American Society of Clinical Psychopharmacology Corner
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Inaccurate Prescribing Warnings in Electronic Medical Record Systems: Results From an American Society of Clinical Psychopharmacology Membership Survey

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Electronic prescribing is widespread. All states allow it, and some states mandate it for all practitioners. In addition, many institutions now require electronic prescribing. It is common for electronic prescribing systems to use computerized decision support algorithms that give prescribers automated warnings or alerts at the time of prescribing if a potential prescribing error is identified regarding, for example, dosing, drug interactions, or contraindications.

Some prior studies suggest that electronic prescribing alerts may reduce prescribing errors and thus can be clinically useful.[1] However, other studies caution that these alerts may have substantial limitations and that clinicians often consider them clinically irrelevant.[2–4] For example, a study conducted in academic primary care settings found that more than one-third of prescribing alerts were judged invalid, based on scientific data, published drug information, or clinical utility.[2] Studies also indicate that clinicians commonly override such warnings.[2,3,5] In the previously noted study, clinicians overrode 85%–96% of prescribing alerts (depending on the type of alert).[2] Another study further suggested that psychiatrists may be more likely than other physicians to receive and override warnings; among 49 psychiatrists, 27.5% of all prescribing attempts generated a warning about a drug interaction (compared to 1.2%–8.2% for other specialties), of which psychiatrist prescribers accepted only 5.3% (ie, they did not override, cancel, or change the prescription).[5] Harmful unintended consequences of such prescribing alerts have also been described—for example, clinically important treatment delays when immediate drug therapy was needed.[6]

Despite this topic's importance, few studies have examined the accuracy of automated prescribing warnings in electronic prescribing systems; to our knowledge, no prior study has focused primarily on prescribing of psychotropic medications. This report presents results from a survey of members of the American Society of Clinical Psychopharmacology (ASCP), a specialty society that advances the science and practice of clinical psychopharmacology, regarding automated warnings generated by electronic prescribing systems.

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J Clin Psychiatry 2019;80(2):18ac12536

To cite: Phillips KA, Citrome L. Inaccurate prescribing warnings in electronic medical record systems: results from an American Society of Clinical Psychopharmacology membership survey. *J Clin Psychiatry.* 2019;80(2):18ac12536.

To share: https://doi.org/10.4088/JCP.18ac12536

METHODS

The authors developed a 30-item survey that obtained information about prescribers' experience with prescribing warnings in electronic medical record prescribing systems. The survey included questions on respondent demographic characteristics, practice characteristics, electronic prescribing systems used, perceived errors in automated electronic prescribing warnings, ability to override prescribing warnings, and related questions. The survey also elicited optional comments. The survey was hosted by SurveyMonkey, a free online tool,[7] and was sent to all current active ASCP members (N = 1,223). Summary statistics were calculated.

RESULTS

A total of 118 ASCP members from 33 states completed the survey (9.6% response rate). A majority of respondents (56.8%) were aged 55–74; 72.4% were male. An electronic prescribing system was used by 78.0% of respondents; 15.9% used more than 1 system. Overall, respondents used a total of 31 different electronic prescribing systems. Use of an electronic prescribing system was mandatory in the state, institution, or practice setting of 43.2% of respondents. Regarding the number of electronic prescriptions written per year, the most commonly endorsed option was "≥ 901" (33.9%).

Supplementary Figures 1–9, available online, show key survey results. Among those who electronically prescribe, 83.1% reported that their electronic prescribing system provides automated warnings at the time of prescribing if the system detects a potentially problematic prescription. Among these individuals, one-third believed that their system has provided incorrect warning information, and one-third of this latter group believed that warnings were inaccurate 50% or more of the time.

Types of information in prescribing alerts that clinicians considered inaccurate were dosing range (54.2% of respondents), drug interactions (50.0%), contraindications (41.7%), dosing frequency (37.5%), dosing time (12.5%), indications (12.5%), and other (8.5%).

The following are examples of erroneous prescribing alerts:

- *The maximum daily dose of fluoxetine is 40 mg/d.*
- *Fluoxetine should not be combined with clonazepam.*
- *Three doses a day of venlafaxine XR 37.5 mg exceeds the recommended maximum of 1 dose a day.*
- *Prescribing bupropion and fluoxetine concurrently is contraindicated.*
- *Aripiprazole is contraindicated for patients ages 6 through 18.*
- *Serotonin reuptake inhibitors are contraindicated for patients under age 18.*

In addition, some electronic prescribing systems do not allow users to prescribe low doses of medications that have the potential for dependence and abuse—for example, less than 5 mg of amphetamine/dextroamphetamine twice a day.

Some respondents noted that although some warnings are not inaccurate, they are not useful and can interrupt workflow. Examples are:

- Warnings about duplicate therapy when prescribing 2 different dosage strengths of the same medication;
- Warnings when prescribing trazodone as a hypnotic in combination with an antidepressant;
- Warnings when prescribing both disulfiram and naltrexone for alcohol use disorder.

Among the respondents who perceived some warnings to be inaccurate, 95.8% stated that their system allows them to explain their rationale for the prescription or to override the warning, thereby enabling them to prescribe the desired medication despite the warning. However, a majority reported being unable to alert the system that the prescribing warning was incorrect.

Regarding the burden of managing inaccurate prescribing data alerts (eg, time required for extra steps needed to complete prescriptions), only 4.2% (1 person) indicated that such warnings were not at all burdensome; 45.8% reported slight burden, 45.8% reported moderate burden, and 4.2% (1 person) reported severe burden.

DISCUSSION

The results of this survey indicate that a substantial proportion of prescribing clinicians with an interest in psychopharmacology believe that their electronic prescribing system has provided incorrect prescribing warnings. It is particularly puzzling and problematic that, as illustrated by the above examples, some warnings do not reflect product labeling information—for example, information pertaining to maximum medication dose or contraindications.

Such errors potentially have profound consequences. For example, the erroneous warning that serotonin reuptake inhibitor medications and aripiprazole are contraindicated for children and adolescents may cause inadequate treatment of potentially life-threatening conditions in this age group, such as major depressive disorder. Presently, serotonin reuptake inhibitors and aripiprazole have multiple FDA-approved indications in youth. Erroneous alerts may be especially problematic when encountered by prescribers who do not have expertise in prescribing psychotropic medication and thus may not recognize their inaccuracy.

Most respondents indicated that they could override warnings and prescribe the desired medication despite the warning. Previous studies indicate that physicians often ignore or override prescribing warnings,[2,8,9] most commonly because the problem was already known to the physician, the benefit of the medication was judged to be greater than the risk, or the warning was considered not clinically important.[3] Our results additionally suggest that inaccuracy of automated warnings might be relevant to clinicians' nonacceptance of warnings.

It is concerning that most respondents reported being unable to alert the system about the inaccuracy of a prescribing warning. Of note, half of survey respondents reported that requirements to override or otherwise respond to alerts were at least moderately burdensome. Other authors have noted the potential for workflow interruption and "alert fatigue," due to the sheer volume of alerts, which may desensitize clinicians to warnings and lead them to ignore or override clinically important prescribing problems.[3,10]

Despite these problems, automated electronic prescribing alerts are potentially very useful.[1,11,12] Medication errors and adverse drug events are common, costly, and clinically important,[10] and accurate warnings have been shown to substantially reduce the frequency of such errors,[12] although the impact on clinical outcomes is less well established.[13,14] A limitation of our survey is that it did not assess the perceived usefulness of electronic prescribing alerts or the balance of perceived benefits versus perceived risks.

Other study limitations include the low survey response rate, which may have introduced bias. In addition, some questions had a small number of responses. Furthermore, the survey did not provide definitions or examples for terms such as "inaccurate," and we do not know whether all alerts considered erroneous by survey participants were actually erroneous. Because many different electronic prescribing systems were used, relative to the number of survey responses, we did not examine perceived errors in specific prescribing systems, and we cannot conclude that all or most electronic systems used by survey respondents contain such errors. Finally, relatively few examples of erroneous warnings were provided, and we cannot assume that they are representative of all alert errors.

In conclusion, this survey suggests that incorrect prescribing alerts for psychotropic medications may be common. Additional studies of this important topic are needed, especially given increasing use of electronic prescribing and the potentially detrimental clinical consequences of inaccurate prescribing warnings.

Published online: December 4, 2018.

Potential conflicts of interest: In the past 36 months, **Dr Phillips** has received research and/or salary support from the National Institute of Mental Health and the National Institute of General Medical Sciences; royalties/honoraria from Oxford University Press, UpToDate, Merck Manual, Guilford Publications, International Creative Management, Inc, Aesculap Academia (Braun Medical Limited), Royal Pharma, and Wheeler, Trigg, O'Donnell, LLP; and speaking honoraria/travel reimbursement from academic institutions and professional organizations. In the past 12 months, **Dr Citrome** has engaged as a consultant with Acadia, Alkermes, Allergan, Indivior, Intra-Cellular Therapeutics, Janssen, Lundbeck, Merck, Neurocrine, Noven, Osmotica, Otsuka, Pfizer, Shire, Sunovion, Takeda, Teva, and Vanda and as a speaker for Acadia, Alkermes, Allergan, Janssen, Lundbeck, Merck, Neurocrine, Otsuka, Pfizer, Shire, Sunovion, Takeda, and Teva; owns stocks (small number of shares of common stock) in Bristol-Myers Squibb, Eli Lilly, Johnson & Johnson, Merck, and Pfizer purchased > 10 years ago; and has received royalties from Wiley (Editor-in-Chief, *International Journal of Clinical Practice*), UpToDate (reviewer), and Springer Healthcare (book).

Funding/support: No external or commercial funding was used in the execution and reporting of this survey.

Acknowledgments: The authors thank Lindsay Snyder, Parthenon Management Group, for assistance with survey development and implementation; Parthenon Management Group provides administrative support for the American Society of Clinical Psychopharmacology.

Supplementary material: Available at PSYCHIATRIST.COM.

Drs Phillips and Citrome are members of the Board of Directors of the American Society of Clinical Psychopharmacology.

REFERENCES

1. Kaushal R, Shojania KG, Bates DW. *Arch Intern Med*. 2003;163(12):1409–1416.
2. Weingart SN, Toth M, Sands DZ, et al. *Arch Intern Med*. 2003;163(21):2625–2631.
3. Tamblyn R, Huang A, Taylor L, et al. *J Am Med Inform Assoc*. 2008;15(4):430–438.
4. Spina JR, Glassman PA, Belperio P, et al; Primary Care Investigative Group of the VA Los Angeles Healthcare System. *Am J Med Qual*. 2005;20(1):7–14.
5. Isaac T, Weissman JS, Davis RB, et al. *Arch Intern Med*. 2009;169(3):305–311.
6. Strom BL, Schinnar R, Aberra F, et al. *Arch Intern Med*. 2010;170(17):1578–1583.
7. SurveyMonkey website. https://www.surveymonkey.com/.
8. Payne TH, Nichol WP, Hoey P, et al. *Proc AMIA Symp*. 2002:602–606.
9. Hsieh TC, Kuperman GJ, Jaggi T, et al. *J Am Med Inform Assoc*. 2004;11(6):482–491.
10. Zenziper Y, Kurnik D, Markovits N, et al. *Isr Med Assoc J*. 2014;16(5):289–294.
11. Schedlbauer A, Prasad V, Mulvaney C, et al. *J Am Med Inform Assoc*. 2009;16(4):531–538.
12. Radley DC, Wasserman MR, Olsho LE, et al. *J Am Med Inform Assoc*. 2013;20(3):470–476.
13. Black AD, Car J, Pagliari C, et al. *PLoS Med*. 2011;8(1):e1000387.
14. Bates DW. *Arch Intern Med*. 2010;170(17):1583–1584.

To view more survey results, see supplementary material at PSYCHIATRIST.COM.

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THE JOURNAL OF
CLINICAL PSYCHIATRY
THE OFFICIAL JOURNAL OF THE AMERICAN SOCIETY OF CLINICAL PSYCHOPHARMACOLOGY

Supplementary Material

Article Title: Inaccurate Prescribing Warnings in Electronic Medical Record Systems: Results From an American Society of Clinical Psychopharmacology Membership Survey

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DOI Number: 10.4088/JCP.18ac12536

List of Supplementary Material for the article

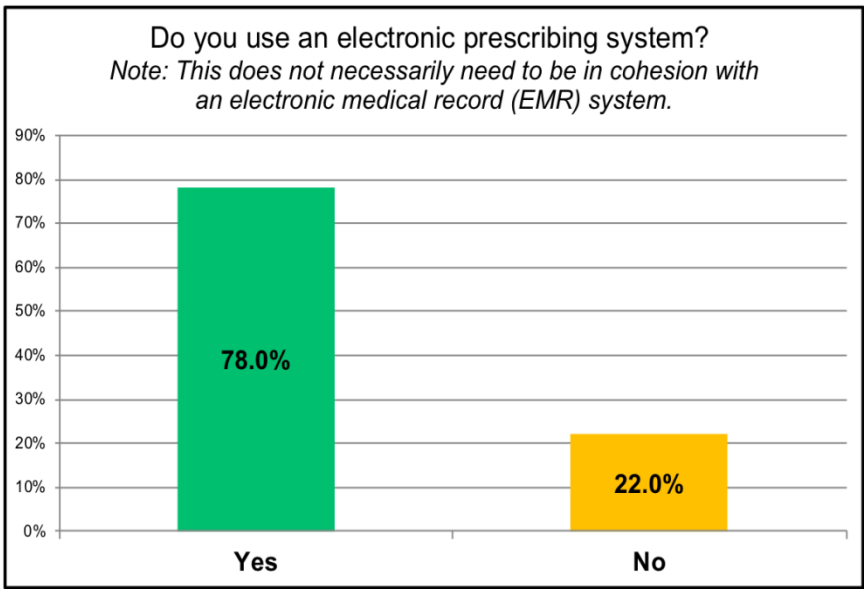
1. Figure 1 — Do You Use an Electronic Prescribing System?
2. Figure 2 — Is Using an e-Prescribing System Mandatory in Your State, Institution, or Any of Your Practice Settings?
3. Figure 3 — Does This e-Prescribing System Give You a Warning if It Thinks That Your Prescription Is Problematic in Some Way?
4. Figure 4 — Do You Believe That Your e-Prescribing System Has Provided Incorrect Information?
5. Figure 5 — What Proportion of These Prescribing Warnings Do You Believe Are Not Accurate?
6. Figure 6 — How Burdensome Are Incorrect Prescribing Alerts?
7. Figure 7 — What Prescribing Information Is Incorrect?
8. Figure 8 — If You Receive a Prescribing Warning That You Consider Inaccurate, Does This e-Prescribing System Allow You to Provide an Explanation or Override?
9. Figure 9 — If Yes, Does It Allow You to Indicate That the Prescribing Warning Is Wrong (if You Believe This Is the Case)?

Disclaimer

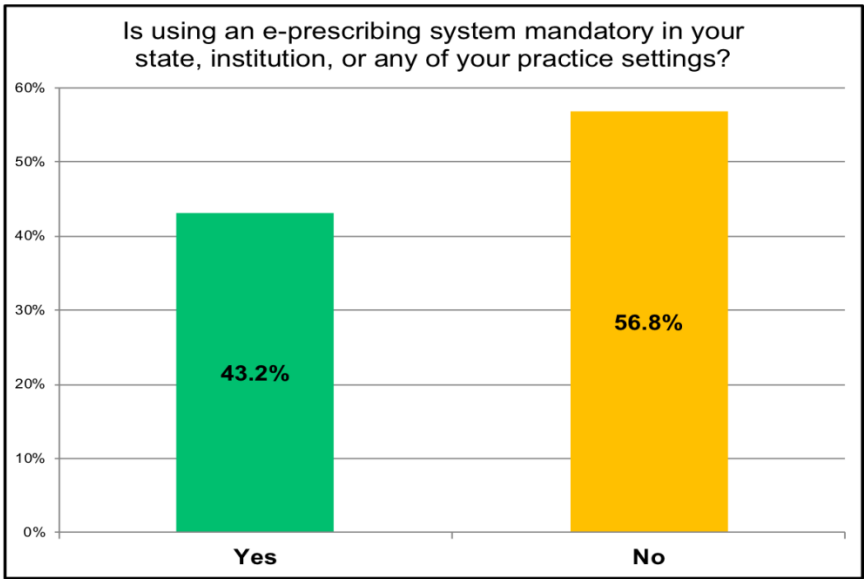
This Supplementary Material has been provided by the authors as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the authors.

Data Supplement

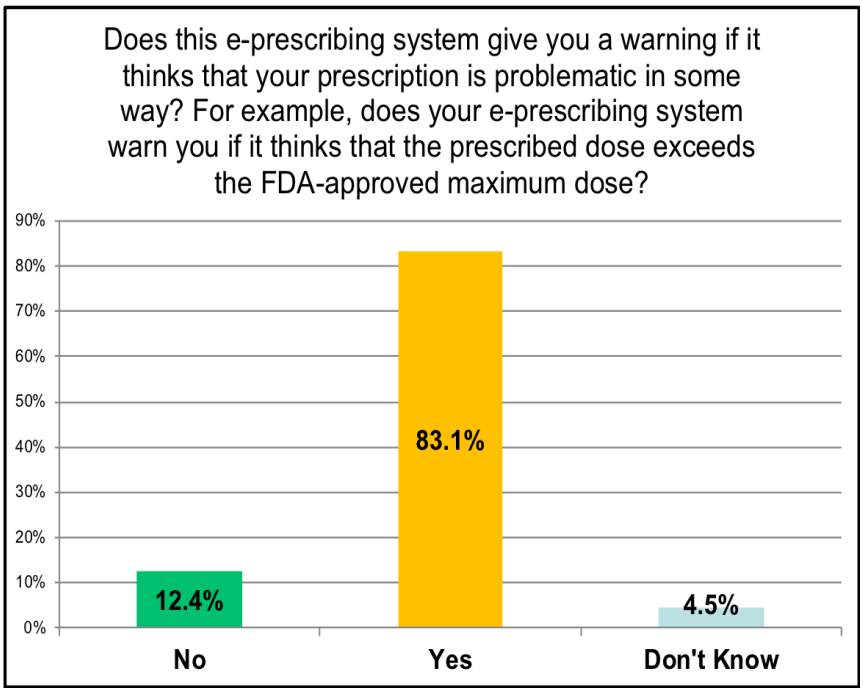
Supplementary Figure 1



Supplementary Figure 2



Supplementary Figure 3



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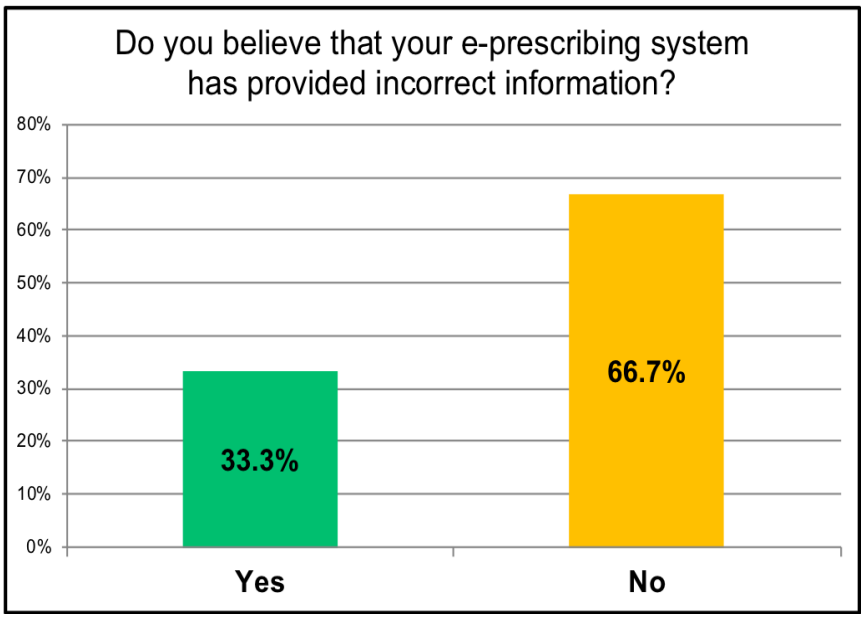
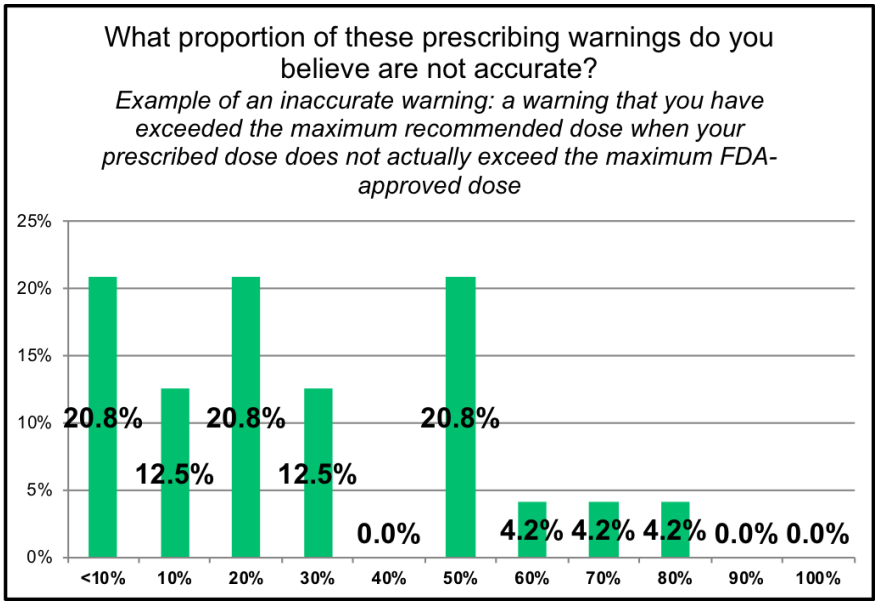
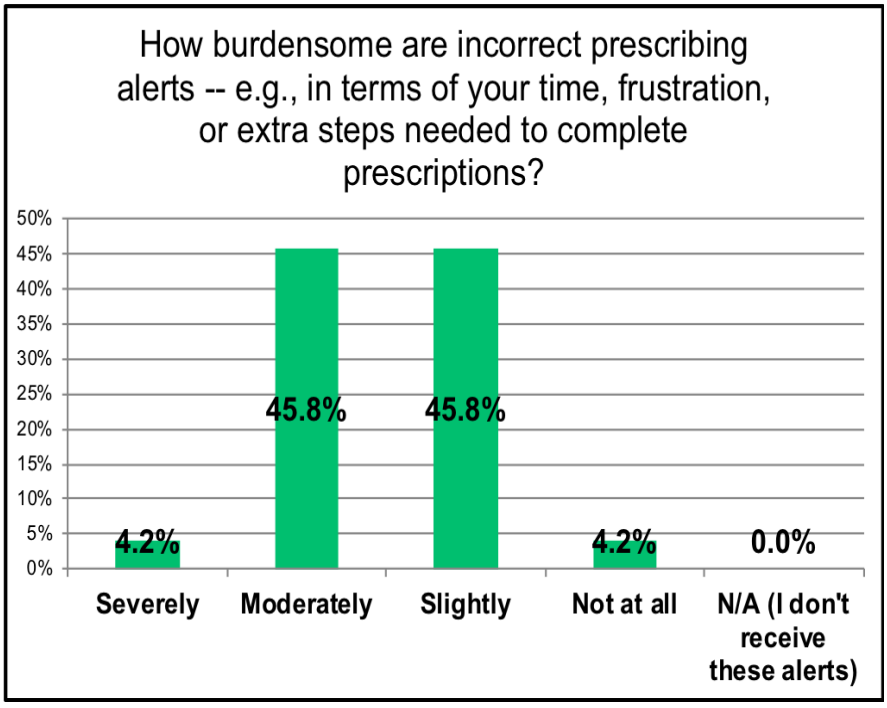


Supplementary Figure 5



Supplementary Figure 6



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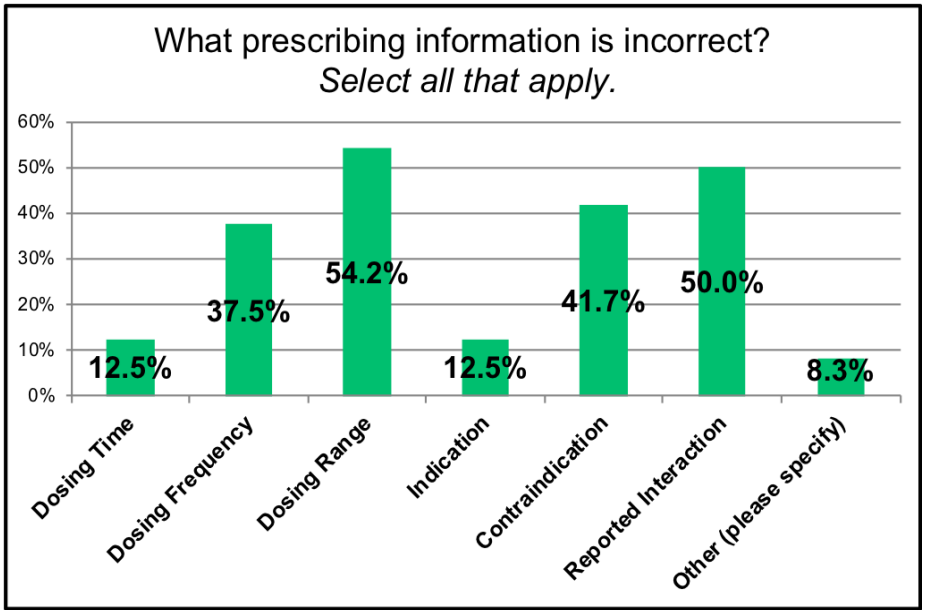
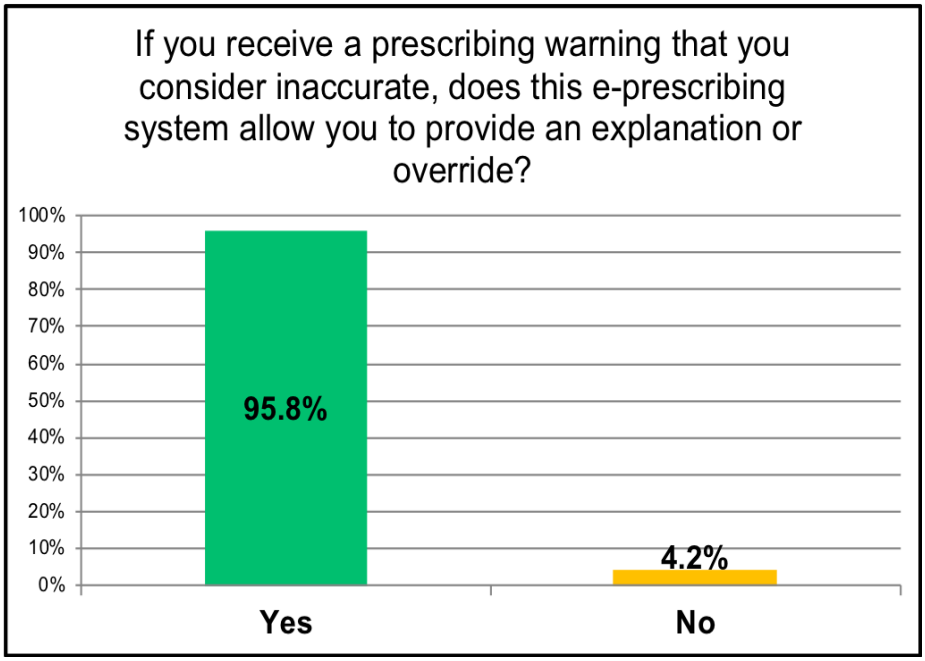


Supplementary Figure 8



Supplementary Figure 9