

Characterising emergency department high-frequency users in a rural hospital

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ABSTRACT

Objective Patients who are frequent users (≥ 4 visits/year) comprise $\sim 10\%$ of patients, but account for $\sim 34\%$ of total yearly emergency department (ED) visits. Non-emergent care provided to frequent ED users affects operating costs and usage. The majority of reports characterising frequent ED use are from urban teaching centres. This study describes frequent users of ED services in a rural community setting and the association between counts of patient's visits and discrete diagnoses.

Design Retrospective study of 1652 frequent ED adult patients from a rural US hospital over a one-year period. Descriptive statistics and Poisson regression were used to explore the characteristics of frequent users and their patterns of diagnoses.

Results Frequent user visits ranged from 4 to 66 per patient. Frequent users were 9.41% of patient volume accounting for 33.94% of the total visits and were younger compared with patients with < 4 visits. Approximately 36% of frequent user visits were generated by 20 diagnoses when the diagnoses were concatenated into domains which covered $\sim 76\%$ of the visits. There was a high correlation between the number of visits and discrete diagnoses in frequent users.

Conclusions These findings suggest a more complex picture of rural ED services and their relationship with primary care and dental services, which needs to be defined before policy development to reduce ED use.

use is a minimum of four or more annual visits.^{3 4} A systematic review of ED usage found frequent ED users to be 4.5–8% of total ED patients, but accounted for 21–28% of the visits.³ With frequent users representing 21–28% of all ED admissions, their care has a significant impact on cost and efficiency of providing services. Estimates of the proportion of the care which could be managed with less intensive services varies from 10% to 50%.⁵

It is often speculated that if frequent users had other service options and insurance they would not be presenting in EDs. LaCalle and Rabin (2010) have noted these assumptions are incorrect. Frequent ED users were likely to have health insurance and a regular care provider, but they were also likely to be in poorer health than people who are not frequent users. That is, they typically were coming in for a valid reason. Frequent ED users are predominately covered by health insurance with only 15% being uninsured, and those publicly insured constituting 60%. Frequent users tended to be sicker with higher acuity, and 51% of them had been admitted to the hospital in the previous five years.³ Older individuals in rural areas have diagnostic similarities to those in urban areas, but were less likely to use the ED.⁶

Patients' diagnoses appear to vary widely in previous studies,³ but pain and exacerbations of chronic disorders have been broadly noted. Variations in rates of diagnoses in frequent ED users may be related to locally available services (ie, dental care). Race and ethnicity were not found to be important predictors in whether or not a patient would become a frequent ED user.⁷ Changes in insurance or usual care provider were likely to increase ED visits, along with poor physical and/or mental health.⁸ Frequent ED users also visited their general practitioners with a high level of frequency, and were more likely to spend the night in the hospital than non-frequent users. The literature notes that they are also a psychosocially vulnerable group.⁹ Top reasons for ED visits include: back pain, migraine headaches and abdominal pain.¹⁰

Despite public opinion to the contrary, study findings consistently have demonstrated that frequent ED users often had better access to routine care, had an assigned primary care doctor, and were more likely to have insurance.^{3 11} Patients with marginal housing, homeless status, those from lower socioeconomic groups, and less education have a higher frequency of usage.^{3 12} Patients who lived within a few miles were more likely to use ED than those who lived further away, especially in cases where the ED was closer than their primary care provider.^{13 14} This suggests the 'convenience'

The frequent use of emergency department (ED) services by patients for non-emergent care results in increased Medicare costs and fragmented care.¹ EDs experienced a dramatic 37% increase in patient volume from 1997 to 2007, which has been attributed to a variety of causes.² Expanded ED volume, cost and pressures on hospital staff are partially dependent on the non-emergent visits generated by frequent users of ED services. Our understanding of frequent ED users and their impact comes primarily from studies completed at urban teaching hospitals. It is unclear whether these findings generalise to rural settings. The overarching goal of this study is to characterise frequent users of a rural ED. The characterisation of frequent ED users in a rural setting provides information to modify services to better meet community health needs.

Frequent ED users have been described in prior studies as better managed with less intensive health services,³ or could be better managed in medical office settings.¹ Additionally, there is a lack of a clear definition as to what defines frequent use. The most common definition of heavy or frequent



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of geographic location coupled with the availability of services during 'off hours' may have further influenced frequency of ED use.¹⁵ Additionally, regional differences have reported decreased ED usage for those enrolled in managed care plans residing in the southern and western USA.¹⁶

Previously published research indicated a small percentage of patients with specific chronic disease diagnoses used the ED repeatedly and accounted for a large percentage of the overall visits.¹⁷ Rural Medicare patients who had a post-high school education, were in poor health, and had cardiovascular or respiratory disease were associated with an increased likelihood of ED use. Chronic obstructive pulmonary disease, alcoholism, psychiatric illness, migraines, sickle cell disease and asthma have all been linked to heavy ED use.¹⁸ Other studies have shown increased frequency in complaints of abdominal pain, lumbago, sprains/strains, dental disorders and myalgias among frequent ED users.¹⁹

Recent research studies have not included characterising the frequent ED user at rural community hospitals; however, a few targeted studies do exist. Riggs, *et al* (2003) found that frequent ED use was associated with a high rate of early (within 72 h) return.⁴ Mehl-Madrona (2008) identified a prevalence of previously undiagnosed psychiatric disorders among frequent users at two rural EDs. Significantly higher rates of depression (ie, 88% vs 56% with the same medical diagnosis), alcohol abuse/dependence, substance abuse/dependence, and anxiety and personality disorders were found among those patients with frequent ED visits. These patients were often diagnosed with a comorbid upper respiratory infection, back pain, viral syndromes, abdominal pain, headaches and alcohol intoxication when compared to random ED users.²⁰

In summary, there is a dearth of studies describing rural EDs and frequent users in these settings. The studies that do exist have demonstrated differing presentations in demographics and symptom profile between rural and urban settings.²¹ The consistency of these differences cannot be determined from the limited studies available. This study provides additional information to be used in evaluating, modifying, or developing appropriate alternatives to ED usage, and promotes more effective non-urgent care in rural settings.

RESEARCH QUESTION

What are the characteristics of frequent users in a rural ED with respect to the rate of total ED visits, age, gender, number of return visits, most frequent diagnoses, payer type and numbers of unique diagnoses?

Design

To address the research question, data from a small Maryland rural community hospital was obtained after approval of the human subjects review committee. The hospital provides 24 h emergency room coverage, and is a level 4/5 trauma centre with approximately 38 000 (including paediatrics) visits per year.

The study employed a retrospective observational design which included data from 12 months of ED admissions between 1 January 2012 and 31 December 2012. Electronic records were searched and selected using MEDITECH 6.4 MAGIC. Data fields obtained for each visit included the patient's ID, age, gender, insurance, principal discharge diagnosis, race and date of visit. The study sample was limited to adults 18 years or older by design. The initial sample included 30 575 adult visits, which were generated by 16 569 individuals to the ED, which constituted the population from which the frequent users were drawn. The sample demographics can be seen in table 1. The

Table 1 Sample demographics

	n Total ED	Percent total ED	n Frequent user	Percent frequent user
Visits				
Male visits	12 942	42.33	4226	38.97
Female visits	17 632	57.67	6617	61.03
Total	30 575	100	10 363	100
Patients				
Male patients	7372	44.49	587	37.63
Female patients	9197	55.51	973	62.37
Total patients	16 569	100	1560	100
Race				
Caucasians	14 309	85.36	1364	87.49
African-American	1659	10.01	170	10.90
Asian	46	0.28	0	0
Others	657	4.32	27	1.60
Missing	5	0.03	0	0
Total	19 103	100.00	1 560	100

mean age of the initial sample was 43.02 years, SD=18.04, and females were 0.86 (43.41 vs 42.54) years older than male.

DEFINITIONS OF STUDY VARIABLES

Age: age was available in years and was used as a continuous variable for selected comparisons. Additionally, an ordered categorical variable was constructed to provide other potentially more informative characterisations. There is no clear standard for the age categories.²² To better characterise the relationship between age and potential aetiologies of having four or more visits, age was divided into five groups: young adults 18–28, adults 29–44, middle-aged adults 45–65, older adults 66–77 and very old adults 78 years and older, respectively. The selection of ranges was based on the 2009 life expectancy age of 77.9 years as the threshold for very old age.²³

Payer type: payer types were aggregated into three subgroups: no insurance/self-insured, private insurance, and US government insurance (Medicare and Medicaid).

Frequent ED user: This study has operationalised four or more visits during the 12-month period of observation as frequent use.

Diagnoses associated with visit: the discharge diagnosis was coded using the Diagnostic Related Group (DRG) system, and was used to define the diagnosis for each admission. Secondary or comorbid diagnoses were not employed.

ANALYSIS

To characterise frequent users of ED services, descriptive statistics were applied after data was evaluated for entry errors. There were several hundred discharge diagnoses assigned to patients upon discharge from the ED. A visual examination of high-frequency diagnoses guided the aggregation of diagnoses into categories/domains for reporting. Additionally, diagnoses not captured during the aggregation but noted in the extant literature were included in the list to provide a more meaningful view of the ED discharge diagnosis. The stability of discharge diagnoses from repeated visits in frequent ED users was explored by correlating their total number of visits and their unique number of discharge diagnoses. Additionally, the relationship between the number of ED visits and the number of

diagnoses by age group and sex was explored using a Poisson regression based on the distribution of the number of ED visits.

RESULTS

Of the 16 584 persons seeking ED services during 2012, there were 1652 (9.41%) patients who had ≥ 4 visits. These patients generated 10 363 visits with a mean of 6.64 visits (SD 4.69, range 4 to 66). This represented 33.94% of the total visits. The gender rate differed from the total sample with females representing 55.87% in the total vs 61.03% for those with four or greater visits. The majority of frequent ED users, 82.75% ($n=1246$), had a listed primary care physician at the time of their visit and listed one of 165 local primary care physicians as their primary care provider.

Age: frequent users of ED services were significantly ($p<0.001$) younger (38.66 years) than those with less than 4 visits per year (42.96 year). Among frequent users, women were younger (38.1 years) than men (39.6 years). Age was not normally distributed in the sample; the differences are more accurately assessed by viewing figure 1.

Diagnoses: eight hundred and ninety-five discharge diagnoses were assigned to frequent users of ED services. The first 20 diagnoses accounted for $\sim 37\%$ of all visits in frequent users. When diagnoses were concatenated into diagnostic domains (ie, sort by pain) and diagnoses not present in the domains but noted in extant literature for high frequency, accounted for $\sim 76\%$ of visits by frequent ED users (table 2).

Payer type for frequent ED users: the payer type for ED services indicated that 60% (5902) of the visits were covered by private insurance, 20.53% (2539) were self-pay and not covered by insurance, and 18.55% (1922) were covered by a US government-based plan.

The relationship between number of diagnoses, number of visits and age: there was a significant main effect ($b=0.15$, D.F.=1, $p<0.001$) for a relationship between the number of diagnoses and the number of visits a frequent ED user had. There was no significant ($p>0.05$) difference in the number of visits based on

membership in a specific age group, and the interaction between age group and number of diagnoses was also non-significant ($p>0.05$). There was a strong correlation ($r = 0.88$, $p>0.001$) between the number of ED visits and the number of unique diagnoses in frequent ED users (figure 2).

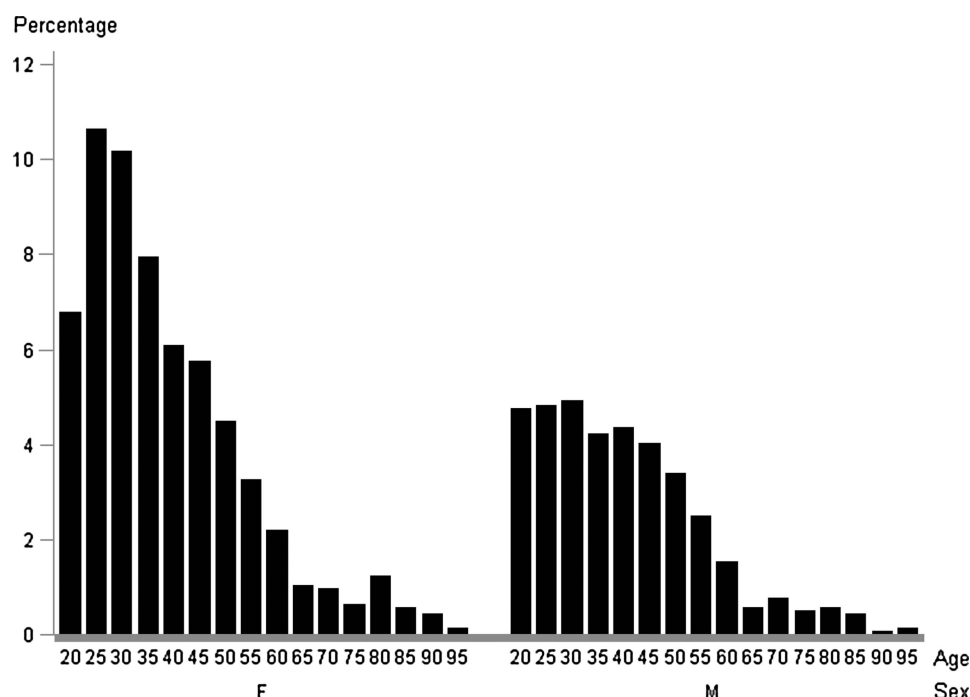
CONCLUSIONS

To our knowledge, this is one of only a few studies that have characterised the use of a rural ED. Our a priori expectations were that ED patients would differ from those treated at large urban teaching hospitals. While there are some unique differences, many of the findings paralleled those that others have reported.

Our study found 9.41% of patients had four or more visits within a 12-month time period which is similar to the rates reported for urban EDs.³ After a review of the findings, and examining existing community and hospital resources, we postulate that frequent ED use may be the result of a number of factors which included lack of local options for care (dental pain), the use of the ED as an option for primary (preventable) care, true emergent needs and scheduled follow-up visits (which were only 1.35% of visits).

The very high correlation between the number of ED visits and unique discharge diagnoses in this patient population does not support the conjecture that a significant portion of return visits are a result of lack of proper care during prior ED care. The data does not provide an indication of the number of patients who may have been advised by primary care or specialist to seek treatment in the ED if symptoms worsened, or directed to the ED instead of being given an office appointment. The pattern suggests that these ED visits are related to an array of diagnoses many of which are related to chronic conditions such as pain and psychiatric disorder. The clinical impression of the younger average age of frequent ED users is they may represent patients who have more symptomatic presentations of emerging chronic physical or mental illnesses. Additionally, the result suggests that a portion of patients may have also returned to the ED when they would rather have seen their family physicians

Figure 1 Age, by sex, of frequent users. Distribution, by sex, of frequent emergency department users.



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Table 2 Most frequent diagnoses, diagnoses not otherwise specified and aggregated diagnoses in frequent emergency department users

Diagnosis	n	%	Aggregated diagnoses	n	%
Other acute pain	442	4.29	Pain	2190	21.27
Headache	427	4.15	Abdominal/gastrointestinal	1078	10.47
Abdominal pain, other specified site	359	3.49	Sprain	638	6.20
Abdominal pain, unspecified site	281	2.73	Headache/migraine	535	5.20
Unspecified dental caries	243	2.36	Dental	519	5.04
Dental disorder not otherwise specified	221	2.15	Asthma/respiratory/ chronic obstructive pulmonary disease/bronchitis	501	4.87
Chest pain not otherwise specified	210	2.04	Back/lumbar/cervical	377	3.66
Urinary tract infection not otherwise specified	198	1.92	Urinary track	306	2.97
Backache not otherwise specified	139	1.35	Mental health	270	2.62
Sprain of neck	131	1.27	Infection	269	2.61
Sprain of ankle not otherwise specified	122	1.19	Injury/wound	240	2.33
Periapical abscess	112	1.09	Drug and alcohol	166	1.61
Female genital symptoms not otherwise specified	110	1.07	Fractures	146	1.42
Anxiety state not otherwise specified	109	1.06	Aftercare/follow-up	140	1.36
Cellulitis of leg	109	1.06	Female Genital sx	110	1.07
Cellulitis of arm	106	1.03	Dehydration	102	0.99
Chest pain not elsewhere classified	103	1.00	Diabetes	69	0.67
Dehydration	102	0.99	Concussion	59	0.57
Lumbago	97	0.94	Cardiac/myocardial/heart	44	0.43
Abdominal pain, epigastric	94	0.91	Epilepsy/seizures	37	0.36
Total	3715	36.09	Total	7796	75.73

but were unable to access them. While this may reflect inadequate access to primary care in the community rather than poor ED treatment, ~83% of patients seen reported having a primary care provider. Of the ED visits by frequent users, 32% (n=3280) occurred during business hours for primary offices, and 84% of these patient visits had a listed primary care physician. Another commonly held belief that was not supported

was the expectation that most of the frequently returning patients would be uninsured and/or indigent. Over half the high-frequency patients had private insurance, while only approximately 14% were not insured and 9.5% were self-pay. These findings also paralleled other reports, but the proportion of Medicare/Medicaid was 19.17% which differed significantly from 60% reported by LaCalle.³

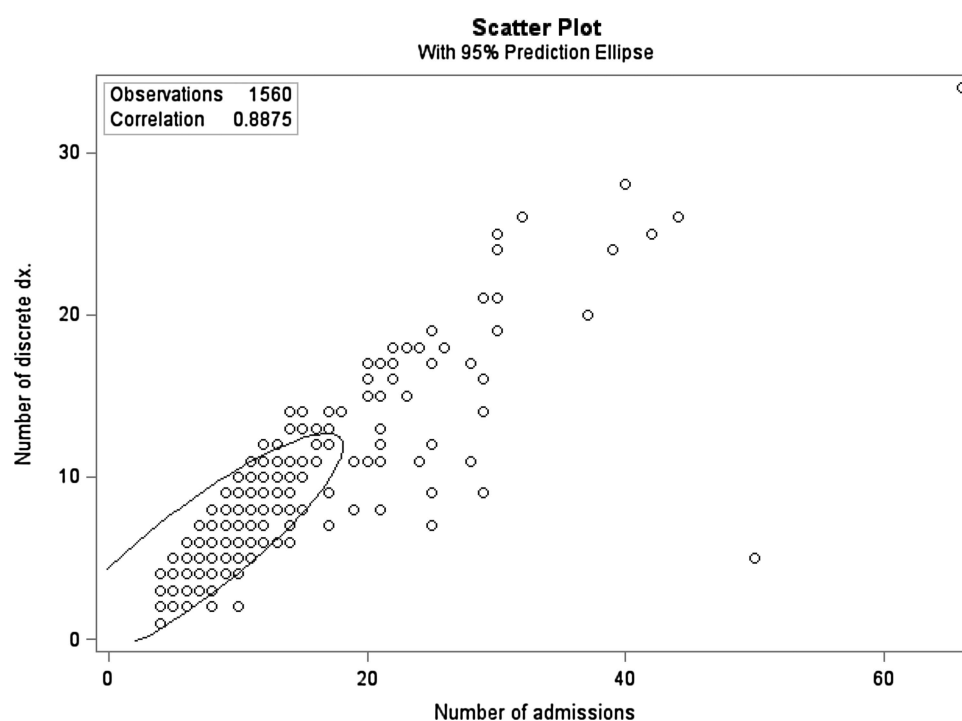


Figure 2 Correlation between the number of ED admissions and discrete diagnoses (dx) in frequent emergency department (ED) users. Scatter plot of frequent ED users and number of visits by the number of unique diagnoses they received over a 12-month period.

Previous research has shown that the likelihood of return ED visits increased with age; however, we did not find that in our study sample. The repeat ED users were younger (~39 years) than the mean age for all adult patients of ~43 years. Others have reported a bimodal distribution by age, with older adults being one of the groups with greater than four visits. Our study did not find this with only 5.75% of frequent ED users greater than 65 years of age. The majority of our sample was represented by two younger groups, 30.28% young adults (18–28 years) and 38.04% adults (28–45 years).

In the current study, the most frequent diagnoses of abdominal pain, headache, backache, chest pain, neck sprain and urinary tract infection are among the diagnoses identified by other studies to be at the highest risk for an unexpected return visit to the ED in rural populations.²¹ Unspecified abdominal pain was the diagnosis most commonly seen in our return user population, and may be due to the long list of differential diagnoses for presentation of abdominal pain. Foran (2010) noted that an initial ED diagnosis tended to be retained by patients, and has suggested this as a potential predictor in future admissions.²¹ This was not the case in the frequent users of ED services in this sample. A significant reason for return in our population was for unspecified dental caries, periapical abscesses and dental disorders. Lack of dental care has long been recognised as a problem in the rural county studied.^{24–25} At the time of this study, this rural community was without dental facilities. Options for patients seeking dental services were to go to the adjoining state or visit the dental clinic two hours away.

It is often speculated that if these patients had other service options, they would not be presenting to EDs in their current volume. Research provides conflicting pictures of patients visiting EDs for non-urgent care; some would prefer to be seen by their family physicians if they were able to access primary care, while others prefer the 24 h service provided by EDs.^{1–15} Patients may not be able to get timely appointments with their family physicians, are referred to the ED for symptoms that even approximate an emergent condition, may significantly impact primary care office schedules, or may have problems accessing care outside of working hours which is supported by the highest frequencies of admissions occurring in the afternoon/evening and nights.

Preventable visits could not be isolated easily by simple descriptive methods which is consistent with other reports about the complexity of categorising non-emergent visits.¹

Given the reported usage statistics above, an improved understanding of who are the frequent ED users is an important first step in considering programmatic interventions to reduce their numbers and provide cost-effective care in the ED at the hospital and community level. The findings suggest that more complex mixed-methods designs will be needed to better understand the aetiologies of frequent ED use given their extensive number of unique diagnoses. Rural hospitals are more likely to face similar challenges in the availability of local services, thus efforts to better understand frequent ED users may provide important information not found in larger studies. While the design limits the ability to generalise from the examination of a single setting, this study points to the importance in examining the inter-relationship between the ED and primary care and dental services.

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REFERENCES

- 1 Cunningham P. *Nonurgent Use of Hospital Emergency Departments*. Washington, DC: Center for Study of Health System Change, 2011 May 11th 2011. Report No.
- 2 Tang N, Stein J, Hsia RY, et al. Trends and characteristics of US emergency department visits, 1997–2007. *JAMA* 2010;304:664–70.
- 3 LaCalle E, Rabin E. Frequent users of emergency departments: the myths, the data, and the policy implications. *Ann Emerg Med* 2010;56:42–8.
- 4 Riggs JE, Davis SM, Hobbs GR, et al. Association between early returns and frequent ED visits at a rural academic medical center. *Am J Emerg Med* 2003;21:30–1.
- 5 Simonet D. Cost reduction strategies for emergency services: insurance role, practice changes and patient accountability. *Health Care Anal* 2009;17:1–19.
- 6 Lishner DM, Rosenblatt RA, Baldwin LM, et al. Emergency department use by the rural elderly. *J Emerg Med* 2000;18:289–97.
- 7 Baker DW, Stevens CD, Brook RH. Determinants of emergency department use: are race and ethnicity important? *Ann Emerg Med* 1996;28:677–82.
- 8 Weber EJ, Showstack JA, Hunt KA, et al. Does lack of a usual source of care or health insurance increase the likelihood of an emergency department visit? Results of a national population-based study. *Ann Emerg Med* 2005;45:4–12.
- 9 Byrne M, Murphy AW, Plunkett PK, et al. Frequent attenders to an emergency department: a study of primary health care use, medical profile, and psychosocial characteristics. *Ann Emerg Med* 2003;41:309–18.
- 10 Brice M. Care plans for patients with frequent ED visits for such chief complaints as back pain, migraine, and abdominal pain. *J Emerg Nurs* 2004;30:150–3.
- 11 Garcia TC, Bernstein AB, Bush MA. Emergency department visitors and visits: who used the emergency room in 2007? *NCHS data brief* 2010(38):1–8.
- 12 Cypress BS. Who is the emergency room patient? An evolutionary concept analysis. *DCCN* 2010;29:182–91.
- 13 Lowe RA, Fu R, Ong ET, et al. Community characteristics affecting emergency department use by Medicaid enrollees. *Med Care* 2009;47:15–22.
- 14 Ludwick A, Fu R, Warden C, et al. Distances to emergency department and to primary care provider's office affect emergency department use in children. *Acad Emerg Med* 2009;16:411–17.
- 15 Marco CA, Weiner M, Ream SL, et al. Access to care among emergency department patients. *EMJ* 2012;29:28–31.
- 16 Fan L, Shah MN, Veazie PJ, et al. Factors associated with emergency department use among the rural elderly. *J Rural Health* 2011;27:39–49.
- 17 Fuda KK, Immekus R. Frequent users of Massachusetts emergency departments: a statewide analysis. *Ann Emerg Med* 2006;48:9–16.
- 18 Milbrett P, Halm M. Characteristics and predictors of frequent utilization of emergency services. *J Emerg Nurs* 2009;35:191–8; quiz 273.
- 19 Cook LJ, Knight S, Junkins EP Jr., et al. Repeat patients to the emergency department in a statewide database. *Acad Emerg Med* 2004;11:256–63.
- 20 Mehl-Madrona LE. Prevalence of psychiatric diagnoses among frequent users of rural emergency medical services. *Can J Rural Med* 2008;13:22–30.
- 21 Foran A, Wueth-Sarvis B, Milne WK. Bounce-back visits in a rural emergency department. *Can J Rural Med* 2010;15:108–12.
- 22 OFFICE S. *Provisional guidelines on standard international age classifications*. United Nations, 1982.
- 23 Centers for Disease Control and Prevention. *Life Expectancy [Web page]*. Atlanta, GA: Centers for Disease Control and Prevention; 2011 [updated Oct. 24th 2011; cited Nov. 8th]. <http://www.cdc.gov/nchs/fastats/lifexp.htm>
- 24 Skillman SM, Doescher MP, Mouradian WE, et al. The challenge to delivering oral health services in rural America. *J Public Health Dent* 2010;70(Suppl 1):S49–57.
- 25 Davis MM, Hilton TJ, Benson S, et al. Unmet dental needs in rural primary care: a clinic-, community-, and practice-based research network collaborative. *JABFM* 2010;23:514–22.



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