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Reading ability among patients presenting for ophthalmic and non-ophthalmic surgery

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It is important for patients to have the ability to read written healthcare information for both medical and legal purposes. Patients who have difficulty reading written instructions are at higher risk for preventable hospitalizations and emergency room visits,^{1,2} report difficulty understanding instructions on medication bottles,³ have worse self-rated health,² and have worse overall health outcomes.¹ Here, we assessed reading ability using several parameters in a group of patients undergoing ophthalmic and non-ophthalmic surgery.

All study procedures were approved by the Institutional Review Board of Johns Hopkins Hospital, adhered to the tenants of the Declaration of Helsinki, and were HIPAA-compliant. One hundred thirty-eight patients undergoing ophthalmic surgery (average age 64.4 [15.4]) and 138 patients undergoing outpatient non-ophthalmic surgery (average age 50.4 [18.8]) at a single institution were enrolled. Informed consent was obtained from all study participants. Patients had to be greater than 18 years of age, communicate in English, and be literate by self-report. Patients were tested wearing the same correction used when signing their anesthesia consent form with 1M sized text. Two patient groups were identified and analyzed separately: (1) those tested with their habitual correction (i.e. reported wearing glasses and were tested with these glasses, or they did not habitually wear glasses and had no glasses during testing), and (2) those tested without their habitual correction (reported wearing glasses but did not have access to these glasses during testing).

The MNRead test was used to quantify measures of reading ability including logMAR reading acuity, where logMAR is the log of the minimum angle of resolution, and logMAR critical print size is defined as the smallest print size supporting a reading speed of 50% of the maximum reading speed.⁴ While other papers have defined critical print size as 70%—80% of maximum reading speed, a lower cut off was chosen since it is adequate for patients to read the consent at half maximum reading speed.

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Average reading acuity among ophthalmic patients with and without their habitual correction was 0.26 (0.34) and 0.44 (0.27) logMAR units respectively ($p<0.001$), with 30% and 62% demonstrating a reading acuity worse than 0.4 logMAR units, which would enable reading of the 1M print of the consent material ($p=0.02$). Among non-ophthalmic patients, the average reading acuity was 0.09 (0.25) and 0.25 (0.28) logMAR units for patients with and without their habitual correction ($p<0.001$), respectively, with 2% and 28% demonstrating a reading acuity worse than 0.4 logMAR units ($p=0.003$).

Average critical print size among ophthalmic patients with and without their habitual correction was 0.28 (0.30) and 0.49 (0.24) logMAR units respectively ($p<0.001$), with 34% and 67% demonstrating a critical print size worse than 0.4 logMAR units ($p=0.005$). Among non-ophthalmic patients, the average critical print size was -0.01 (0.19) and 0.28 (0.25) logMAR units for patients with and without their habitual correction, respectively ($p<0.001$), with 2% and 39% demonstrating a critical print size worse than 0.4 logMAR units ($p=0.02$).

Average maximum reading speed (words/minute) among ophthalmic patients with and without their habitual correction was 206 (78) and 192 (76) respectively ($p=0.27$). Among non-ophthalmic patients, the average maximum reading speed was 269 (126) and 246 (68) ($p=0.46$) for patients with and without their habitual correction, respectively.

The time required to read the 685-word anesthesia consent form (1M text), and the time required to read a theoretical consent form with larger print (2M text) were estimated based on the patient's reading speed at the relevant text sizes. Thirty of 66 ophthalmic (45%) and 3/5 (60%) non-ophthalmic patients who were modeled to require more than 10 minutes to fully read the consent form would have been able to read the larger print consent form in under 10 minutes.

One potential limitation in this study is that patients were not observed reading the actual consent form as out-loud reading for a sustained period would not be practical. Further, the necessary text size to enable reading could not have been determined as the consent form only contains one text size. The consent form is also of a higher literacy level than the MNRead sentences, such that our modeled time to read the consent form may be underestimated.

When considering reading acuity, critical print size, and modeled consent form reading time as outcomes of reading ability, high rates of reading difficulty are found, especially among ophthalmic patients and patients asked to read and sign consent material without their habitual correction. Of note, there was a sizeable cohort of patients unable to read 1M sized text who were able to read print twice as large (34/49 and 4/4 ophthalmic and non-ophthalmic patients respectively or 69% and 100%). Given these results, we would advocate for 1) providing patients with the option of large size print, electronically or on written documentation, and 2) ensuring that patients wear their refractive correction (or have correction provided), when patients need to review and sign any written documentation. These results are relevant not only for consent forms, but also pre- and post-operative instructions, medications labels, and other documentation of medical importance.

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Figure 1.

Proportion of ophthalmic and non-ophthalmic patients able to read a consent form at varying text sizes

Legend: Modeled ability to read a consent form among a group of ophthalmic and non-ophthalmic patients with and without their habitual correction based on their observed ability to read the MNRead chart. (A) Ophthalmic patients (B) Non-ophthalmic patients