eAppendix

eAppendix Methods

1. Further Description of the Alcohol as a Vital Sign Initiative Workflow

Alcohol as a Vital Sign (AVS) is a primary care clinic-based alcohol screening, brief intervention and referral to treatment initiative begun in June 2013 and used in all adult primary care clinics in Kaiser Permanente Northern California (KPNC).[1] During the pre-visit evaluation, in addition to recording conventional vital signs, medical assistants asked patients structured evidence-based screening questions, embedded in the electronic health record (EHR), based on the National Institute on Alcohol Abuse and Alcoholism's (NIAAA) guide for clinicians "Helping Patients Who Drink Too Much"[2] including: (1) On average, how many days a week do you have an alcoholic drink?, and (2) On a typical drinking day, how many drinks do you have? For patients who asked what constitutes 1 "drink," medical assistants provided the following examples: 12 ounces of beer or a wine cooler, 5 ounces of table wine, 3-4 ounces of fortified wine, 1 "jigger" (1.5 ounces) of brandy, or 1 shot (1.5 ounces) of 80-proof distilled spirits.[2] Medical assistants could enter any whole integer or select "refused to respond" or "not applicable" for either question. The initial AVS medical assistant trainings were conducted in small groups by nurse managers at each Medical Center. Ongoing medical assistant training also occurs at each Medical Center and is delivered by nurse managers. The initial curricula and training materials were standardized across the Northern California region, and there is an online repository that contains training materials and is available to all Kaiser Permanente employees. Thus, training is consistent across all medical assistants, and any possible variations in delivery and recording of the AVS screening questions are likely to be minimal.

Approximately 87% of all adult, primary care patients completed this screening within the current study period. Patients who exceeded NIAAA's weekly limits (>7 for women and men aged >65 years, >14 for men aged ≤65 years)[2] were offered time-limited, office-based counselling by physicians based on motivational interviewing principles,[3] as well as referral to chemical dependency treatment, if needed.

2. Calculation of Mean Lorazepam-Equivalent Daily Dose (LEDD)

We calculated each patient's mean LEDD of benzodiazepines by:

(1) converting the strength of individual medications to lorazepam-equivalents in milligrams (see **eAppendix Table 1**, below), and then

(2) calculating the total lorazepam-equivalents milligrams of all benzodiazepines filled within the 12 months around each patient's first AVS screening encounter in the study period, and then dividing the total number of milligrams by 366.[4]

eAppendix References

1. Mertens JR, Chi FW, Weisner CM, et al. Physician versus non-physician delivery of alcohol screening, brief intervention and referral to treatment in adult primary care: the ADVISe cluster randomized controlled implementation trial. *Addict Sci Clin Pract.* 2015;10:26.

2. National Institute on Alcohol Abuse and Alcoholism. Helping patients who drink too much: a clinician's guide. https://pubs.niaaa.nih.gov/publications/Practitioner/CliniciansGuide2005/guide.pdf. Updated 2016. Accessed January 29, 2018.

3. Miller WR, Rollnick S. *Motivational Interviewing: Helping People Change.* 3rd ed. New York: The Guilford Press; 2012.

4. Kroenke K, Krebs EE, Wu J, et al. Telecare collaborative management of chronic pain in primary care: a randomized clinical trial. *JAMA.* 2014;312:240-8.

eAppendix Table 1. Conversion of Individual Benzodiazepines to Lorazepam-Equivalents [*]

Medication	**Lorazepam-equivalent dose (mg)**
alprazolam	0.5
chlordiazepoxide	10.0
clobazam	10.0
clonazepam	0.25
clorazepate	7.5
diazepam	5.0
estazolam	1.0
flurazepam	30.0
lorazepam	1.0
midazolam	2.0
oxazepam	15.0
temazepam	30.0
triazolam	0.25

[*] The medications included in this table are limited to the benzodiazepines that were dispensed to patients in the current study cohort.

eAppendix Table 2. Diagnostic Codes for Medical and Psychiatric Conditions

Condition	**ICD-9**	**ICD-10-CM**
Anxiety disorders, including PTSD	300.0*, 300.2*, 300.3, 309.21, 309.24, 309.28, 309.81, 313.0	F40.***, F41.***, F42.***, F43.0, F43.1*, F43.22, F43.23, F43.8, F43.9
Insomnia	307.4*, 327.00, 327.01, 327.02, 327.09, 780.50, 780.51, 780.52, 780.55, 780.56, 780.59	G47.0*, G47.2*, G47.8, G47.9, F51.0*, F51.8, F51.9, Z72.82*
Seizure disorder	345.**	G40.***
Musculoskeletal pain	back pain (721.3* - 721.9*, 722.2*, 722.30, 722.70, 722.80, 722.90, 722.32, 722.72, 722.82, 722.92, 722.33, 722.73, 722.83, 722.93, 724.**, 737.1*, 737.3*, 738.4, 738.5, 739.2, 739.3, 739.4, 756.10, 756.11, 756.12, 756.13, 756.19, 805.4, 805.8, 839.2*, 839.42, 846, 846.0, 847.1, 847.3, 847.2, 847.9), neck pain (721.0*, 721.1*, 722.0*, 722.31, 722.71, 722.81, 722.91, 723.**, 839.0*, 839.1*, 847. 0), arthritis/joint pain (>=710 and <720 or >=725 and <740)	Available upon request in spreadsheet format
Alcohol use-related diagnoses, excluding remission	291*, 303* (excluding 303.03, 303.93), 305.0* (excluding 305.03)	F10.1*, F10.9*, F10.2* (excluding F10.11, F10.21), F10.9*

Abbreviations: CM, Clinical Modification; ICD, International Statistical Classification of Diseases and Related Health Problems

* Indicates any integer