

Pattern of Co-Morbidities in Multiple Chronic Diseases in Children

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Abstract

Introduction: In adult the magnitude of chronic disease is studied before many times but a little is known about the multiple chronic conditions in the children. Our study shows the prevalence and pattern of chronic diseases and co-morbidities in children.

Materials and Methods: Subject identified with the chronic disease, came to the hospital in January 2014 to December 2014, were analyzed. The relationship between urgent health care and co-morbidities is analyzed using logistic regression.

Results: From the study, more than 80% children had a single chronic condition and more than 19% children had two or more chronic conditions, in which asthma with allergic rhinitis was more prevalent. It is clear that as the number of chronic condition increases in the child, they need significant health care. The children with >4 chronic conditions had 3.57 times the odds of a significance as compared with those children having one chronic disease ($P < 0.0001$).

Conclusion: Study showed that the increase in the number of chronic conditions in children were associated with greater risk of mortality and morbidity and needs urgent health care.

Key words: Allergic Rhinitis, Asthma, Children, Co-morbidities, Health care

INTRODUCTION

Multiple chronic conditions in the population have raised attention in many nations,¹ and this comprises a significant clinical problem toward the public health sector.^{2,3} The problem of multiple chronic conditions among developed and developing countries has rapidly escalated to become a most important public health and medical fact.

The combined effects of increasing life expectancy and the aging of population undoubtedly will further increase the associated societal burden of chronic illnesses among future populations of older people. There are so many studies, those are a concern with adults especially for older adults; two-third of whom have been shown that they

live with 2 or more diseases.⁴ As people with MCC suffer suboptimal health outcomes, and it raises the health care expenses, additional concentration on this population is critical to improve health care quality and expenditure. Individual managing the multiple chronic conditions required a lot of addition resources like financial and emotional support with a higher level of medical treatment to successfully manage the diseases.⁵ By understanding the prevalence and pattern of these co-morbid condition or multiple chronic conditions, is important to provide effective and efficient health care to the patient and their family.

To date, no one has attempted to offer an action-oriented framework that outlines national strategies to maximize care coordination and improve health and quality of life for little individuals with MCC and a little is known to the multiple chronic conditions in these little individuals. Hence, this study was done to find out the pattern of multiple chronic conditions in children so that individuals managing these disease in children can manage them more effectively and efficiently to decrease mortality and morbidity in children.

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MATERIALS AND METHODS

The study was done in Teerthanker Mahaveer Medical College and Research Centre, Moradabad. Uttar Pradesh, total numbers of pediatric subjects were taken 1085 children who came to the emergency/Pediatric Department. Children were identified with ICD-9 code for chronic condition, were taken in the study group between the period from January 2014 to December 2014, as other researchers have used similar condition.⁶

The information about the patients were obtained from the emergency and pediatric department and then characteristics of disease and treatment were entered on a predesigned proforma, from the case sheets of the patients prepared and maintained by the consultants concerned. Logistic regression analysis was done to compare odd of the significant event by the number of chronic diseases present continuing for age and gender.

OBSERVATIONS AND RESULTS

From the Table 1, the author concluded that the majority of children in the sample (80.65% $n = 1085$) had only one chronic condition over the study time. Among 875 children admitted for only one chronic condition, 190 children (17.51%) had 2 chronic diseases, only 16 cases for 3 chronic conditions, i.e., 1.47% and 0.37% children for 4+ chronic disease (4 cases).

Illustration from Table 2, those who were admitted for single chronic condition, the prevalence of asthma was 35.31% (309 cases), was by far most ubiquitous of the disease for which the patient came in the hospital. Allergic rhinitis and allergy (unspecified) patients were 22.29% and 8%, respectively (195 cases and 70 cases) other chronic disease such as epilepsy 6.97%, congenital heart disease 6.06%, hypertension 5.03%, diabetes Type II 4.91%, cerebral palsy 4%, and diabetes Type I 2.97% had a little prevalence as compared to asthma and allergic rhinitis but neoplasm, sickle cell anemia, chronic nephritis, rheumatoid arthritis, rheumatic heart disease, cystic fibrosis, and other disease; each accounts for only < 2%.

From Table 3, a most frequent combination of 2 chronic conditions was asthma with allergic rhinitis, i.e., 34.74% (66 cases). Asthma was again dominating in this group. Second most prevalent combination was asthma and allergy (unspecified) accounting for 14.21% (27 cases). Other combination of asthma with epilepsy, diabetes type 2, congenital heart disease, hypertension, and cerebral palsy were 7.89, 4.74%, 4.74%, 4.21%, and 4.21%, respectively. While with Allergic rhinitis most prevalent combination

Table 1: Children with chronic conditions and significant cases

Number of conditions	Cases (%)	Significant cases (%)
1	875 (80.65)	184 (21.03)
2	190 (17.51)	57 (30.00)
3	16 (1.47)	6 (37.50)
4+	4 (0.37)	3 (75.00)
Total	1085	

Table 2: Children came for one chronic disease

Chronic condition	Cases	Percentage
Asthma	309	35.31
Allergic rhinitis	195	22.29
Allergy (unspecified)	70	8.00
Epilepsy	61	6.97
Congenital heart disease	53	6.06
Hypertension	44	5.03
Diabetes Type 2	43	4.91
Cerebral palsy	35	4.00
Diabetes Type 1	26	2.97
Neoplasm	17	1.94
Sickle cell anemia	8	0.91
Chronic nephritis	4	0.46
Rheumatoid arthritis	3	0.34
Others	3	0.34
Rheumatic heart disease	2	0.23
Cystic fibrosis	2	0.23
Total	875	100

was with unspecified allergy, i.e. 11.05% (21 cases) next with epilepsy, i.e., 5.26%.

There are three chronic conditions were evident in 16 children, and Table 4 provides an idea of the most prevalent combination of disease in this group. Asthma with allergic rhinitis and allergy (unspecified) was accounting 37.5% next to asthma with allergic rhinitis and epilepsy, i.e., 18.75%.

Table 1 shows that with an increase in the number of chronic condition required significant health care like hospitalization or emergency care. Most of the children (75%) with 4+ chronic conditions had more fatality, so they need immediate management. By the Table 5, when controlling the age and gender, the odds of having significant health problem with increased number of chronic disease raising from 21.03% for children with one chronic condition to 75% for children with 4 or more chronic condition. Those with 4 or more conditions had 3.57 times the odds of a significant event as compared to the one chronic condition children.

DISCUSSION

The burden of chronic disease in children has been studied in limited fashion over the past decade. One study on 5001

Table 3: Children came for two chronic disease

Chronic condition combination		Cases	Percentage
Asthma	Allergic rhinitis	66	34.74
Asthma	Allergy (unspecified)	27	14.21
Allergic rhinitis	Allergy (unspecified)	21	11.05
Asthma	Epilepsy	15	7.89
Allergic rhinitis	Epilepsy	10	5.26
Asthma	Diabetes Type 2	9	4.74
Asthma	Congenital heart disease	9	4.74
Asthma	Hypertension	8	4.21
Asthma	Cerebral palsy	8	4.21
Allergic rhinitis	Hypertension	4	2.11
Allergic rhinitis	Congenital heart disease	4	2.11
Asthma	Neoplasm	3	1.58
Asthma	Diabetes Type 1	2	1.05
Asthma	Sickle cell anemia	2	1.05
Others		2	1.05
Total		190	100

Table 4: Children came for three chronic disease

Chronic condition combination			Cases	Percentage
Asthma	Allergic rhinitis	Allergy (unspecified)	6	37.5
Asthma	Allergic rhinitis	Epilepsy	3	18.75
Asthma	Epilepsy	Cerebral palsy	2	12.5
Allergic rhinitis	Allergy (unspecified)	Congenital heart disease	2	12.5
Asthma	Diabetes type 2	Hypertension	1	6.25
Allergic rhinitis	Diabetes type 2	Hypertension	1	6.25
Asthma	Allergy (unspecified)	Congenital heart disease	1	6.25
Total			16	100

Table 5: Odds of having significant event

Number of conditions	Odds ratio	P value
1	Reference	Reference
2	1.43	<0.0001
3	1.78	<0.0001
4+	3.57	<0.0001

children⁷ reported the extent of single condition chronic disease in different cohorts of children and estimated the prevalence of chronic disease ranging from 12% to 26%. Asthma was the most prevalent physical conditions that were dominant among children with 1 chronic condition from the data set. From this study, author also found the same that asthma was a most prevalent chronic condition. Little information is available in the literature regarding multiple chronic conditions beyond a national study conducted some years ago involving a household sample 18000 children <18 years of age, author suggested that 19% of children had 1 or more chronic conditions.⁸ Fewer than 5% of children had 2 or more chronic conditions and <1% had 3 or more such conditions. In this study, Asthma and allergies predominated in the findings. Author of the current study found the same results, but the prevalence of disease differs from previous research as a previous study done in the normal population and this study was done in

those children who came to hospital, i.e., diseased children. Both these studies used self-report data. Newacheck and Stoddard⁸ used in 1988, national child health interview survey for the study, and Van Cleave *et al.*⁷ used the national longitudinal survey of Youth Child cohorts for 1988-2006 in this study.

These data are very important and useful for the policy makers and pediatrician, who deal with the chronic conditions in the children. These findings are based on the physician diagnoses. In this sample, about 17.51% children had 2 chronic conditions and very few, i.e., <2% for 3 or 4+ conditions. In those with 2 or more conditions, asthma was almost always evident.

Our data also suggest that in the intervening years from 1988 to 2006, the prevalence of co-morbidities in children increased from 5% in earlier Newacheck and Stoddard study to 12% in data. However, in our study it was 17.51%, which is on higher side it may be due to that this study conducting in developing country and author's data are hospital based, not self-reporting or population survey. In our data asthma and allergic rhinitis comprise the most prevalent combination in those children with 2 or 3 chronic conditions. A different finding from the earlier Newacheck and Stoddard study that our data suggest that in children

allergy accompanying asthma are evident to a significant degree. This observation is corroborated in studies that have shown that sensitivity to allergens is high in vulnerable communities.^{9,10}

Other research in adult population has demonstrated that individuals with multiple chronic diseases have increased utilization of the health care system and often have much higher individual demands of health care literacy, financial needs, and resource needs to manage the conditions adequately,¹⁰ furthermore clinical systems caring for these individuals require greater investment in integrated communication systems and coordination of care.^{5,11} Our study offers insight into the pediatric population, and this co-morbid chronic condition showed same as for adult studies that children with multiple chronic conditions demand more and advance health care system.^{12,13}

CONCLUSION

During the study period, asthma was the most prevalent condition in children and being most prevalent with a combination of allergic rhinitis and same was most prevalent with allergy (unspecified). With increase in the number of chronic disease, increase the need of urgent health care and required advanced management that range from 21.03% single chronic disease to 75% in 4 or more chronic disease, so it is clear that if the number of chronic condition increase in the children will increase the risk for poor outcome or increase the fatality in children.

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