Published in final edited form as:

Am J Surg. 2016 March ; 211(3): 631–636. doi:10.1016/j.amjsurg.2015.12.005.

Readability of discharge summaries: with what level of information are we dismissing our patients?

Asad J. Choudhry, M.B.B.S.^a, Yaser M. K. Baghdadi, M.D.^a, Amy E. Wagie, M.H.A.^b, Elizabeth B. Habermann, Ph.D.^b, Stephanie F. Heller, M.D.^a, Donald H. Jenkins, M.D.^a, Daniel C. Cullinane, M.D.^c, and Martin D. Zielinski, M.D.^{a,*}

^aDepartment of Surgery, Mayo Clinic, 200 First Street SW, Rochester, MN 55905, USA

^bRobert D. and Patricia E. Kern Center for the Science of Health Care Delivery, Surgical Outcomes Program, Mayo Clinic, Rochester, MN, USA

^cDepartment of Surgery, Marshfield Clinic, Marshfield, WI, USA

Abstract

BACKGROUND—We assessed the health literacy of trauma discharge summaries and hypothesize that they are written at higher-than-recommended grade levels.

METHODS—The Flesch–Kincaid grade level (FKGL) and Flesch reading ease scores (FRES), 2 universally accepted scales for evaluating readability of medical information, were used.

RESULTS—A total of 497 patients were included. The mean patient age was 56 ± 22 years. Average FKGL and FRES were 10 ± 1 and 44 ± 7 , including 132 summaries classified as very or fairly difficult to read. A total of 204 (65%) patients had functional reading skills at grade levels below the FKGL of their dismissal note; only 74 patients (24%) had the reading skills to adequately comprehend their dismissal summary. Total 30-day readmissions were 40, 65% of whom were patients with inadequate literacy for dismissal summary comprehension.

CONCLUSIONS—Patient discharge notes are written at too advanced of an educational level. To ensure patient comprehension, dismissal notes should be rewritten to a 6th-grade level.

Keywords

Educational disparities; Flesch–Kincaid grade level; Health literacy; Readability; Trauma readmissions

Health literacy, which is defined as an individual's capacity to obtain, interpret, and understand information needed to make health-related decisions, is considered one of the best predictors of a person's health status.¹ Disparity between the literacy of the average US adult and patient health information is increasingly cited as a barrier to patient involvement in their own care.² Poor or limited health literacy is shown to add more than \$73 billion of

* Corresponding author. Tel.: +1-507-255-2923; fax: +1-507-255-9872. zielinski.martin@mayo.edu.

The authors declare no conflicts of interest.

Presented in part at the Minnesota Surgical Society Meeting, May 1, 2015 in Minneapolis, MN and the Midwest Surgical Association Meeting, July 26–29, 2015 in Lake Geneva, WI.

added costs to the US health care system each year.¹ Patients with poor health literacy are at a higher risk for seeking emergency care and have more frequent hospital admissions that are associated with longer lengths of stay.^{1,3,4} National adult literacy surveys show that nearly half of the US population is either “functionally illiterate,” with a reading grade level of 0 to 5, or “marginally literate,” with a grade level of $\pm$ to 8.⁵

A large portion of the US population may have deficiencies in comprehending available patient health information. Thus, the National Institutes of Health, the US Department of Health and Human Services, and the American Medical Association advise writing health information at a 6th-grade level to be effectively understood by the average adult.^{1,6,7} The aim of this study is to assess the readability of patient hospital dismissal summaries and compare this to the patient's educational level. We hypothesize that current dismissal summaries are written at higher-than-recommended grade levels. Furthermore, we highlight deficiencies and focus on areas of improvement to create patient-centered dismissal summaries with enhanced readability.

Methods

After obtaining institutional review board approval, we retrospectively searched our prospective trauma registry for all adult patients (≥ 18 years of age) admitted to the trauma service from August 1, 2014, to December 31, 2014. Exclusion criteria included all in-hospital deaths and patients not discharged from the hospital with a dismissal summary. Furthermore, as our dismissal summaries are written in English, we excluded all English as a second language (ESL) patients. Patient records were then reviewed for demographic and clinical parameters, including age, sex, race, marital status, highest level of education obtained, mechanism of injury (MOI), Injury Severity Score (ISS), hospital length of stay (LOS), and dismissal disposition. Extended LOS was defined as greater than the 75th quartile. Hospital disposition was divided into dependent (where patients would have the assistance of health care providers, eg, nursing home, outside hospital, rehab center, hospice, and home with health assistance) and independent (with no further health care assistance eg, home without health assistance) locations. Patients with a traumatic brain injury (TBI) were identified, and their Glasgow Outcome Score (GOS) on discharge was collected. The primary outcomes were hospital readmissions and documented calls to the service within 30 days from the date of discharge.

Hospital dismissal summary

Once the pertinent data were collected from the trauma registry, the hospital dismissal summary was extracted from the electronic medical record. The dismissal summary is composed of 2 sections, the first of which details the patient's hospital course with information commonly intended for care providers; this is individualized for each patient based on patient presentation and hospital course. The second section is designed for patients and consists of information for further care. This section is derived from a common template and customized to each patient given the variation in their injuries and hospital course.

Flesch readability formulas

The Flesch–Kincaid grade level (FKGL) and Flesch reading ease scores (FRES) were developed in the 1940s by Rudolf Flesch and use sentence length and word complexity to calculate the readability of a text. Longer and more complex sentences require the reader to maintain more concentration to understand the meaning of a sentence.⁸ At the same time, complex words require more effort on the part of the reader to comprehend their meaning and thus, attain a higher score. The FRES quantifies how easy it is to read the text; scores commonly range from 0 to 100, with a higher score indicating that the material is easier to read. A reading ease score less than 50 indicates that the material is difficult to read, and a score less than 30 implies that the text is very difficult to read. The service writing the dismissal summary was noted, and a comparison of readability among different services was determined.

A digital copy of the written material was made as a Microsoft Office Word 2010 file (Microsoft Corporation, Redmond, WA, USA). All additional information not directly related to patient care was deleted, and only running text was kept. After correcting for grammatical errors and spelling mistakes, the readability of the text was determined using Microsoft Office Word's built-in calculator to calculate the FKGL and FRES, 2 universally accepted scales for evaluating the readability of medical information.

Continuous data is presented with a mean $\pm$ standard deviation (and quantiles as appropriate). Categorical data are presented as counts and percentages; the chi-square test was used to assess for an association between two categorical variables. Associations between continuous and categorical variables were measured with a *t*-test, and correlation between two continuous variables was assessed with a spearman's rank correlation coefficient. The association of a binary variable with an ordinal variable (patient functional reading level) was analyzed with a Cochran Armitage Trend Test. Statistical significance was defined as a *P* value of .05. Analysis was performed using JMP version 9.0 (SAS Institute Inc., Cary, NC, USA).

Results

A total of 497 patients were included in the study cohort, of which 312 (63%) were male. A majority of the patients (467 [94%]) were white. A total of 245 (49%) of the patients were married, 245 (49%) were single, and 7 (1%) had an unknown marital status. Mean patient age was 56 ± 22 years (range, 18 to 104 years). The mean ISS and Glasgow Coma Scale scores were 11 ± 9 and 14 ± 3 , respectively. A total of 471 patients (94%) had blunt injuries, 24 (5%) had penetrating injuries, and the remaining 2 had unknown MOIs. Of the 497 patients, 259 (52%) underwent operative management for their traumatic injury; the remaining 238 (47%) had nonoperative management of their injuries.

The average LOS was 5 ± 6 days (range, 1 to 61 days). A total of 104 patients had an extended-LOS greater than 7 days. A total of 319 patients (64%) were dismissed to an independent care location, and the remaining 178 (36%) were dismissed to dependent care locations.

The mean FKGL and FRES were 10 ± 1 and 44 ± 7 (range 8.1 to 12.7 and 24.1 to 59.3), respectively, with 132 summaries (26%) classified as very or fairly difficult to read. There were no statistical differences in FKGL and FRES scores based on blunt ($10.17 + 44.43$) vs penetrating MOI ($10.10 + 44.37$), ISS ($\rho = -0.02$, $P = 0.53$), and extended ($10.24 + 43.2$) vs nonextended ($10.14 + 44.7$) LOS (all $P > .05$). The patient's dismissal summary grade level (FKGL) was not significantly related to 30-day readmissions ($P = .55$) and calls ($P = .41$) to the hospital. There was no significant difference in grade level of dismissal notes in patients who underwent operative vs nonoperative management of their traumatic injuries (10.24 vs 10.08 $P = .09$). A total of 235 (47%) of the dismissal notes were written by the trauma service, followed by 114 (23%), 108 (22%), and 40 (8%) notes written by orthopedic trauma, neurosurgery, and other miscellaneous services, respectively. Compared with other services, discharge notes from the trauma service were written, on average, at a lower grade level (9.6 vs 10.7) with a higher reading ease score (49 vs 40 ; all $P < .0001$).

TBI was noted in 188 (38%) patients. Of these, 9 (5%) had severe or moderate disability based on their GOS. The remaining 179 (95%) had good recovery from their TBI. The average FKGL and FRES of discharge notes of patients with GOS scores greater than 5 were 10.3 and 47.31, respectively. There was no statistical difference noted in FKGL of notes in patients with GOS scores of less than 5 and of a score of 5 (10.3 vs 10.1 ; $P > .05$).

Education data

Patient education data were available for 314 patients. The majority held a General Education Development degree or graduated from high school (282 [90%]). Furthermore, 70 patients (22%) had a college or postgraduate degree. Fourteen (4%) patients were "functionally illiterate," with a reading grade level of 0 to 5; 127 (40%) patients were "marginally literate," with a grade level of 6 to 8. A total of 204 patients (65%) had functional reading skills at a grade level less than the grade level their dismissal note was written at. Seventy-four (24%) patients had functional reading skills at levels above the FKGL of their dismissal note (Table 1). Of 23 patients with readmissions on whom education data were available, 15 (65%) had an educational grade level lower than that their note was written at. In addition, of the 79 patients with calls to the hospital in whom education data were available, 53 (67%) had an educational grade level lower than that their note was written at.

Total 30-day hospital readmissions and calls were 40 and 113, respectively. Reasons for readmissions and patient calls are summarized in Table 2. Thirty-five (88%) readmissions were possibly because of instructions not being understood or followed. Thirty-nine (35%) calls were from someone other than the patient. Notes for patients with or without a readmission were at the same grade level (10th-grade level). The patient's functional reading grade level was not significantly related to 30 day readmissions ($P = .30$) and calls ($P = .37$) to the hospital.

Comments

Discharge instructions are made to communicate important medical information to aid patients in the management of their own care. Nevertheless, patients may have a difficult time understanding these instructions. To our knowledge, our study is the first to compare the readability of trauma dismissal summaries to the functional reading skills of patients. We demonstrated that a majority of patients may be unable to comprehend the information they receive. Existing dismissal summaries contain information at a readability level too advanced for most patients to comprehend; the average dismissal note requires reading skills of a college graduate. Difficulty in reading discharge summaries is further confirmed by a majority of notes being classified as fairly difficult or difficult to read based on the FRES.

Readability of a written transcript is the objective measure of reading skills the individual must possess to understand that material.⁸ Typically, it is measured in terms of grade levels, eg, a text with a measured readability of 10 can be read and comprehended by someone who has reading skills of the 10th grade or higher, but may be difficult to read and comprehend by someone with reading skills of a lower grade level. Adults, on average, read 5 grade levels lower than the highest educational level obtained.⁸ In our study, 65% patients had functional reading skills lower than the grade level the note was written at. Furthermore, only 24% of patients had functional reading skills higher than required to read their dismissal summary.

Readability formulas are an indirect method of measuring literary competency skills. Other tools such as the Test of Functional Health Literacy in Adults and the Cloze method have been validated to assess literary competency skills.⁸ It is important to note, however, that no tool is without its limitations; both the Test of Functional Health Literacy in Adults and the cloze method require someone to administer the test. In addition to being time consuming, they require concentration on the part of the patient for up to 20 minutes to accurately assess literary skills.

Dismissal notes written by the trauma service were found to be at a lower grade level than notes written by other services. This is likely because of the use of more complex terminology in the more specialized fields. As a result, we recommended that health care providers explain terminology in their respective fields to aid in patient comprehension. Nevertheless, every effort should be made to ensure that all patient-oriented material is written at an appropriate level regardless of specialty. Derivation of dismissal notes differ at each institution, potentially accounting for differences in the readability of notes. In particular at our institution, the content of the first section of the dismissal summary was substantially different for each patient, but the second section (consisting of information for further care) was derived from a common template. This similarity in content of the second section may account for why we noted no statistical difference when comparing the readability of dismissal summaries based on patient injuries, hospital discourse, and dismissal locations.

Survivors of TBI are likely to have secondary disabilities from their injury, including cognitive deficits. TBI patients read at rates markedly lower than those of neurotypical

adults and often read slower than typical oral-reading rates for adults.⁹ TBI patients have a wide range of reading skills after their injury; to provide the most readable medical information, it should be written at an even lower grade level. Information at a 6th-grade level or lower has been suggested for these patients.⁹ Dismissal notes of TBI patients in our study were at the same grade level as non-TBI patients.

Although the reading skills of the intended readers should be taken into consideration, they are often overlooked when developing health information. Emphasis should be on the use of simple terms and shorter sentences. The use of active language, with clear and direct meaning, will cut overall length. In addition, inclusion of visual illustrations can have an additive effect on improving comprehension of content. Another method to improve comprehension is the direct review of dismissal summaries with patients and their care providers before dismissal. Using a “teach-back” technique, a method in which patients are asked to repeat back and explain key information or demonstrate instructions, can help health care providers be sure their patients have understood the information. Furthermore, sharing instructions with family or other care providers can improve patient understanding of notes especially if other individuals have higher functional literary skills. Finally, we strongly advise that patients are made aware of information intended for care providers and that such information is separated from content specifically for patients.

The limitations of our study primarily include the use of one formula to determine the readability of medical documents. To date, there are over 200 readability formulas that use different mathematical indices to calculate the readability of texts, though the FKGL is the most commonly used for general and medical documents.⁸ In addition, we did not include ESL patients in our study and were not able to assess their functional reading skills. As ESL patients make up a large portion of the US patient population, it would be important to assess their ability in understanding health information. Finally, we had no direct way of measuring the true literacy rates of our patients and estimated literacy based on their highest level of education obtained. In reality, patients may have both higher and lower levels of literacy than assumed.

In conclusion, patient discharge instructions are all too often written at too high of an educational level. Information should be written to the appropriate recommended grade levels of 6th grade or lower for TBI patients. Further studies are needed to determine if appropriate grade-level discharge notes will decrease readmission rates and improve quality of care.

Effective patient-centered communication is a challenging goal. However, health care providers can make substantial gains by raising awareness to match patient-oriented information to appropriate levels of literacy.

Acknowledgments

This publication was made possible by CTSA grant number UL1 TR000135 and KL2 TR000136 from the National Center for Advancing Translational Sciences (NCATS), a component of the National Institutes of Health (NIH). Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NIH.

References

1. Weiss BD. Health literacy: an important issue for communicating health information to patients. *Zhonghua Yi Xue Za Zhi (Taipei)*. 2001; 64:603–8. [PubMed: 11853212]
2. Cutilli CC, Bennett IM. Understanding the health literacy of America results of the national assessment of adult literacy. *Orthop Nurs*. 2009; 28:27–34. [PubMed: 19190475]
3. Berkman ND, Sheridan SL, Donahue KE, et al. Low health literacy and health outcomes: an updated systematic review. *Ann Intern Med*. 2011; 155:97–107. [PubMed: 21768583]
4. Eichler K, Wieser S, Brügger U. The costs of limited health literacy: a systematic review. *Int J Public Health*. 2009; 54:313–24. [PubMed: 19644651]
5. Kutner, M., Greenberg, E., Jin, Y., Paulsen, C. U.S. Department of Education. National Center for Education Statistics; Washington, DC: 2006. The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy (NCES 2006–483)..
6. National Institutes of Health. [July 1, 2015] How to Write Easy to Read Health Materials.. National Library of Medicine. Available at: <http://www.nlm.nih.gov/medlineplus/etr.html>.
7. U.S. Department of Health and Human Services OoDPaHP. National Action Plan to Improve Health Literacy. Washington DC: U.S. Department of Health and Human Services. 2010
8. Badarudeen S, Sabharwal S. Assessing readability of patient education materials: current role in orthopaedics. *Clin Orthop Relat Res*. 2010; 468:2572–80. [PubMed: 20496023]
9. Harvey J, Hux K, Scott N, et al. Text-to-speech technology effects on reading rate and comprehension by adults with traumatic brain injury. *Brain Inj*. 2013; 27:1388–94. [PubMed: 24102239]

Table 1

Patient education Levels compared to FKGL of dismissal notes

Patient's highest educational level attained	No.	%	Patient's functional reading grade level	No. of patients with educational reading grade abilities lower than the FKGL their dismissal note is written at	No. of patients with educational reading grade abilities at the same grade level that the FKGL their dismissal note is written at	No. of patients with educational reading grade abilities higher than the FKGL their dismissal note is written at
8th grade or Less	14	4	3rd grade	14	0	0
11th grade, "some high school, but did not graduate"	18	6	6th grade	18	0	0
12th grade, "high school graduate or GED"	109	35	7th grade	109	0	0
14th grade, "some college or 2-year degree"	103	33	9th grade	61	28	14
16th grade, "4-year college graduate"	33	10	11th grade	2	8	23
18-23 grade, "postgraduate studies"	37	12	13-18th grade	0	0	37
Total	314			204	36	74

FKGL = Flesch-Kincaid grade level; GED = General Education Development degree.

Table 2

Reasons for calls and readmissions

Reasons	No.	%
Worsening pain	12	30
Surgical site related	6	15
Nutrition or metabolism related	5	12
Urinary tract problem	5	12
Head injury related	4	10
Other	4	10
Fall injury	2	5
Respiratory related	1	3
Gastrointestinal system related	1	3
Total	40	100
Call reasons		
Development of new symptoms	30	27
Medication related	25	21
Pain related	21	19
Patient instruction related	17	15
Wound related	11	10
Other	9	8
Total	113	100
Who is calling		
Patient	74	66
Nurse	18	16
Spouse	9	8
Family: parent, sibling, son/daughter	6	6
Physician, therapist	6	5
Total	113	100