2. Health care providers factors. From this assumption, it is concluded that compliance can only be achieved if the health care provider takes over by educating the patient, and, if possible, by meeting

TABLE 5. Impact of Index Chronic Diseases on Children and Its Relation to SQC

Impact	BA		CE		IDDM		RHD	
	No.	% SQC	No.	% SQC	No.	% SQC	No.	% SQC
Physical impact								
Minor/moderate	200	78.0	63	7.9	84	56.0	113	33.6
Severe	163	84.0	38	18.4	38	57.9	10	30.0
P Values		.15		.11*		.84		.56
Psychosocial impact								
Minor/moderate	312	83.3	82	9.8	96	60.4	40	17.5
Severe	125	80.8	42	33.3	34	61.8	82	41.5
P Values		.53		.001		.89		.009
Ability to follow regular school								
Yes	120	73.3	42	4.8	113	60.2	90	24.4
No	32	62.5	10	10.0	1	100	3	33.3
P Values		.23		.48*		.42		.73
Grade repeating								
No	123	72.4	47	6.4	86	59.3	80	21.3
Yes	29	65.5	5	.0	28	64.3	13	46.2
P Values		.46		.73*		.64		.05
Scholastic achievement								
Excellent/very good	40	70.0	22	4.5	37	5.7	37	56.8
Good/passable	112	71.4	30	6.7	77	62.3	76	61.8
P Values		.86		.75		.57		.60
Parental satisfaction with care (n = 870)	(76)	(364)	(12)	(52)	(58)	(76)	(82)	(41)
Very good	35	48.6	37	5.4	19	52.6	15	6.7
Fair	354	85.9	72	23.6	92	62.0	89	33.7
Poor	51	84.3	64	26.6	23	60.9	19	52.6
P Values		.000		.000		.02		.02

* One-tail Fisher's exact test.

him halfway about the complexity of the regimen. The relationship between the health care provider and the patient can also strongly influence compliance.[18,19]

Noncompliance, therefore, reflects the quality of delivered care in terms of defective health education rather than problems in the availability of medications in the local market as in many other developing countries[20] or problems in the access to pharmacy or health services.

Recently, there has been an overwhelming amount of published evidence about the low quality of care in developing countries.[21] Sauerborn et al[22] analyzed maternal and child health services in a rural district of Burkina Faso. They found that communication in both curative and preventive clinics were poor. Research from Ghana, Mali, and Burkina showed that the perceived low quality of health care was one of the primary reasons that people did not attend primary health care services in cases of illness.[23,24] In contrast, in industrialized countries, quality of care is widely debated in the context of health reform.[25] A wealth of literature reflects the progress made in developing tools to monitor and improve the quality of health care. Therefore, quality monitoring is one of the primary health priorities to make comparable quality assessment results routinely available to a variety of audiences (providers, health plans, consumers, and purchasers) and to identify potential deficiencies in health care provision that can be corrected through quality improvement activities.[9]

Regarding the outcome of chronic diseases on children, factor analysis revealed 2 factors (physical and psychosocial impact), which explained 41.5% of variance with moderate adequacy (Kaiser-Meyer-Olkin test of sampling adequacy = .67). Such aggregation of factors in a meaningful manner is an indication of the construct validity of the items. Dependence on parents in domestic activities, urinary incontinence, physical disadvantage, and the degree of discomfort attributable to illness were all aggregated into the physical impact factor, whereas the level of socializing, mood, and the level of activity compared with peers were aggregated into the psychosocial impact factor. Cronbach α reliability was .54. A rather small value, however, it could be reasonable considering the small number of items (10) included, because the reliability is a function of the number of items studied.[26]

The severity of physical and psychosocial impact on chronically diseased children is consistent with international figures.[2] A recent study conducted in Finland reported a strong association between childhood-onset epilepsy and physical fitness in adulthood.[27] Another European study reported that epilepsy and its treatment had a significant impact on a number of different aspects of daily living, which confirms our findings concerning the burden of these diseases and their impact not only in the present but also on the future productivity of children.[28]

In relation to the impact of chronic diseases on school performance parameters, one quarter of asthmatic and epileptic children were unable to attend school regularly because of their sickness, compared with only .9% (1/113) and 3.2% (3/93) of diabetic and rheumatic children, respectively. These results suggest that it is the specific nature of the disease that is the primary determinant of the severity of physical impact rather than the quality of delivered care. This is apparent from the lack of significant

association between the degree of physical impact or school performance parameters and the quality of delivered care. In contrast, there was a strong association between the degree of psychosocial impact and the quality of delivered care in CE and RHD, suggesting that the provision of improved quality of care for these diseases would have a significant impact on all psychosocial aspects and quality of life of these children.

Furthermore, lower parental educational levels and charged medication, comprised nearly all risk factors for SQC of the studied chronic diseases, which points again to the socioeconomic and cultural background of the health problem. A low level of parental education could be associated with poor parenting skills including nonadherence to the prescribed management. Poor families with a great deal of economic burden are more likely to be hospitalized, which confirms the results of a recent study that reported that communities in which people have poor access to medical care have higher rates of hospitalization for chronic diseases.[29] This might be partly attributable to the tendency of clinicians to hospitalize patients from lower socioeconomic levels.

An interesting finding in our study is that on gathering information on satisfaction with care, the majority of parents reported fair satisfaction with care for the 4 index diseases, which was unexpected considering the low educational level of this sector of the community. This awareness of the public about the quality of delivered care is also confirmed by the high percentage of children receiving SQC. In addition, there was a strong association between parental satisfaction with care and the quality of delivered care. Therefore, parental satisfaction with care seems to be a reliable marker of the quality of health care delivery regardless of the educational level of the community. Therefore, it could be used as a sensitive marker for the quality of health care even in developing countries.

CONCLUSION

We can conclude that chronic diseases have a profound impact on children, especially those belonging to the lower socioeconomic levels of the society, on their scholastic performance and the health care system. In addition, the social changes occurring in populations in health transitions should be accompanied by an increase in quality of care assessment as an integral part of monitoring health system performance.

By exploring the details of medical practice provided to chronically diseased children and by gathering information on satisfaction with care and the impact of chronic diseases on children and their school performance, a foundation is provided on which to build a quality improvement program using the parameters in our study as an initial framework.

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