Fasting Status of Patients Undergoing Ambulatory Laboratory Testing

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Many studies use glucose values from electronic medical record data to identify patients with prediabetes and diabetes (1–3). Since diagnostic criteria are based on fasting glucose (4), investigators often choose to assume that patients were fasting if phlebotomy was performed in the morning. We sought to assess the validity of the assumption that outpatient morning measurements are fasting measures.

We surveyed adult patients (age ≥18 years) presenting for phlebotomy at the Johns Hopkins Outpatient Center between 7:00 A.M. and noon over 2 weeks in November 2018. Patients responded to a four-question written survey provided by the registration staff. The survey asked *1*) about their fasting status, *2*) whether the ordering provider instructed them to fast, *3*) whether they were getting a glucose and/or cholesterol test ("If you know which blood test(s) you are getting done, please select ones that are included on the list below," with answer options of "glucose" and "cholesterol panel"), and *4*) what time they presented to the laboratory. We defined fasting status as "nothing to eat or drink 8 h before the test except for water." Anticipating a fasting status of 70%, we estimated that we would need 500 respondents to be within 5% of the estimate. We tested the association between fasting status and time of morning and between fasting status and type of laboratory test with χ^2 tests. This study was approved by the Johns Hopkins University Institutional Review Board.

Of 493 survey respondents who presented to the laboratory between 7:00 A.M. and noon, 49% (95% CI 45–54%) reported that they had fasted. Patients presenting earlier versus later in the morning were more likely to be fasting, with 65% (95% CI 55–74%) fasting between 7:00 and 8:00 A.M. compared with 31% (95% CI 16–50%) fasting between 11:00 A.M. and noon (P trend <0.001) (Fig. 1). Among those who had fasted, 48% (95% CI 42–55%) reported that their provider had advised them to fast. Of those respondents instructed to fast, the majority (90% [95% CI 84–95%]) had fasted. Overall, more respondents who reported that they were having a glucose and/or cholesterol measurement had

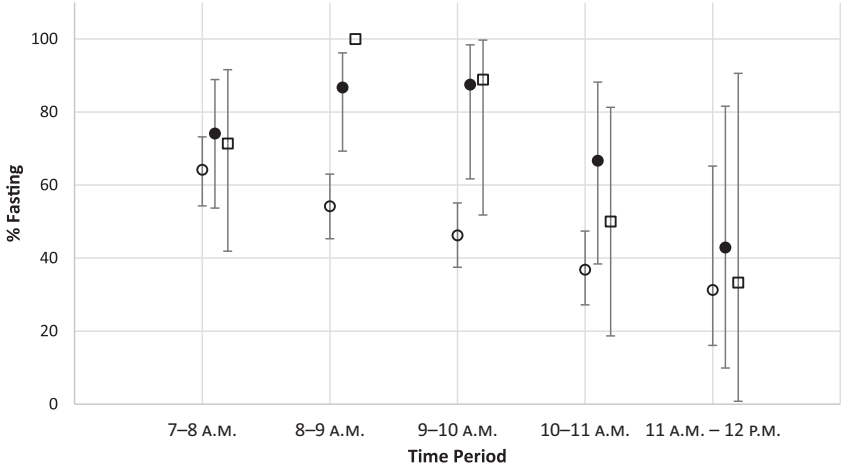

Figure 1—By time of day, the percentage of patients who were fasting among all respondents (white circle), those receiving a glucose test (black circle), and those receiving a glucose and/or cholesterol test (white square). Vertical lines represent 95% CIs.

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fasted (76% [95% CI 68–82%]) relative to those having other testing (37% [95% CI 32–43%]; $P < 0.001$). The prevalence of fasting among those reporting a glucose and/or cholesterol measurement before 10:00 A.M. was 80% (95% CI 71–86%).

We are unaware of other studies that have examined the fasting status of patients presenting for laboratory testing in an ambulatory setting. Studies using electronic medical record data often cannot explicitly confirm that the measured glucose data are truly fasting values. Simply assuming that glucose measurements represent fasting values could undermine the validity of using "fasting" glucose data from electronic medical records for identifying individuals with diabetes, prediabetes, and other related conditions that require fasting values.

Our analyses have limitations. Our findings are from a large, academically affiliated testing site and may not be generalizable to other settings. Patients may have had recall bias about the type of testing they were scheduled for and whether the ordering provider had instructed them to fast.

Our survey of patients demonstrated that about half of patients presenting to a large, academically affiliated site for phlebotomy in the morning had fasted. Glucose and cholesterol measures before 10:00 A.M. were more likely than not to be fasting. The reported range of fasting patients may help investigators explore the impact of misclassification of patient fasting status in studies. Use of other variables in the electronic health records besides those identified in our study may enhance the accuracy of using ambulatory glucose data for population studies of diabetes and prediabetes.

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