Medicaid/State Children's Health Insurance Program Patients and Infectious Diseases Treated in Emergency Departments: U.S., 2003

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SYNOPSIS

Objective. Emergency departments (EDs) are a critical source of medical care in the U.S. Information is sparse concerning infectious disease visits among Medicaid entitlement enrollees nationwide. The objective of this study was to describe infectious diseases in terms of Medicaid/State Children's Health Insurance Program (SCHIP) as an expected source of payment.

Methods. Data for 2003 from the National Hospital Ambulatory Medical Care Survey (NHAMCS) were analyzed for infectious disease visits. NHAMCS is a national probability sample survey of visits to hospital EDs and outpatient departments of nonfederal, short-stay, and general hospitals in the U.S. Data are collected annually and are weighted to generate national estimates.

Results. Nationally in 2003, an estimated 21.6 million visits were made to hospital EDs for infectious diseases (rate = 76 visits/1,000 people). Medicaid/SCHIP was the expected source of payment for an estimated 6.7 million infectious disease-related visits (rate = 200 visits/1,000 people covered by Medicaid). Children aged <15 years made 39% of visits nationwide (nationwide rate = 139 visits/1,000 people). Of Medicaid visits, 63% were made by children <15 years of age (Medicaid enrollees rate = 255 visits/1,000 people). The rate of visits for Medicaid enrollees was comparable for females and males (198 visits vs. 201/1,000 people). The rate of visits for black Medicaid enrollees was 33% higher than for white Medicaid enrollees (255 vs. 192 visits/1,000 people). Upper respiratory tract infection (URTI) is the most frequent infectious condition recorded at ED visits. An estimated 47% of ED visits with an expected pay source of Medicaid relate to URTIs (93 visits/1,000 people), compared with 38% of ED visits in general (29 visits/1,000 people).

Conclusion. Medicaid enrollee-specific ED visit rates for infectious diseases were higher by age group, gender, race, and region, compared with national rates. Because approximately half of visits relate to URTIs for a Medicaid payment group, URTIs should form the basis for development of appropriate control strategies.

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Since 1992, the Centers for Disease Control and Prevention (CDC) has funded states to conduct community health assessments and use findings from these analyses to support policy development. To measure progress toward achieving the *Healthy People 2010* objectives,[1] multiple states have incorporated surveillance datasets from the Behavioral Risk Factor Surveillance System (BRFSS), Youth Behavioral Risk Factor System (YBRFS), and the hospital discharge systems into their online query systems. Emergency department (ED) datasets, however, have not been widely incorporated because of the lack of statewide ED data in certain states. EDs are positioned to treat injuries and illnesses. Despite the lack of continuity of care and concerns that ED visits cost more than conventional visits to primary-care physicians, an estimated 114 million visits were made in 2003.[2] Medicaid enrollees in particular have been associated with ED use.[3–5] In a recent study, the ED visit rate for Medicaid patients was higher than the ED visit rates for those with Medicare, those with no insurance, and those with private insurance.[2]

A recent report revealed that >75% of visits to EDs are covered by some form of insurance; 28% of such visits are made by Medicaid patients.[2] From 2000 to 2005, Medicaid added almost 18 million beneficiaries and became the largest entitlement program in the U.S.[6] In fiscal year 2004, Medicaid paid $287 billion in benefits, of which the federal share was approximately $168 billion.[7] Because Medicaid is a state and federally funded health insurance program for the economically disadvantaged, interest in how to control health-care costs is growing.

Annually, >20 million visits to EDs relate to infectious disease.[8] Previous studies have examined infectious diseases among Medicaid patients locally[3,9] but results cannot be generalized nationwide. Because the number of ED visits has not declined,[2] evaluating and comparing subpopulation analyses of ED visits to national data is useful, as is putting the differences in perspective and highlighting health disparities in entitlement program visits. The results of this analysis, in turn, can aid development of policy, programs, and focused prevention strategies both nationally and at the regional level.

The purpose of this study was to estimate the number of Medicaid enrollee visits to EDs for infectious diseases and to calculate visit rates with a Medicaid source of payment. The author applied infectious disease diagnostic codes,[10] which are located in multiple sections of the International Classification of Diseases, 9th Revision (ICD-9-CM) rubrics[11] to the 2003 data from the National Hospital Ambulatory Medical Care Survey (NHAMCS-ED) data, to obtain visit estimates. A national profile of infectious diseases has not been previously determined for the Medicaid entitlement program.

METHODS

NHAMCS-ED is an annual survey conducted by CDC's National Center for Health Statistics (NCHS). It is a national probability sample survey of visits to hospital emergency and outpatient departments of nonfederal, short-stay, and general hospitals in the U.S.[2] Data for this report are from the 2003 survey and were collected for December 29, 2002, to December 28, 2003.[2] NHAMCS-ED uses a four-stage probability design of primary sampling units (PSUs), hospitals that had EDs, emergency service areas within EDs and clinics, and patient visits within emergency service areas and clinics.[2]

Altogether, 546 hospitals were selected for this survey, 443 of which had eligible EDs. Of the 508 emergency service areas selected from the eligible EDs, 475 participated. At each sampled ED, staff were asked to complete encounter forms for a systematic random sample of patient visits occurring during a randomly assigned four-week reporting period. Up to three reasons for an ED visit could be reported, using the patient's own words, if possible; text entries were converted to reason for visit codes using a system developed by NCHS.[2] In another data item, the physician or staff were asked to record up to three diagnoses, which were coded accordingly to the ICD-9-CM by NCHS-contracted medical coding staff during processing. The first-listed diagnosis is the most closely related to the patient's major reason for visit. Respondents were asked to record up to two diagnoses that related to the current visit. In 2003, a total of 40,253 patient record forms were completed at EDs.

Data for NHAMCS-ED are collected by the U.S. Bureau of Census, and participating hospitals are selected from a proprietary database of all hospitals in the U.S. (Verispan Hospital Database). In 2003, the hospital response rate was estimated at 85%.[2] Data are weighted to generate national estimates by using three estimation processes: inflating reciprocals of the sampling selection probabilities, adjusting for nonresponse, and applying a population weighting ratio adjustment.[2] This multistage estimation procedure produces unbiased estimates. NHAMCS-ED captures up to three diagnoses fields per patient visit. Records were selected if at least one infectious disease-associated clinical diagnostic code[10] was identified in any of the three diagnosis fields.

Infectious disease-related visit rates were calculated

by age group, gender, race, and census region. Rates were also calculated for each infectious disease category. Lastly, infectious diseases were examined by age group, race, and gender for the most common infectious conditions presenting to the EDs. Denominators for the calculation of rates were provided by the CDC/NCHS.[12] Appropriate 95% confidence intervals (CIs) for the rates were determined by calculating the relative standard errors for the estimates of visits, using the coefficients provided by the NCHS.

RESULTS

Total visits for infectious diseases

An estimated 21.6 million visits met the definition of infectious diseases, based on using the three ICD-9-CM coded diagnosis fields (Table 1). This figure represents 19% of the estimated 114 million ED visits in 2003. The first diagnosis field captured an estimated 17.1 million (79%) of all infectious disease visits.

Children aged <15 years had the highest infectious disease-associated ED visit rates (139 visits/1,000 people). The rate of visits for females was higher than the rate for males (85 vs. 66 visits/1,000 people). White people made approximately 71% of infectious disease-related visits; however, the rate was significantly higher among black people (158 visits vs. 66 visits/1,000 people). An estimated 9.4 million infectious disease-related ED visits occurred at Southern hospitals, and the South also had the highest rate of ED visits for infectious diseases overall (89 visits/1,000 people). The lowest rate of visits was in the West (61 visits/1,000 people). Thirty-one percent of infectious disease visits to EDs were expected to be paid by the Medicaid entitlement program.

Medicaid entitlement program visits for infectious diseases

The NHAMCS-ED data show that an estimated 6.7 million visits with a diagnosis of infectious disease listed

Table 1. Number and rate of infectious disease visits to hospital emergency departments for all payment categories and for those with an expected pay source of Medicaid,[a] NHAMCS: U.S., 2003

Characteristic	*Estimated number of visits for infectious diseases for all payments in EDs*	*Rate of visits for infectious diseases per 1,000 people for all payments (95% CI) in EDs[b]*	*Estimated number of Medicaid visits for infectious diseases in EDs*	*Rate of visits for infectious diseases per 1,000 people covered by Medicaid (95% CI) in EDs[c]*
Age group				
0–14 years	8,439,637	139 (133, 145)	4,231,777	255 (244, 266)
15–24 years	3,554,030	89 (85, 93)	992,916	196 (187, 205)
25–44 years	5,062,313	61 (58, 64)	978,654	177 (169, 185)
45–64 years	2,652,682	39 (37, 41)	385,634	106 (101, 111)
≥65 years	1,918,454	56 (53, 59)	110,676	41 (39, 43)
Gender				
Female	12,374,421	85 (81, 89)	3,790,235	198 (190, 204)
Male	9,252,695	66 (63, 69)	2,909,422	201 (192, 210)
Race				
White	15,335,588	66 (63, 69)	4,400,359	192 (184, 200)
Black	5,597,088	158 (151, 165)	2,104,558	255 (244, 266)
Other	694,440	41 (39, 43)	194,740	80 (76, 84)
Region				
South	9,434,340	89 (85, 93)	3,403,055	264 (252, 274)
Midwest	4,509,741	66 (63, 69)	1,131,969	164 (157, 171)
Northeast	3,925,337	74 (71, 77)	985,692	154 (147, 161)
West	3,757,698	64 (61, 67)	1,178,942	159 (152, 166)
Total	21,627,116	76 (73, 79)	6,699,657	200 (191, 209)

[a]Visits are not exclusive because more than one infectious disease category might be selected and up to three diagnoses could be recorded per visit.

[b]Denominator is a civilian noninstitutionalized.

[c]Denominator is people covered by Medicaid.

NHAMCS = National Hospital Ambulatory Medical Care Survey

ED = emergency department

CI = confidence interval

Medicaid as the expected source of payment. Children aged <15 years had the highest infectious disease-associated ED visit rate among Medicaid enrollees (255 visits/1,000 people covered by Medicaid). Sixty-three percent of infectious disease-related visits to EDs occurred among this age group. Among all Medicaid enrollees, the rate of infectious disease-associated visits was similar for females and males (198 vs. 201 visits/1,000 people). Sixty-six percent of infectious disease visits were among white people with Medicaid, but visit rates were 33% higher among black people (192 vs. 255 visits/1,000 people covered by Medicaid). By region, ED visit rates were highest in the South for infectious diseases (264 visits/1,000 people) and lowest in the Northeast (154 visits/1,000 people). Ninety-three percent of visits were initial visits, whereas 4% were return visits. Among Medicaid patients, an estimated 78% of Medicaid visits for infectious diseases occurred in metropolitan statistical areas (MSAs) for infectious diseases.

National and Medicaid enrollee-specific rates for infectious diseases

In all characteristics examined (age group, gender, race, and region), visit rates were markedly higher among Medicaid enrollees. Medicaid children aged <15 years had the highest infectious disease-associated ED visit rate and represented one of every five infectious disease-related visits to the ED. The rate ratio of visits when Medicaid enrollee-specific groups were compared with national rates were as follows: 0–14 years (1.8), 15–24 years (2.2), 25–44 years (2.9), 45–64 years (2.7), and >64 years (0.7). Although visit rates were higher among black people (nationwide and Medicaid enrollee-specific) for infectious disease visits, this effect was less pronounced among Medicaid enrollees (black-white Medicaid visit rate ratio was 1.3 vs. 2.4 for national black-white ratio). The finding that Medicaid tends to decrease racial differences in visits had previously been reported.[3]

By gender, the rate ratio of visits was 2.3 for females and 3.0 for males when Medicaid-specific rates were compared with national rates. Higher visit rates recorded among Medicaid enrollees by demographics nationwide were also noted at regional levels, where Medicaid-specific rates, at a minimum, doubled the national rates.

National and Medicaid enrollee-specific rates for selected infectious diseases

Respiratory tract infections represented 50% of ED visits nationwide and 56% of ED visits in which Medicaid was the expected source of payment (Table 2). Upper respiratory track infection (URTI) was the leading cause of infectious disease visits nationwide and for Medicaid enrollees. Visit rates were substantially higher among the Medicaid population (93 vs. 29 visits/1,000 people). Otitis media was the second most frequent infectious disease visit cause among Medicaid enrollees, representing 18% of ED visits. The Medicaid population otitis media rate ratio when compared with the nationwide rate was 3.5 (35 visits vs. 10 rates/1,000 people). Urinary tract infections (UTIs) represented 22% of ED visits among the Medicaid visits expected source of payment and 16% nationwide; ED visit rates were 83% higher among Medicaid enrollees for this condition.

Specific rates of infectious diseases among Medicaid enrollees by demographic characteristics

Table 3 presents infectious disease rates by age group, race, and gender. URTI rates were highest among children aged <15 years (140 visits/1,000 people), white people (87 visits/1,000 people), and males (100 visits/1,000 people). Otitis media visit rates were highest among children aged <15 years (62 visits/1,000 people), black people (39 visits/1,000 people), and males (39 visits/1,000 people). UTI visits were highest among people aged 15–24 years (52 visits/1,000 people), black people (29 visits/1,000 people), and females (33 visits/1,000 people).

DISCUSSION

Infectious disease-related visits reported in this study are comparable to previous estimates generated from the NHAMCS-ED data.[13] The stability in rates makes NHAMCS-ED data attractive and relevant in decisions relating to the use and misuse of EDs. Although regional data can be used with caution to assist states in making informed decisions about epidemiologic characteristics of infectious diseases treated in EDs in their jurisdictions, CDC's Assessment Initiative program continues to work with health organizations, including the National Association of Health Data Organizations (NAHDO) and the National Association of Public Health Statistics and Information Systems (NAPHSIS) to facilitate collection, analysis, and presentation of community health data at local levels. Access to this information is needed to guide development of population-based health interventions.

The magnitude of infectious disease-related visits to EDs in this study is an example of why in-depth public health surveillance data should be examined to serve as a basis for decision making. A higher proportion of infectious disease ED visits in the South requires further research to explain this phenomenon both nationwide

Table 2. Rates of emergency department visits per 1,000 people for specific infectious diseases,[a] NHAMCS: U.S., 2003

Infectious disease group	*Estimated number of visits for infectious diseases for all payments in EDs*	*Rate of visits for infectious diseases per 1,000 people for all payments (95% CI) in EDs[b]*	*Estimated number of Medicaid visits for infectious diseases in EDs*	*Rate of visits for infectious diseases per 1,000 people covered by Medicaid (95% CI) in EDs[c]*
Upper respiratory	8,288,694	29 (28, 30)	3,117,053	93 (89, 97)
Urinary	3,460,916	12 (12, 13)	724,519	22 (21, 23)
Otitis media	2,889,389	10 (10, 10)	1180660	35 (34, 37)
Skin	2,801,141	10 (10, 10)	550,828	16 (15, 17)
Lower respiratory	2,471,430	9 (9, 9)	624,837	19 (18, 20)
Eye	602,129	2 (2, 2)	138,953	4 (4, 4)
Enteric	383,715	1 (1, 1)	141,794	4 (4, 4)
Vaginitis and cervicitis	311,046	1 (1, 1)	77,459	2 (2, 2)
Other viral infections	286,094	1 (1, 1)	113,958	2 (3, 3)
STD	132,562	1 (1, 1)	29,596	1 (1, 2)
Total	21,627,116	76 (73, 79)	6,699,657	200 (191, 209)

[a]Visits are not exclusive because more than one infectious disease category might be selected and up to three diagnoses could be recorded per visit.

[b]Denominator is a civilian noninstitutionalized.
[c]Denominator is people covered by Medicaid.
NHAMCS = National Hospital Ambulatory Medical Care Survey
ED = emergency department
CI = confidence interval
STD = sexually transmitted disease

and for Medicaid-specific source of ED visit payment. Managed-care organizations, public health agencies, and research institutions should share information and knowledge appropriate for making the best possible decisions, especially when the majority of ED visits are from MSAs (78%). ED hospitals located in these areas might be negatively affected.[14]

The results of this study have major implications. Infectious diseases remain a burden to public health,[10,15] and with more than 8 million visits relating to URTIs, surprisingly, the *Healthy People 2010* guidebook lacks an appropriate objective for this indicator.[1] Visit rates were highest nationally and among Medicaid subpopulations for this infection, in comparison with other infectious disease visits to EDs, as presented in Table 2. Development of appropriate objectives nationwide and by subpopulations (e.g., age group, gender, payment mechanisms, or race) can enable trend monitoring of rates at the national and regional levels.

The advent of managed-care organizations has gained attention nationally. During the last decade and especially the past several years, managed-care organizations have evolved with regard to access, quality of care, and cost containment.[16] The propensity to control costs in Medicaid, however, remains unclear, given that ED visit volume continues to increase. This viewpoint has become obvious in hospitals and health-care settings where these patients are treated. Surprisingly, ED research findings are inconsistent regarding patient and system characteristics: uninsured individuals were no more likely to have an ED visit than insured individuals;[17] insurance status, and specifically Medicaid coverage, had no association with use of the ED as a usual source of sick care;[18] children covered by Medicaid were 54% less likely to use the ED than children with private insurance;[9] and increased ED use by Medicaid patients was attributed to difficulties in accessing primary care.[3]

Although no single answer exists to address ED use (e.g., lack of practitioners in area, hours of operation, location, need to work during day when doctors' offices are open, transportation, etc.),[3–5,9] managed-care organizations should not overlook or miss reasons for ED visits in their quest to contain costs. Research is needed to determine why Medicaid enrollees continue to use EDs for conditions that can be addressed otherwise.

Approximately 70% of visits to health service centers relate to URTIs,[19] but acceptable treatment guidelines remain elusive.[20–22] Inappropriate use of antibiotics to treat URTIs, which often have viral etiology, is well-documented.[23,24] Recent studies have reported that a multifaceted approach consisting of interactive educational programs, repetitive use of printed algorithms, telephone advice lines, and triaging can be used to

treat URTIs.[19,25,26] Of particular concern is the recent study of senior medical students from 22 accredited medical schools in New England and mid-Atlantic states about their knowledge and compliance with CDC's principles of antibiotic use, which identified substantial gaps regarding appropriate use of antimicrobial agents for treating URTIs.[27]

Treatment of URTIs is a challenge because laboratory tests for causative agents are often insensitive and usually identify the agent in only a minority of cases. Antibiotics are often prescribed for ED patients with URTIs despite their ineffectiveness.[28] As the number of antibiotics available to physicians increases, the tendency for inappropriate prescription exists. Although an array of medicine is available for symptomatic relief of URTIs, many of them are only partially effective in reducing symptoms, but none is curative.[29] Patient and provider education should be intensified, and the roles of professional and managed-care organizations in advancing evidence-based guidelines for treating URTIs should be explicit. According to Finch and Low, advances in information technology offer the promise of more dynamic, computer-assisted forms of guidance.[22]

Costs remain the major concern about the appropriate and inappropriate use of EDs. Bernstein recently argued that inappropriate use of ED services does not apply to most ED patients who use this source for mental health and substance abuse care.[30] In 2003, only 50% of ED visits in the U.S. were classified as urgent or emergent.[2] The majority of ED visits of adolescents were nonurgent.[31] Because increasing ED use and overcrowding might interfere with the management of patients truly in need of immediate care, entitlement programs, in particular, have an obligation to educate enrollees about cost-free management modalities. Creating links between EDs and other agencies has been recommended to connect these patients to primary-care providers.[32]

This study has certain limitations. First, because of the NHAMCS-ED design, state-level data are unavailable. Second, because visits with a second- or third-listed diagnosis were selected in addition to those with a first-listed diagnosis of infectious diseases, all visits might not have been made specifically for infectious diseases. However, 79% of infectious disease-related visits were captured in the first diagnosis field. Third, certain conditions not listed in the published infectious diseases published codes[10] can be excluded in this estimate (e.g., sepsis from unknown origin). Additionally, chronic infectious diseases such as human immunodeficiency virus are less likely to be treated at EDs.[2] Infectious disease estimates generated in this research should be considered conservative.

Fourth, an item in the survey asked for "primary expected source of payment," and that is what was used in this research. It is possible that the primary expected source of payment differed from the party that ultimately paid for the visit. If the patient has more than one source of payment, Medicaid/SCHIP has priority of selection as the primary source of payment over Medicare, Worker's Compensation, private insurance,

Table 3. Rates of emergency department visits for Medicaid enrollees per 1,000 people for specific infectious diseases,[a] by age group, race, and gender, NHAMCS: U.S., 2003

Characteristic	*Upper respiratoy*	*Otitis media*	*Lower respiratory*	*Skin*	*Urinary*
Age group					
<15 years	140	61	17	13	8
15–24 years	66	14	24	20	52
25–44 years	58	14	30	23	39
45–64 years	37	[b]	15	21	23
≥65 years	9	[b]	[b]	[b]	14
Race					
White	87	37	20	15	21
Black	14	39	16	23	29
Other	48	[b]	[b]	[b]	[b]
Gender					
Female	87	32	19	12	33
Male	100	39	19	22	7
Total	93	35	19	16	22

[a]Visits are not exclusive because more than one infectious disease category might be selected and up to three diagnoses could be recorded per visit.

[b]Does not meet reporting requirements

NHAMCS = National Hospital Ambulatory Medical Care Survey

self-pay, no charge/charity, and other. Lastly, there could also be a difference between the patient's reason to visit the ED and the final diagnosis. It is unknown if this limitation overestimates or underestimates infectious diseases reported in this research. However, the clinical diagnoses provided by the attending personnel were used in generating estimates.

This study has described infectious disease ED visits among Medicaid enrollees' source of payment and compared visit rates with national data. It is necessary to put the findings in context. First, a major strength of this study was the use of similar research methodology, which NCHS has used consistently to analyze and present data on ED visits.[2,33–35] The results reported in this study could be compared, in parallel, with these NCHS research publications. However, while this form of analysis simply examines weighted estimates by population characteristics, it does not account for confounders such as race, income, or age, which may be due to demographic characteristics.

An alternate approach would have been to use regression analysis and examine ED visits for infectious diseases vs. ED visit for non-infectious diseases as a dependent variable. Possible independent variables to consider could include age, race, region, MSA, and Medicaid vs. non-Medicaid enrollees. This alternate approach has two major advantages: determine if the visit rate differences found in this study were something inherent about Medicaid enrollees or a particular region; and determine which variables actually predict ED visits for infectious diseases.

It is recommended that future analysis incorporate both approaches to broaden our understanding of ED visits among Medicaid enrollees and other subpopulation groups. Second, the NCHS annually publishes estimates and percent distribution of the leading diagnoses groups treated in EDs nationwide.[2] In 2003, contusion with intact skin surface, acute respiratory infections, abdominal pain, and chest pain were the leading diagnoses at visits, representing 16% of ED visits nationwide.[2] It is possible that the leading diagnoses reported among the general population were different for Medicaid enrollees. To fully address use patterns of the Medicaid enrollees, it is important to present the leading diagnoses groups treated in the ED for this subpopulation, and this issue is the subject of a different article.

Third, a major finding of this research relates to URTIs. URTIs are the most common infection during visits to the ED for both Medicaid enrollees and nationwide visits. Emphasis on URTIs is warranted given the rate ratios of URTI visits for the two population groups (29 vs. 93 visits/1,000 people). The magnitude of the problem is also noted in proportions of URTI visits to total visits for both population groups (38% vs. 47%). Reasons why Medicaid enrollees visit EDs for this condition much more than the general population should be explored. Lastly, the author is unable to distinguish Medicaid enrollees from SCHIP participants in the data file. As such, specific visit estimates and rates could not be generated for each subpopulation group.

EDs are mandated by federal law to evaluate anyone seeking care. Data on insurance coverage, and especially entitlement programs, are useful in health services research, health surveillance, education, training, and quality-of-care monitoring. Future decisions and recommendations should address URTIs through such avenues as telemedicine and consumer health-care information to support the management of health decisions. Because entitlement programs might continue to grow, they should partner to improve health and meet the *Healthy People 2010* objectives. As such, entitlement programs should develop biosurveillance, outreach, and evaluation studies.

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The findings and conclusions in this report are those of the author and do not necessarily represent the views of the CDC. Data presented in this article include Medicaid and the State Children's Health Insurance Program (SCHIP) visits to emergency departments. For brevity, Medicaid visit was used throughout the manuscript. Charges paid in part or in full by this plan include payments made directly to the hospital and payments reimbursed to the patient. In addition, these charges include those covered under a Medicaid-sponsored prepaid plan or the SCHIP.

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