Appendix

This appendix describes in more detail the New Dale-Chall readability formula, the NDC reading level conversion table, and the quality evaluation results mentioned in the paper.

1. The New Dale-Chall (NDC) formula

The original NDC readability formula published in 1995 is:[1]

$$Dale - Chall\ cloze\ = 64 - 0.95\ unfamiliar\ words^* - 0.69\ average\ sentence\ length$$

* For sample shorter than 100 words, the number of unfamiliar words should be turned into a percentage.

The formula applied in this paper is:[1,2]

$$NDC\ cloze\ score\ = 64 - (0.95 \times 100 \times \frac{n_{wd}}{n_d}) - (0.69 \times ASL)$$

  a) Nwd = n_{wd} = number of "difficult" words not matching the Dale-Chall list of "easy" words
  b) Nw = n_{wd} = number of words
  c) ASL = Average Sentence Length = number of words / number of sentences
  d) cloze score: a widely accepted index in the literature for the text readability level. It indicates the percentage of correct fill-ins for the deletion in a text during a cloze test. This test is based on the belief that readers can insert the missing words in the text based on their reading comprehension.[3,4]

2. The New Dale-Chall (NDC) reading level conversion table

Table S1. Equivalent New Dale-Chall cloze scores and reading levels

Reading Levels	Cloze Scores (x)
1	$x \geqslant 58$
2	$57 \leq x < 54$
3	$53 \leq x < 50$
4	$49 \leq x < 45$
5-6	$44 \leq x < 40$
7-8	$39 \leq x < 34$
9-10	$33 \leq x < 28$
11-12	$27 \leq x < 22$
13-15	$21 \leq x < 16$
16+	$x \leq 15$

Reading levels are the estimated reading ability levels for reading and understanding the text. The lower the reading level, the easier the text. The cloze scores were converted into reading levels

using the above mapping table, ranging from 1 (about first-grade reading level) to 16+ (college graduate level). [1]

3. Quality evaluation of patient directions

Table S2. Quality evaluation of 966 randomly selected prescription label directions

Issue category	Issues before transcription, N (%)[a]	Issues resolved, N	Issues introduced, N	Issues after transcription, N (%)[a]	P-value (McNemar's test)	Example directions on prescription labels[b]
No action verb	279 (28.9)	273	0	6 (0.6)	p < 0.001	1 tablet by mouth daily at bedtime
No dose	24 (2.5)	14	1	11 (1.1)	p = 0.002	use 4 times a day
No dose unit	72(7.5)	61	3	14 (1.4)	p < 0.001	inject 0.75 subcutaneously once every week
No route	167 (17.3)	164	11	12 (1.2)	p < 0.001	take 1 capsule once a day
No frequency	7 (0.7)	2	0	5 (0.5)	p = 0.480	take 1 tablet by mouth as needed with food
"As needed" without indication	34 (3.5)	1	2	35 (3.6)	p = 1.000	take 1 tablet by mouth twice a day as needed
"As directed" without a qualifier	26 (2.7)	2	16	40 (4.1)	p = 0.002	use as directed
Abbreviations/ Latin words/Medical jargons	221 (22.9)	210	1	12 (1.2)	p < 0.001	1 tab(s) po bid[c]
Total	849	727	34	157		

a) Some prescription label direction may contain more than one issue

b) All the example prescription label direction strings are transcribed to lower cases for easy reading

c) tab(s) = tablets, po = by mouth, bid = twice daily

Reference

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