1. Wang CJ. Medical documentation in the electronic era. *JAMA*. 2012;308(20):2091-2092.
2. Wenger E. Communities of practice and social learning systems. *Organization*. 2000;7(2):225-246.
3. Quirk T. Writers should not fear jargon. *Nature*. 2012;487(7408):407.
4. Engel KG, Buckley BA, Forth VE, et al. Patient understanding of emergency department discharge instructions: where are knowledge deficits greatest? *Acad Emerg Med*. 2012;19(9):E1035-E1044.

In Reply: I agree with Mssrs Dittmar and Weller that there is a trade-off between medical jargon and vernacular language. All professions develop their own language out of necessity to communicate with colleagues quickly and to protect themselves from outsiders. It may not always be possible to make concepts more understandable for patients without sacrificing brevity or specificity. However, I disagree that clinicians are the only target audience of documentation in the electronic era, given that many health care institutions are making tethered personalized health records available to their patients. I mentioned in the article that to make any terminology accurate and appropriate for communication, "[p]erhaps it is time for medical scholars to work with consumers to define the most helpful terms for patients and families."

Moreover, not all current medical jargon is useful for clinicians or patients. For example, *wheezing* is a more specific and helpful term than *rhonchi*. Most patients with asthma would have had wheezing explained to them but not rhonchi, and not all medical practitioners can precisely define the term rhonchi when this is communicated to them by their colleagues. Terminology would also need to be updated periodically—indeed, some existing medical terms are outdated because of changes in our understanding of disease mechanisms.

As therapeutic advances reach patients, motivating patients to adhere to recommended regimens may represent "the last mile" of health care delivery. To help patients understand their disease processes and participate in shared decision making, physicians must speak the patient's language whenever possible.

The Accreditation Council for Graduate Medical Education endorses interpersonal and communications skills as a core competency,[1] and in the electronic era, this may include online communications. Patients who look up medical terms online may encounter more medical jargon that they may not be able to interpret due to limited health literacy. I hope that by making medical language less mysterious, physicians can allow patients to have more meaningful participation in their own health care. The purpose of my Viewpoint was to start this conversation. It is time to revamp the arcane system of health communications in the electronic era when many patients can use these tools to access health-related information.

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Conflict of Interest Disclosures: The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Wang reported serving on the scientific advisory board for MedicusTek, a start-up company focusing on portable primary care medical devices, and owning stock.

1. ACGME. Program director guide to the common program requirements, September 2012. http://www.acgme.org/acgmeweb/Portals/0/PDFs/commonguide/CompleteGuide_v2%20.pdf. Accessed February 8, 2013.

ONLINE FIRST

RESEARCH LETTER

The Changing Demographics of Congenital Heart Disease Hospitalizations in the United States, 1998 Through 2010

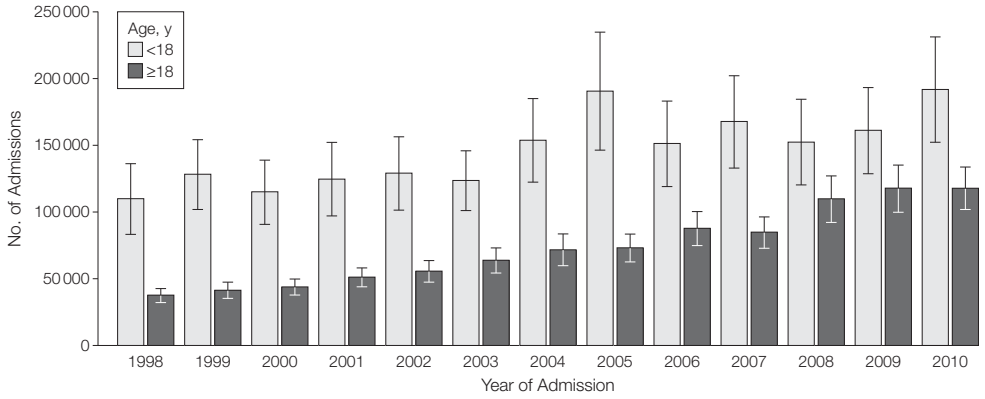
To the Editor: Congenital heart disease incidence has remained stable,[1] but longevity has improved. There are more than 787 000 adults with congenital heart disease in the United States.[2] Adults with congenital heart disease remain at risk for frequent hospitalizations.[3] We analyzed US hospitalizations from 1998 through 2010 for children and adults with congenital heart disease.

Methods. We identified congenital heart disease admissions to acute care hospitals from 1998 through 2010 using the Nationwide Inpatient Sample, a stratified 20% sample of hospitalizations, including approximately 8 million admissions annually from approximately 1000 hospitals. *International Classification of Diseases, Ninth Revision* (*ICD-9*) codes were used to identify congenital heart disease,[4] which was classified as simple, complex, or unclassified.[5] To minimize the effect of year-to-year variability, we compared the number of hospitalizations between the first and second halves of the study (January 1, 1998, through June 30, 2004; July 1, 2004, through December 31, 2010). The primary outcome was the change in number of admissions for all congenital heart disease diagnoses for pediatric (aged <18 years) vs adult patients; we also analyzed defect complexity for each age category.

Continuous variables were compared using 2-sided *t* tests and categorical variables were compared using 2-sided Rao-Scott χ^2 tests. Logistic regression, with congenital heart disease as the dependent variable, was used to test for interaction between age and time. Analyses used SAS 9.3 (SAS Institute Inc) with sampling weights to produce nationally representative estimates accounting for complex survey design and hospital clustering. Statistical significance was defined as $P < .05$. The Brigham and Women's Hospital institutional review board determined the study did not qualify as human subjects research and was exempt from oversight.

Results. The annual number of congenital heart disease hospitalizations among adults increased more quickly and consistently from 1998 through 2010 than pediatric hospitalizations (FIGURE). Adult admission volume was 87.8% higher during the second half of the study (n=622 084) compared with the first half (n=331 162), while pediatric admissions grew 32.8% (1 082 540 vs 815 471) ($P < .001$ for interaction between age group and period) (TABLE).

Figure. Annual Pediatric and Adult Congenital Heart Disease Admissions in the United States



Error bars represent 95% CIs.

Table. Changing Characteristics of US Adults and Children Hospitalized With Congenital Heart Disease From 1998 Through 2010

	Pediatric, No. (%)			Adult, No. (%)		
	January 1998-June 2004	July 2004-December 2010	*P* Value[a]	January 1998-June 2004	July 2004-December 2010	*P* Value[a]
No. of patients, mean (95% CI)	815 471 (719 105-911 836)	1 082 540 (963 564-1 201 517)		331 162 (304 193-358 132)	622 084 (576 067-668 101)	
Age, mean (95% CI), y	1.06 (0.94-1.17)	0.93 (0.81-1.04)	.02	52.8 (52.3-53.4)	56.1 (55.6-56.6)	<.001
Sex						
Female	384 040 (47.1)	509 758 (47.1)	.93	176 835 (53.4)	316 909 (50.9)	<.001
Male	431 026 (52.9)	571 729 (52.8)	.93	154 176 (46.6)	304 807 (49.0)	<.001
Length of stay, mean (95% CI), d	14.1 (13.6-14.6)	17.0 (16.3-17.6)	<.001	5.6 (5.5-5.8)	5.8 (5.7-6.0)	<.001
Insurance						
Private	415 666 (51.0)	468 668 (43.3)	<.001	147 425 (44.5)	246 650 (39.6)	<.001
Public or uninsured	399 805 (49.0)	613 872 (56.7)	<.001	183 737 (55.5)	375 434 (60.4)	<.001
Charges per admission, mean (95% CI), $[b]	51 975 (48 629-55 321)	78 674 (74 423-82 923)	<.001	28 381 (27 098-29 663)	43 346 (41 134-45 557)	<.001
Type of congenital heart disease						
Simple[c]	221 454 (27.2)	323 987 (29.9)	<.001	193 594 (58.5)	411 959 (66.2)	<.001
Isolated secundum ASD/PFO[d]	109 918 (13.5)	205 935 (19.0)	<.001	104 413 (31.5)	270 580 (43.5)	<.001
Unclassified[c]	65 813 (8.1)	59 377 (5.5)	<.001	39 469 (11.9)	60 239 (9.7)	<.001
Complex[c]	528 204 (64.8)	699 177 (64.6)	.72	98 100 (29.6)	149 886 (24.1)	<.001
Heart failure	38 827 (4.8)	49 161 (4.5)	.63	63 793 (19.3)	125 167 (20.1)	.02
Arrhythmia	33 884 (4.2)	46 744 (4.3)	.49	93 299 (28.2)	196 746 (31.6)	<.001
Cardiac surgery on bypass	90 019 (11.0)	105 668 (9.8)	.17	59 875 (18.1)	99 078 (15.9)	.009
Catheterization	45 286 (5.6)	45 049 (4.2)	.004	62 400 (18.8)	99 305 (16.0)	<.001
PFO/ASD catheter closure	2675 (0.3)	5348 (0.5)	.03	9580 (2.9)	26 494 (4.3)	.03
Diagnostic EP study	1249 (0.2)	1238 (0.1)	.08	6746 (2.0)	11 723 (1.9)	.21
≥1 Cardiac procedure	129 225 (15.9)	144 971 (13.4)	.05	116 248 (35.1)	197 354 (31.7)	<.001
Elixhauser comorbidities, mean (95% CI), No.	0.21 (0.19-0.23)	0.27 (0.25-0.29)	<.001	1.27 (1.25-1.30)	1.80 (1.77-1.83)	<.001
>2 Comorbidities	3704 (0.5)	8131 (0.8)	<.001	50 551 (15.3)	178 805 (28.7)	<.001
Chronic lung disease	20 026 (2.5)	27 378 (2.5)	.57	47 189 (14.2)	106 096 (17.1)	<.001
Chronic kidney disease	1796 (0.2)	3932 (0.4)	<.001	8812 (2.7)	51 202 (8.2)	<.001
Diabetes mellitus	625 (0.1)	833 (0.1)	.98	40 410 (12.2)	104 624 (16.8)	<.001
Depression	595 (0.1)	775 (0.1)	.89	11 783 (3.6)	35 432 (5.7)	<.001

Abbreviations: ASD, atrial septal defect; EP, electrophysiology; PFO, patent foramen ovale.
[a] *P* values reflect comparison between 1998-2004 and 2004-2010 for each age group with 2-sided *t* tests for continuous variables and Rao-Scott χ^2 tests for categorical variables using provided sample weights and accounting for the complex stratified sampling design.
[b] 1998 US dollars adjusted for Consumer Price Index inflation.
[c] Simple, unclassified, and complex congenital heart disease according to the 32nd Bethesda Conference report.[2]
[d] Simple secundum ASD/PFO was classified in the absence of other congenital heart disease or pulmonary hypertension.

Admissions for simple defects changed 112.8%, unclassified defects changed 52.6%, and complex defects 52.8% between the eras among adults, compared with changes in simple defects (46.3%), unclassified defects (−9.8%), and complex defects (32.4%) for children. Adults accounted for 36.5% (95% CI, 34.0%-38.9%) of congenital heart disease admissions in the latter era, up from 28.9% (95% CI, 26.6%-31.2%). The extent of medical comorbidity was greater among adults, though this increased significantly for both children and adults over the study period. Length of stay and inflation-adjusted hospital charges increased for both children and adults, but there was a modest decline in the proportion of admissions involving cardiac procedures among both groups (Table).

Comment. The frequency of hospitalizations for adults with congenital heart disease has grown at a rate more than twice that for children from 1998 through 2010. As a result, annual adult admissions are approaching those of children, accounting for 36.5% of all congenital heart disease admissions. While simple defects make up a greater percentage of adult admissions, a similar growth in admissions is seen for more complex congenital heart disease.

The observed trend is likely due to a number of independent forces including better congenital heart disease survival, an aging population, and accumulating comorbidities. Limited availability of quality outpatient services may also contribute.[6] Further research is warranted to understand the forces generating admissions.

Using *ICD-9* codes to define congenital heart disease has inherent limitations. For example, secundum atrial septal defects include small defects and patent foramen ovale; though these lesions are of questionable clinical relevance, they may be increasingly documented using sensitive diagnostic imaging in the context of speculation of a pathologic role in embolic events. However, the trends are not limited to simple congenital heart disease. These are hospitalization-level, not patient-level, data and will include multiple hospitalizations for a given patient. These data do not reflect the number of congenital heart disease patients, but rather the burden of congenital heart disease admissions. Because the described factors are not likely to abate, this trend may continue. Adult congenital heart disease admissions will have an increasing impact on resource utilization. Further research and focus on optimizing health care delivery is warranted to effectively care for adults with congenital heart disease.

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Study concept and design: O'Leary, Landzberg, Siddiqi, Opotowsky.
Acquisition of data: Opotowsky.
Analysis and interpretation of data: All authors.
Drafting of the manuscript: O'Leary, Opotowsky.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: O'Leary, Siddiqi, Opotowsky.
Administrative, technical, or material support: Landzberg, Siddiqi, Opotowsky.
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1. Hoffman JI, Kaplan S. The incidence of congenital heart disease. *J Am Coll Cardiol*. 2002;39(12):1890-1900.
2. Care of the adult with congenital heart disease: 32nd Bethesda Conference. *J Am Coll Cardiol*. 2001;37(5):1161-1189.
3. Somerville J. Management of adults with congenital heart disease: an increasing problem. *Annu Rev Med*. 1997;48:283-293.
4. Opotowsky AR, Siddiqi OK, Webb GD. Trends in hospitalizations for adults with congenital heart disease in the U.S. *J Am Coll Cardiol*. 2009;54(5):460-467.
5. Warnes CA, Liberthson R, Danielson GK, et al. Task force 1: the changing profile of congenital heart disease in adult life. *J Am Coll Cardiol*. 2001;37(5):1170-1175.
6. Gatzoulis MA, Hechter S, Siu SC, Webb GD. Outpatient clinics for adults with congenital heart disease: increasing workload and evolving patterns of referral. *Heart*. 1999;81(1):57-61.

CORRECTIONS

Middle Initial in Byline: In the Letter to the Editor entitled "Blood Culture Collection for Suspected Bacteremia" published in the January 23/30, 2013, issue of *JAMA* (2013;309[4]:339), a middle initial should be added to an author's name in the byline. The second name in the byline should read: "Jamil D. Bayram, MD, MPH." The article has been corrected online.

Incorrect Name in Byline: In the Original Contribution entitled "Pediatric Readmission Prevalence and Variability Across Hospitals," published in the January 23/30, 2013, issue of *JAMA* (2013;309[4]:372-380), an author name included the wrong initial. The name should have been Vincent W. Chiang. The article has been corrected online.