



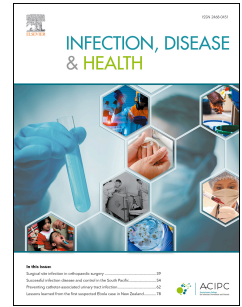
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Improving air traveller IPC health literacy through better communication: Investigation of the readability of COVID-19-related IPC traveller-facing information from 121 national and international commercial airlines

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Letter

Improving air traveller IPC health literacy through better communication:
Investigation of the readability of COVID-19-related IPC traveller-facing
information from 121 national and international commercial airlines

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Letter

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information from 121 national and international commercial airlines

22 **Dear Editor,**

23

24 Sotomayor-Castillo and colleagues report in the journal (Volume 26(2); May 2021) on travellers'
25 health concerns and attitudes towards infection, prevention and control (IPC) measures with air
26 travel during the COVID-19 pandemic [1]. From this comprehensive cross-sectional observational
27 study involving 205 individuals, airline customers (90.7%; n=186) indicated that airlines should
28 provide more information on how to prevent the spread of infection to their passengers and
29 suggested that such information would best be disseminated to passengers by email or SMS
30 messaging, together with flight-related documentation, followed by employing inflight television
31 programming [1].

32

33 Given that until this point preceding the COVID-19 pandemic, documentation and information from
34 commercial airlines to their passengers on airline-related IPC issues was sparse. With the onset of
35 COVID-19 from early 2020, airlines had to react rapidly in their duty of care to their passengers to
36 protect them from acquiring COVID-19 when travelling via commercial air travel. This protection
37 involved increasing the health literacy of passengers through the production of IPC information in
38 several modalities, as described by Sotomayor-Castillo and colleagues [1]. The vast majority of
39 airlines duly responded by amending their websites to include sections in IPC and COVID-19,
40 within a relatively short time as the pandemic emerged and evolved. However, to date, there has
41 been no quantitative evaluation of how successful these airlines websites were in terms of their
42 readability of the passenger-facing materials produced and displayed on the airlines' websites.
43 Therefore, it was the objective of this study to examine the readability of COVID-19 IPC-passenger
44 facing information displayed on commercial airline websites.

45

46 Commercial airlines (n=121) were identified on the Skytrax website (<https://skytraxratings.com/>)
47 and each of their individual websites were visited and assessed digitally for their readability during

48 the period February – April 2022. From their main website, specific COVID-19 related URLs were
49 identified for each airline. These were freely available and in the public domain. To ascertain the
50 readability scores, the online subscription software package, Readable (www.readable.com) was
51 used. Readable has been used recently in studies as a tool to measure the readability of healthcare
52 materials [2,3]. Four readability metrics were selected, including two reading grade levels and two
53 readability scoring systems (Table 1), as well as four text parameters (word count, sentence count,
54 words per sentence and syllables per word). Table 1 details the results of these readability scores
55 and text parameters from the 121 airline URLs examined and Figure 1 shows the range of values
56 obtained with the Flesch Reading Ease metric. There was a wide variation in all readability
57 parameters examined. Only 30 (30/121; 24.8%), approximately a quarter of airlines managed to
58 provide COVID-19 related information that was deemed easy to read (score >60) and the mean
59 readability score for the Flesch-Kincaid Grade Level, the Gunning Fog and the SMOG scores fell
60 short of the target values (Table 1). The Flesch-Kincaid Grade Level is equivalent to the US grade
61 level of education and shows the required education to be able to understand a text. Text intended
62 for readership by the general public should aim for a grade level of around 8, equivalent to a
63 schooling age 13 to 14 years. Some airlines directed their passengers to their national health
64 authority for up-to-date advice and guidance on COVID-19, in accordance with evolving local
65 legislation. However, some of this information was prepared rapidly for healthcare professionals,
66 which suffered from poor readability scores for general public readership. Airlines should therefore
67 appreciate that while such websites will be accurate and current, they may lack good readability
68 properties amongst their passenger readership.

69

70 Readability is an objective measure of the reading skills an individual must possess to aid in the
71 understanding of the material being read, but does not account for reader motivation and ability to
72 comprehend information as described in health literacy models [4]. Readability measures are useful
73 formulae that can score or grade a written text based on several text parameters, as detailed in Table

74 I. For a seminal review of readability metrics, the reader is referred to Badarudeen and Sabharwal
75 [5]. Several online readability calculators are now available as a basic tool to help authors estimate
76 the readability of their written text and offer the ability to change their text in real time, but it must
77 be noted that readability formulae have their limitations [6]. With the rapid emergence and
78 evolution of the COVID-19 pandemic, commercial airlines had little time to respond to a relatively
79 unfamiliar topic, as well as providing passenger support through developing digital supports in the
80 form of IPC-related websites.

81

82 In our study, the mean Flesch Reading Ease score was 54.0 (Table 1). When we compare this to
83 other studies which have examined the readability of airline websites outside of COVID-19, this
84 provides some insight into how well airlines produce website content, which they have unlimited
85 time to prepare, as well as knowing the subject materials well, for example luggage information,
86 identification information and information on travel delays. A study of nine Indian airlines
87 published in 2019 (pre-COVID-19) showed that the mean Flesch Reading Ease score was 67.9 for
88 seven of the airlines, which had fairly comparable scores, with the other two airlines receiving
89 scores of 3.6 and -62.2, which could be considered outliers and outside the normal range [7]. This
90 score of 67.9 was 25.7% higher than the COVID-19 IPC score and could suggest that airlines were
91 better at preparing content that they are more familiar with and having sufficient time to prepare,
92 i.e. not under emergency pandemic conditions.

93

94 Whilst the readability mean targets were not reached by airline websites, they fell short only by a
95 small margin, indicating that with careful rewording, these mean readability parameters could be
96 reached with relative ease. How could this be achieved? Airlines and other travel providers should
97 become familiar with digital tools such as readability calculators. Adoption of such readability
98 calculators and scrutiny of materials by airlines and other travel providers during drafting and
99 preparation of such materials will help 'lay-check' and develop IPC materials with improved

100 readability for passengers, potentially leading to improved health literacy and IPC awareness
101 amongst travellers. Additionally, developing collaborations between airlines and IPC professionals
102 and networks would assist airlines and travel providers in producing optimal materials for their
103 passengers. The conveyance of scientific information to a non-scientific audience has become
104 increasingly important and popular today, particularly within healthcare and for IPC purposes. IPC
105 teams have now become articulate in the transfer of knowledge and guidance to patient
106 stakeholders, their carers and their families in lay terms and IPC professionals act as conduits of
107 such information transfer from the peer-reviewed evidence base to practical IPC guidelines for the
108 lay audience [8].

109

110 In conclusion, well-written IPC information on airline websites, with a good readability score may
111 assist passengers to better understand the content, which may in turn improve their knowledge,
112 attitude and practices around infection control and prevention whilst travelling.

113

114 **Ethical Considerations:**

115 Ethical approval is not required as no humans nor animals were involved in this study.

116

117 **Funding:**

118 None

119

120 **Conflict of Interest:** None

121

122 **Authorship Statement:**

123 All authors were involved in the draft and revision of this paper.

124

125 **Availability of data and material:** None available

126

127

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Table 1: Analysis of readability score and text parameter metrics of COVID-19 IPC information displayed on commercial airline websites (n=121)

	Readability Metric				Text Parameter			
	Flesch Reading Ease ^{a,b}	Flesch-Kincaid – Grade Level ^{c,d}	Gunning Fog score ^c	SMOG score ^c	Word count	Sentence count	Words per sentence	Syllables per word
Mean	54.1	9.0	10.9	11.7	890.6	71.2	13.3	1.6
Standard Error	0.7	0.1	0.2	0.1	53.8	4.6	0.3	0.01
Range	32.7 – 74.3	4.3 – 15.3	5.3 – 17.6	6.9 – 16.5	140 - 4712	13 - 322	3.5 – 26.7	1.4 – 1.9

^a Target score = >60

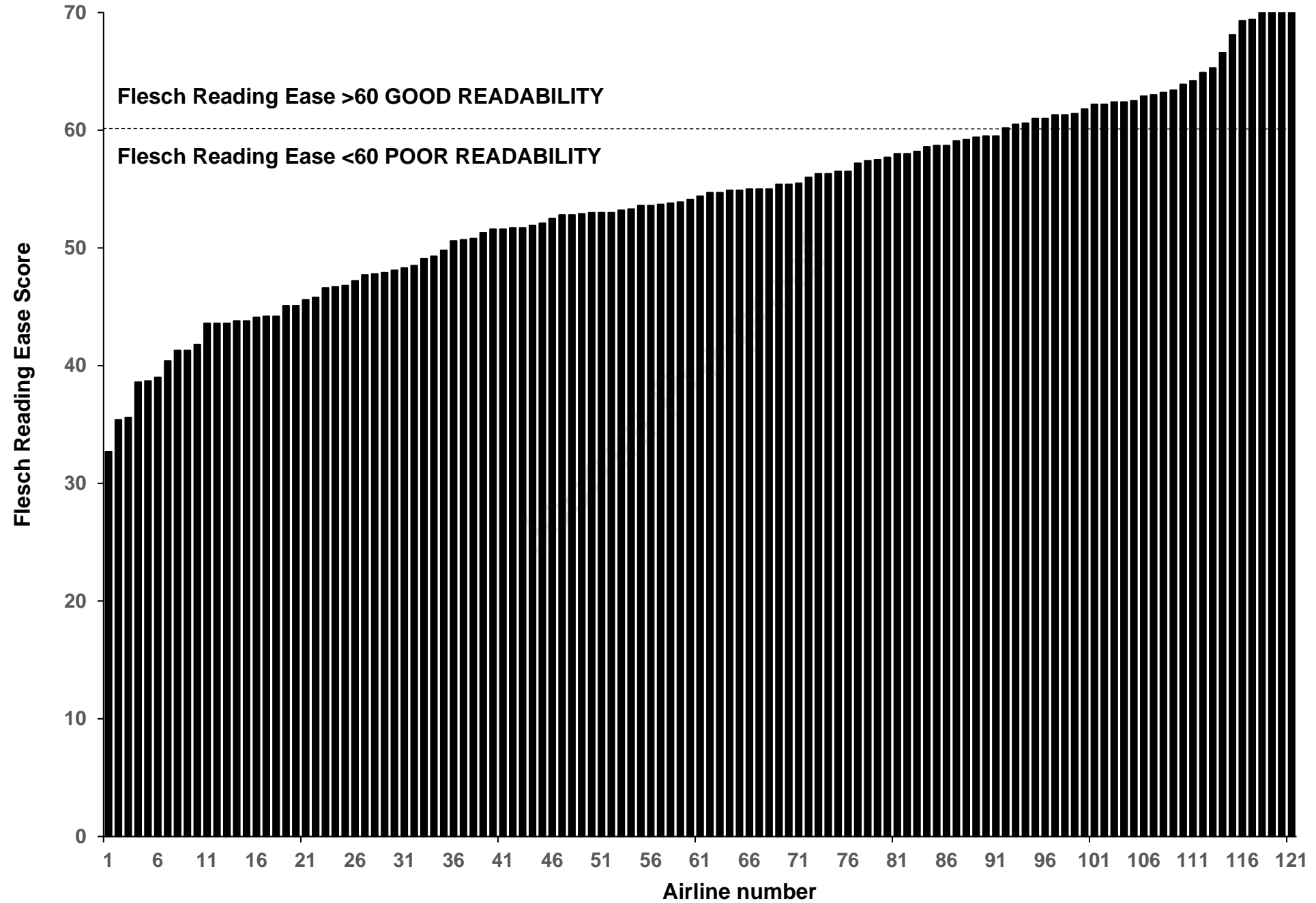
^b

$$206.835 - 1.015 \left(\frac{\text{total words}}{\text{total sentences}} \right) - 81.6 \left(\frac{\text{total syllables}}{\text{total words}} \right)$$

^c Target score = <8-10

^d

$$0.39 \left(\frac{\text{total words}}{\text{total sentences}} \right) + 11.8 \left(\frac{\text{total syllables}}{\text{total words}} \right) - 15.59$$



HIGHLIGHTS

- Commercial airlines websites (n=121) providing COVID-19 IPC information were examined
- Recommended readability targets not reached.
- Only ¼ of airline IPC-related websites examined had good readability
- Mean Flesch Reading Ease score = 54.1 (Target >60); Mean Flesch-Kinkaid Grade Level = 9 (Target <8)
- Need for further work to improve readability of IPC information on airline websites

CRediT Authorship Statement:

Janssen Garcia

Data curation; Formal analysis; Investigation; Methodology; ; Writing – review & editing.

John E Moore

Conceptualization; Data curation; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing – original draft; Writing – review & editing.

Beverley C Millar

Conceptualization; Data curation; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing – original draft; Writing – review & editing.