

BRIEF REPORT

Laypeople's (Mis)Understanding of Common Medical Acronyms

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ABSTRACT

OBJECTIVES: Abbreviations are often used in medicine yet may be a source of confusion for patients and their families. We aimed to determine the general public's understanding of commonly used medical acronyms.

METHODS: For this cross-sectional study, we surveyed state fair visitors regarding their understanding of 5 common medical acronyms. An electronic survey was administered to a volunteer sample of adults who spoke and read English and who had never trained to work in medicine or nursing. Free-text responses were coded as correct, partially correct, or incorrect by 2 independent researchers, adding a third researcher if consensus was not reached. Analysis methods included descriptive statistics, Fisher exact tests, and multivariable logistic regression models.

RESULTS: We recruited 204 volunteers (55% female; mean age 43 years; 67% had a bachelor's degree or higher). ED (emergency department) was correctly defined by 32%, PCP (primary care provider/physician) by 18%, CBC (complete blood count) by 14%, and PRN (as needed) and NPO (nothing by mouth) by 13% each. Female gender was associated with higher odds of correctly understanding NPO (odds ratio, 3.11; 95% confidence interval, 1.18–8.21; $P = .02$); older age was associated with higher odds of understanding PRN (odds ratio, 1.03; 95% confidence interval, 1.00–1.05; $P = .04$). Education level was not found to correlate significantly with successful explanation of any tested acronym.

CONCLUSIONS: Medical acronyms are a predictable source of miscommunication. In this large cross-sectional study, none of the acronyms evaluated was understood correctly by more than one-third of adults. Clinicians should avoid using acronyms with patients and families to minimize confusion.

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Minimizing the use of jargon with patients is an established best practice for clinicians, yet studies show that it remains commonly used on pediatric hospital rounds and in other health care settings.^{1–5} Although many acronyms and abbreviations are primarily intended for internal health care team communication, previous studies have shown that they are regularly used in patient encounters and medical notes that are accessible to patients and their families and represent a unique category of jargon use.^{2,3,6} Physician self-evaluation of communication skills has been shown to be flawed⁷; an important step in addressing this is improving our understanding of how well various jargon terms are understood by patients and caregivers. In a 2008 study of outpatient surgical patients assessing understanding of 10 medical terms (including 7 acronyms), Fields and colleagues identified understanding rates from 31% (MI, NPO) to 93% (EKG)⁸; however, understanding of many commonly used acronyms has not been studied. An improved awareness of which common acronyms are likely to be misunderstood will improve our ability to communicate with patients and their parents or other caregivers in hospital and clinic settings. In this investigation, we aimed to capture the understanding of common medical acronyms among a cross-section of the public. We hypothesized that although acronyms are commonly used in clinical settings,^{2,3} they would be poorly understood by the lay public.

METHODS

Setting and Survey Design

We received institutional review board approval to conduct a series of studies on adults' understanding of jargon at a state fair in August 2021. This setting was selected as an efficient opportunity to recruit a large convenience sample of lay volunteers in a nonmedical setting via our university's existing research pavilion. We created a novel survey to assess understanding of commonly used medical terminology, with a 5-question acronym subseries reported here and additional findings and methods reported elsewhere^{9,10}; survey questions were piloted informally and refined before deployment. Each question began: "Imagine your doctor tells (or asks) you the following..." followed by a sentence such as "Did you go to the ED?" or "You will need to be NPO." The 5 abbreviations assessed were ED (emergency department), NPO (*nil per os*; nothing by mouth), CBC (complete blood count), PRN (*pro re nata*; as needed), and PCP (primary care provider). We selected these acronyms based on our own experience in practice and usage noted in our previous observational study of jargon use in an inpatient pediatric setting.² Participants entered what they thought each abbreviation meant, with an option to indicate they did not know. The survey also gathered respondent demographics including age, gender, and education.

Survey Delivery Method

To assess differences in interpretation based on hearing acronyms versus reading them, we created written and verbal versions of the survey. Both versions were accessed via REDCap on

an iPad with the question prompts written out.¹¹ In the verbal version, the phrases being studied were read aloud by a voice actor and played when respondents clicked a sound file; audio excerpts could be replayed as needed.

Subject Selection and Data Collection

State fair attendees were invited to participate in the survey in exchange for a drawstring bag at our research pavilion during a 5-hour study window.¹² Survey participants were required to be at least 18 years old and comfortable completing a survey in English; volunteers who reported medical or nursing training were excluded. All willing, eligible subjects were recruited, with no maximum number. Eligible participants were randomized to complete the verbal or written survey via throw of a die. Participation was voluntary and anonymous, and participants received the gift regardless of completion.

Analysis

Answers to the survey were independently coded as incorrect, partially correct, or fully correct by 2 investigators, using a third investigator when consensus was not initially reached. For an answer to be coded as "correct," the participant needed to accurately describe the intended meaning of the acronym; direct explanation of each letter was not required.

We used descriptive statistics to summarize the survey results, calculating means and standard deviations for continuous variables and counts and percentages for categorical variables. We used Fisher exact tests to compare survey questions between written and verbal groups and multivariable logistic regression models to look for associations of a correct response with demographic group. *P* values less than .05 were considered statistically significant. SAS V9.4 (SAS Institute Inc., Cary, NC) was used for the analysis. Reporting was guided by the STROBE checklist for observational studies.¹³

RESULTS

A total of 204 subjects completed the survey; respondent demographics are presented in Table 1. Four of 5 acronyms studied (NPO, CBC, PRN, PCP) were correctly explained by fewer than 20% of subjects. Among acronyms tested, NPO was the least well understood, with 26/204 (13%) responses coded as correct. ED was the acronym most frequently defined correctly (65/204; 32%). No statistically significant differences in understanding were found between groups hearing the verbal version versus those who accessed phrases in writing, so the findings are reported in aggregate. Full descriptions of acronym findings are presented in Table 2.

Logistic regression analysis identified 2 factors associated with differences in understanding between groups. Female gender was associated with higher odds of correctly understanding the acronym NPO (odds ratio, 3.11; 95% confidence interval, 1.18–8.21; *P* = .02), and older age was associated with higher odds of understanding the acronym PRN (odds ratio, 1.03; 95% confidence interval, 1.00–1.05;

N = 204	
Age, y	
Mean (SD)	42.7 (16.6)
Median (IQR)	43 (26.5–55.0)
Range	18–82
By age group, n (%)	
18–24	47 (23.0)
25–34	26 (12.7)
35–44	34 (16.7)
45–54	44 (21.6)
55–64	30 (14.7)
65+	23 (11.3)
Gender, n (%)	
Female	113 (55.4)
Male	91 (44.6)
Education, n (%)	
Some high school	1 (0.5)
High school or GED	21 (10.3)
Associate's degree	14 (6.9)
Some college	32 (15.7)
Bachelor's degree	79 (38.7)
Graduate or professional degree	57 (27.9)

IQR, interquartile range; SD, standard deviation.

$P = .04$). Level of education was not found to correlate significantly with successful explanation of any of the 5 acronyms.

DISCUSSION

Acronyms have been shown to be a commonly used type of jargon in clinical settings.^{1–4} Because effective communication between providers and patients or families has been found to be correlated with better patient outcomes and lower costs,^{14–16} reducing potential confusion caused by acronyms is of value. To further the ability of clinicians to communicate clearly with patients and families, we surveyed a convenience sample of volunteer state fair

visitors to perform this cross-sectional study of the general public's understanding of 5 common medical acronyms. All 5 were understood by fewer than one third of respondents; the 2 commonly used Latin acronyms PRN (literally meaning *in the circumstances* and medically meaning *as needed*) and NPO (meaning *nothing by mouth*) were understood by only 13%. These Latin-based acronyms are likely especially challenging because the patient cannot reverse-engineer the meaning from the letters of the acronym. In the case of CBC, expanding the acronym to “complete blood count” could still be considered jargon, leaving patients uncertain as to what is being proposed. Indeed, in a study of adults with heart failure, although 100% understood emergency department versus 67% understanding ED, expanding MI to myocardial infarction only increased understanding from 37% to 53%, confirming that expansion of acronyms may be helpful but not sufficient.¹⁷

Although some acronyms such as PRN and CBC may be more often used between medical team members than with patients, they are frequently used in patient-accessible electronic notes. In addition, in our experience, ED and PCP are regularly used in written and oral communication with patients and their families, and NPO was used at the pediatric bedside during our previous study of inpatient rounds.² The findings we report here indicate that clinicians should avoid or exercise special care when using acronyms in discussions with patients and families. The low level of understanding identified in this study was consistent whether the information was delivered verbally or in writing, supporting the need for clinicians to be cautious about communication in either modality. This would include being thoughtful about using acronyms in clinical notes because the OpenNotes policy leads to increased patient and family access to formerly restricted written documentation.¹⁸

Much of the existing literature on jargon understanding describes surveys conducted in medical settings^{19–21}; this study was unusual in that it assessed public understanding without the contextual clues inherently present when a patient seeks medical care. In their study of surgical patients, Fields et al found that 31% of respondents understood the acronym NPO compared with 13% of our sample.⁸ Surgical patients are likely to associate the phrase NPO with their upcoming surgery, enabling contextual bias. In a different segment of our group's state fair-based survey, conducted during a separate recruitment session, the phrase “You are to have nothing by mouth”

Acronym	Correct	Partially Correct	Incorrect	Don't Know	Most Frequent Incorrect Response
	N (%)	N (%)	N (%)	N (%)	
Did you have a PCP?	37 (18.1)	0	42 (20.6)	125 (61.3)	Illicit drug
Did you go to the ED?	65 (31.9)	1 (0.5)	51 (25.0)	87 (42.6)	Erectile dysfunction
We will need to get a CBC.	29 (14.2)	9 (4.4)	39 (19.1)	127 (62.3)	Type of scan
We will make that PRN from now on.	27 (13.2)	0	44 (21.6)	133 (65.2)	Daily
You will need to be NPO.	26 (12.7)	5 (2.5)	24 (11.8)	149 (73)	No repeated incorrect response

CBC, complete blood count; ED, emergency department; NPO, *nil per os* (nothing by mouth); PCP, primary care provider; PRN, *pro re nata* (as needed).

was understood by 75% of respondents, a clear improvement over our finding regarding NPO.¹⁰ However, the misunderstanding of this wording by 1 in 4 adults argues for even clearer phrasing, such as “Do not eat or drink anything.”

One potential limitation of this study is that the recruited subject population was found to be better educated and older than the US population at large, with two thirds reporting a bachelor's degree or higher (vs. 37.9% of the US population older than age 25 years)²² and a median age of 43 years (vs. 38.8 years nationally).²³ This likely reflects bias in the population that would visit a university research building during their visit to a fair. This, along with the study's limitation to English speakers and its location in the Midwest, may limit its generalizability to other populations and settings. However, we did not identify an association between increased level of education and increased understanding of the tested acronyms. In addition, if the high level of subject education were to skew the results, it would be expected to falsely increase rates of understanding, making these low rates of understanding even more noteworthy. Another source of bias is the subjective nature of scoring free-text responses.

We selected this method to minimize subjects' ability to guess the correct response without knowing it, as would occur with multiple choice surveys. We mitigated this subjectivity by having 2 researchers separately code the responses, but it is possible it skewed the results in an unmeasured way.

CONCLUSIONS

This study demonstrates that 5 commonly used medical acronyms are poorly understood by members of the public when presented with a medical scenario without contextual clues to aid in decoding. Given that some expanded versions of medical acronyms are Latin-based or still contain jargon, further research to identify appropriate plain-language substitutions may be beneficial. Because of the importance of effective communication between clinicians and their patients, clinicians should exercise caution when using acronyms with patients and their families and should carefully monitor their communication for medical jargon.

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