Avoidable hospitalization of children, morbidity and health care supply

Hospitalizacja dzieci możliwa do uniknięcia, zachorowalność i zasoby opieki zdrowotnej

Olha Oleksiuk

Lviv National Medical University after Danylo Halytsky, Lviv, Ukraine

Wprowadzenie. Hospitalizacja możliwa do uniknięcia albo hospitalizacja z powodu przyczyn, przewidujących leczenie ambulatoryjne (ACSC) – to są przypadki hospitalizacji, gdzie szybka i skuteczna ambulatoryjna opieka może zapobiec konieczności hospitalizacji. Wskaźniki chorobowości szpitalnej z powodu ACSC są wykorzystywane do kontroli dostępu i jakości opieki medycznej.

Cel. Zbadania zależności pomiędzy wskaźnikami chorobowości szpitalnej dzieci z powodu ACSC, ich zapadalnością i chorobowością, oraz liczbami lekarzy i łóżek szpitalnych.

Materiał i metody. Wykaz 16 ACSC został wybrany przez zespół ekspertów przy użyciu zmodyfikowanej metody Delphi. Dane o zachorowalności, chorobowości i szpitalnej chorobowości z powodu ACSC dzieci (0-17 lat) mieszkających w obwodzie Lwowskim Ukrainy przez okres jednego roku uzyskano od statystyków zakładów opieki zdrowotnej świadczących usługi medyczne dla dzieci. Zależność między liczbą lekarzy, łóżek szpitalnych dla dzieci, ich zachorowalnością, chorobowością a chorobowością szpitalną z powodu ACSC była testowana przez modele liniowej regresji wieloczynnikowej.

Wyniki. Ogólny średni wskaźnik chorobowości szpitalnej dzieci z powodu ACSC był 803,9±95,6 na 10 tys. dzieci. ACSC stanowiły 57,4% wszystkich wypisanych dzieci. Najwyższe wskaźniki wśród ACSC miały ostre infekcje górnych dróg oddechowych (AURI) (421,8±70,6). Wskaźniki chorobowości szpitalnej dzieci z powodu wszystkich ACSC i AURI są pozytywnie związane z wskaźnikami liczby łóżek szpitalnych i chorobowości na 10 tys. dzieci (o 81% i 50%).

Wnioski. Wyniki są zgodne z wynikami innych badań sugerujących, że wskaźniki chorobowości szpitalnej dzieci z powodu wszystkich ACSC są wyższe na obszarach o większej proporcji szpitalnych łóżek pediatrycznych i chorobowości dzieci. Dostępność lekarzy świadczących usługi medyczne dla dzieci w podstawowej opiece zdrowotnej jest pozytywnie związana z wskaźnikami ich chorobowości szpitalnej z powodu: określonych chorob zakaźnych dzieci, niedożywienia, zapalenia płuc, zaburzeń czynności żołądka, dyskinezy dróg żółciowych.

Słowa kluczowe: *hospitalizacja możliwa do uniknięcia, hospitalizacja z powodu przyczyn przewidujących leczenie ambulatoryjne, wskaźnik liczby lekarzy, wskaźnik liczby łóżek szpitalnych, zachorowalność, chorobowość*

Background. Avoidable hospitalization or hospitalization for ambulatory care sensitive conditions (ACSC) are hospitalization cases where timely and effective ambulatory care could prevent the need for hospitalization. Avoidable hospitalization rates are used for the monitoring of access and quality of medical care.

Aim. To study associations between avoidable paediatric hospitalization rates, morbidity rates, physicians and hospital beds supply.

Materials & methods. The list of 16 ACSC was chosen by a panel of experts using a modified Delphi approach. Data on incidence, prevalence and discharges, due to ACSC during a year among children (0-17 years) – residents of the Lviv region, Ukraine, were obtained from the statisticians of health care institutions rendering medical services to children. The influence of incidence, prevalence, physicians and bed supply on ACSC hospitalization rates was tested by linear regression models.

Results. The overall mean rate of paediatric hospitalization due to ACSC was 803.9±95.6 discharges per 10,000 children during a calendar year. ACSC accounted for 57.4% of all discharges. The highest levels among ACSC had acute upper respiratory infections (AURI) (421.8±70.6). Hospitalization rates for all ACSC and for AURI were positively associated with proportions of all children's beds and prevalence of all ACSC and AURI (by 81% and 50%).

Conclusions. The results are consistent with other studies suggesting that ACSC hospitalization rates among children are higher in areas with higher proportion of hospital beds and morbidity. Availability of physicians rendering medical services to children at primary level is positively associated with their their hospitalization rates for: certain children infectious diseases, malnutrition, pneumonia, functional disorders of stomach, biliary dyskinesia.

Key words: *avoidable (preventable) hospitalization, hospitalization for ambulatory care sensitive conditions, physician supply, bed supply, incidence, prevalence*

Adres do korespondencji / Address for correspondence
Olha Oleksiuk MD
Dontsova str.16, fl.1, Lviv, 79008, Ukraine
phone (032) 275-47-95; e-mail: telishevska@gmail.com

Abbreviations

ACSC – ambulatory care sensitive conditions
AURI – acute upper respiratory infections
DP – district paediatrician
ICD-10 – 10th revision of the International Classification of Diseases
MoH – Ministry of Health
FP – family physicians

Introduction

In developed countries avoidable (preventable) hospitalization or hospitalization for ambulatory care sensitive conditions (ACSC) are hospitalization cases where timely and effective ambulatory care or patient compliance with medical workers' advice could prevent the need for hospitalization. Avoidable hospitalization rates are used for monitoring of access and quality of medical care [1-6].

The premise underlying the ACSC hospitalization indicator, that greater access to health care will be associated with lower ACSC hospitalization rates, has been studied empirically using population studies by examining relationships between them and physicians/hospital beds supply.

Analyzed population studies give controversial results as to type of association between hospitalization for ACSC among children and physician supply indices. Population studies carried out by American authors [7-10] had found statistically significant negative correlation between the number of primary care physicians per 1000 population and ACSC pediatric hospitalization rates. Children living in American counties, with low proportion of physicians and lack of community health centres were more likely to be hospitalized with ACSCs. No significant association was found between proportions of pediatricians and ACSC hospitalization rates among children [11].

The researchers' findings regarding relationship of availability of beds and avoidable hospitalization rates of the population is more unanimous – most authors indicate that there is a positive correlation between these indicators [9, 12-14].

Areas with higher morbidity rates are likely to have greater health needs, which is associated with higher ACSC hospitalization rates [9, 15, 16].

Aim

To study associations between avoidable paediatric hospitalization rates, morbidity rates for ACSC, physicians and hospital beds supply.

Materials and methods

The list of diseases with ICD-10 codes considered ACSC among Ukrainian children as defined by a panel of experts using a modified Delphi approach [17]. Ukrainian experts followed W. W. Weissman et al. [18] criteria for expert determining of ACSC list, as well as also took into account possibilities to treat Ukrainian children due to these diseases at day hospitals of policlinics and ambulatories.

Among 16 chosen ACSC (the list of ACSC with ICD-10 codes is presented in table I) official hospitalization discharge statistics of MoH of Ukraine has separate data for only five of them – intestinal infectious diseases; acute otitis media, pneumonia, asthma, and certain renal infectious diseases. That is why data on quantity of children's (aged 0-17 years) discharges during a year due to 16 ACSC we obtained from health care institutions. Specially elaborated questionnaires were filled in by 215 respondents – statisticians of health care institutions from 16 regions (out of 20) of the Lviv region, Ukraine, rendering medical services to 85.7% of children living in the region. The respondents also presented data on the number of attached children, registered cases of diseases during a year (all and newly registered) due to 16 ACSC, as well as the number of physicians providing medical services and hospital beds to children. For each region the following indices were calculated per 10.000 of the children's population (aged 0-17 years): prevalence, incidence and hospitalization rates for 16 ACSC (separately and for all ACSC); proportion of all physicians rendering medical services to children at primary level (policlinics and ambulatories), and proportion of only district pediatricians (DP) and family physicians (FP).

Statistical analysis was performed using the SPSS 13.0 for Windows computer system. Multiply linear regression models (obtained by stepwise selection) were used to determine the relationship between hospitalization rates for 16 ACSC and mentioned above indices of health care supply.

Results

The overall mean rate of avoidable paediatric hospitalization in the Lviv region was 803.9±95.6 discharges per 10.000 children. The prevalence of ACSC was 7505.5±434.6 and incidence – 6548.1±407.2 per 10.000 children (table I). ACSC accounted for 57.4% of all discharges, 39.9% of all registered cases of diseases and 48.0% of all newly registered cases during a year among children.

The highest levels of hospitalization, prevalence and incidence among ACSC were registered due to AURI, chronic bronchitis and bronchiolitis (table I).

According to regulations of MoH of Ukraine children should obtain primary care at their place of residence from physicians of the attached health care institution (policlinic, rural physician's ambulatory or ambulatory of the family physician). At primary level a child should be under constant surveillance of

Table I. Hospitalization rates, prevalence, and incidence for ACSC among children, Lviv region, Ukraine (means with standard errors per 10.000 children)

Ambulatory care sensitive conditions	ICD-10 codes	Hospitalization rate $\bar{x}\pm SE$	Prevalence $\bar{x}\pm SE$	Incidence $\bar{x}\pm SE$
Intestinal infectious diseases	A02-A09	40.5±13.4	41.8±4.3	41.8±4.3
Certain preventable children infectious diseases	B01, B05, B06, B26	3.7±2.3	58.1±13.7	58.1±13.7
Iron deficiency anemias	D50	6.0±1.8	501.2±70.3	209.0±38.6
Malnutrition	E40-E46	1.0±0.5	25.5±17.2	17.6±13.1
Epilepsy	G40-G41	1.6±0.6	27.3±4.0	4.7±1.0
Acute otitis media	H65.0.1, H66	24.1±7.7	305.6±32.4	305.6±32.4
Acute upper respiratory infections	J00-J06	421.8±70.6	4516.5±358.5	4516.5±358.5
Pneumonia	J12-J16, J18	52.1±8.4	75.8±7.9	75.8±7.9
Acute bronchitis & bronchiolitis	J20, J21	156.6±30.6	759.1±100.4	759.1±100.4
Chronic sinusitis, chronic diseases of tonsils and adenoids	J32, J35	11.4±3.0	479.6±78.6	155.9±28.7
Asthma	J45, J46	12.5±1.9	39.3±3.0	4.4±0.5
Gastroduodenitis, unspecified	K29.9	25.5±6.8	124.5±21.8	63.0±16.6
Functional disorders of stomach	K31	15.9±7.3	275.1±47.4	196.6±31.6
Biliary dyskinesia	K83.8	5.7±2.6	88.3±27.8	33.3±13.7
Certain renal infectious diseases	N10-N12	24.0±4.3	122.3±16.9	41.1±6.4
Acute cystitis	N30.0	1.5±0.7	65.7±12.2	65.7±12.2
Together (16 ACSC)		803.9±95.6	7505.5±434.6	6548.1±407.2

Table II. Main determinants of the hospitalization rates for ACSC among children, Lviv region, Ukraine

Determinants of the hospitalization rates for	Constant α	Coefficients β	p for β	Models characteristics		
				Adjusted R^2	F-test	p for F
Intestinal infectious diseases	-86.2			0.52	13.6	0.004
Prevalence/incidence		0.74	0.004			
Certain children infectious diseases	-20.8			0.42	9.6	0.01
Proportion of DP and FP		0.68	0.01			
Malnutrition	-4.3			0.79	24.1	<0.001
Prevalence		0.82	<0.001			
Proportion of all physicians*		0.52	<0.01			
AURI	-600.2			0.50	8.6	<0.01
Proportion of all pediatric beds		0.64	<0.01			
Prevalence/incidence		0.46	0.03			
Pneumonia	-53.1			0.58	11.2	0.001
Prevalence/incidence		0.46	0.04			
Proportion of all physicians*		0.46	0.03			
Acute bronchitis & bronchiolitis	-64.2			0.23	5.5	0.03
Proportion of all pediatric beds		0.53	0.03			
Asthma	-4.1			0.35	9.0	<0.01
Proportion of all pediatric beds		0.63	<0.01			
Functional disorders of stomach	-59.1			0.21	4.9	0.04
Proportion of DP and FP		0.51	0.04			
Biliary dyskinesia	-24.2			0.38	8.3	0.02
Proportion of all physicians*		0.66	0.02			
Certain renal infectious diseases	2.0			0.43	10.1	<0.01
Prevalence		0.69	<0.01			
Acute cystitis	-3.8			0.33	8.2	0.01
Proportion of pediatric somatic beds		0.61	0.01			
Together (16 ACSC)	-1490.3			0.81	26.8	<0.001
Proportion of all pediatric beds		0.85	<0.001			
Prevalence		0.53	0.03			

* rendering medical services to children at primary level

either a district pediatrician (DP) or a family physician (FP). Besides, at primary level children could be consulted or treated by pediatricians or children physicians – specialists (e. g. surgeon, urologist, etc). Children physicians – specialists at primary level are available only at city policlinics. Mean proportion of all physicians rendering medical services to children at primary level was 19.0±1.1 and of only DP and FP – 15.7±0.8 per 10.000 children.

Inpatient care for children in Ukraine is provided at the secondary and tertiary level. The bed stock for children is divided into pediatric somatic beds and different specialized pediatric beds. In the Lviv region inpatient care for children at secondary level is provided by inpatient wards in children's hospitals, central district and district hospitals. In the study we calculated proportions of all pediatric beds and separately pediatric somatic beds at the secondary level, which were correspondingly 35.4±2.6 and 27.5±2.2 per 10. 000 children.

In the multiple regression equations, as the dependent variables (y) were taken hospitalization rates for all 16 ACSC and separately for each of it, and as the independent variables (x) – corresponding rates of ACSC prevalence, incidence and proportions of: all children physicians, DP and FP, all beds for children, pediatric somatic beds. For acute ACSC – intestinal infectious diseases, certain children infectious diseases, acute otitis, AURI, pneumonia, acute bronchitis & bronchiolitis, acute cystitis prevalence rates were equal incidence ones (table II).

Components of obtained statistically significant models are presented in table II. The multiple regression analysis revealed that the hospitalization rate due to all 16 ACSC was positively correlated by 81% with proportions of all children's beds and prevalence of ACSC.

The availability of all children's beds positively influenced the hospitalization rates for AURI, acute bronchitis & bronchiolitis and asthma, while the availability of pediatric somatic beds – the hospitalization rates for acute cystitis.

The hospitalization rates for malnutrition, pneumonia, biliary dyskinesia positively correlated with availability of all children physicians and the hospitalization rates for preventable children infectious diseases and functional stomach disorders – with availability of all DP and FP.

The study found positive correlations between the hospitalization rates for intestinal infectious diseases, malnutrition, AURI, pneumonia and renal infectious diseases and their prevalence.

Piśmiennictwo / References

1. Billings J, Anderson GM, Newman LS. Recent findings on preventable hospitalizations. Health Affairs 1996, 15(3): 239-249.

2. Casanova MC, Peiro PR, et al. Avoidable pediatric hospitalization in the Community of Valencia and Catalonia. Gac Sanit 1998, 12(4): 160-168.

3. Ansari Z, Laditka JN, Laditka SB. Access to health care and hospitalization for ambulatory care sensitive conditions. Med Care Res Rev 2006, 63(6): 719-741.

4. Cousineau MR, Stevens GD, Pickering TA. Preventable hospitalizations among children in California counties after child health insurance expansion initiatives. Med Care 2008, 46(2): 142-147.

5. Chang CF, Herrod HG, Steinberg SS. Prevalence and costs of acute and chronic potentially avoidable pediatric hospitalizations in Tennessee. Tenn Med 2009, 102(11): 35-39.

6. Pracht EE, Orban BL, et al. The relative effectiveness of managed care penetration and the healthcare safety net in reducing avoidable hospitalizations. J Health Qual 2011, 33(4): 42-51.

7. Basu J, Friedman B. Preventable illness and out-of-area travel of children in New York counties. Health Econ 2001, 10(1): 67-78.

8. Friedman B, Basu J. Health insurance, primary care, and preventable hospitalization of children in a large state. Am J Manag Care 2001, 7(5): 473-481.

9. Laditka JN, Laditka SB, Probst JC. More may be better: evidence of the negative relationship between physician supply and hospitalizations for ambulatory care sensitive conditions. Health Serv Res 2005, 40(4): 1148-1166.

10. Parchman ML. Primary care physicians and avoidable hospitalizations. J Fam Pract 1994, 39(2): 123-128.

11. Garg A, Probst JC, et al. Potentially preventable care: ambulatory care-sensitive pediatric hospitalizations in South Carolina in 1998. South Med J 2003, 96(9): 850-858.

12. Goodman DC, Fisher ES, Gittelsohn A, et al. Why are children hospitalized? The role of non-clinical factors in pediatric hospitalizations. Pediatrics 1994, 93(6): 896-902.

13. Friedman B, Basu J. Health insurance, primary care, and preventable hospitalization of children in a large state. Am J Manag Care 2001, 7(5): 473-481.

14. Giuffrida A, Gravelle H, Roland M. Measuring quality of care with routine data: avoiding confusion between performance indicators and health outcomes. BMJ 1999, 319: 94-98.

15. Bindman AB, Grumbach K, Osmond D, et al. Preventable hospitalizations and access to health care. JAMA 1995, 274(4): 305-311.

16. Saxena S, George J, Barber J, et al. Association of population and practice factors with potentially avoidable admissions for chronic diseases in London: cross sectional analysis. J Royal Soc Med 2006, 99: 81-89.

17. Олексюк ОБ. *Запобіжна госпіталізація дітей Львівської області*. ОБ Олексюк. Вісник соціальної гігієни та організації охорони здоров'я України 2009, 2: 44-51. (Preventable Hospitalization of Children in Lviv Region. Bulletin of Social Hygiene and Health Protection Organization of Ukraine 2009, 2: 44-51).

18. Weissman JS, Gatsonis C, Epstein AM. Rates of avoidable hospitalization by insurance status in Massachusetts and Maryland. JAMA 1992, 268(17): 2388-2394.