

Evaluation of Pharmacist Interventions in Patients with Substance Use Disorder and Mental Illness Managed Through a Collaborative Telehealth Educational Model

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Disclosure Statement

- IRB Status: Exempt
- Co-investigators:
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 - Melanie Townsend, PharmD, BCPS
 - Sarah Porter-Osen
 - Emily McMillan, MD
- Conflicts of Interest: None
- Project Sponsorship: None

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Learning Objectives

- Explain the Project ECHO model and the hub-site pharmacist's role within the model
- Describe the most common types of medication recommendations made during the Corrections Collaborative ECHO

ECHO: Extension for Community Healthcare Outcomes

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Background

- Separation of rural primary care providers from urban academic medical centers
 - Differences in medical knowledge and clinical practice across the country
- Project Extension for Community Healthcare Outcomes (ECHO) is a telehealth educational model
 - Collaborative case management between teams at the specialty "hub" and the distant site "spokes"

• Arora S, et al. *Acad Med*. 2014;89(1):30-2.
• Health Resources and Services Administration 2015. Available at: <http://www.hrsa.gov/rural-health/telehealth/index.html>.
• Arora S, et al. *Public Health Rep*. 2007;122(Suppl 2):74-7.

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Background

- No current literature assesses the impact of individual team member roles in Project ECHO
- Patients with dual diagnoses of substance use disorder and mental illness are particularly challenging for distant site providers to manage

• Zhou C, et al. *Acad Med*. 2016 Oct;91(10):1439-61.
• Arora S, et al. *Public Health Rep*. 2007;122(Suppl 2):74-7.

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Purpose

- To evaluate the role of a clinical pharmacist on a collaborative telehealth ECHO for adult patients with substance use disorder and mental illness

ECHO: Extension for Community Healthcare Outcomes

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Methods: Study Design

- Pilot study
- Retrospective, cross-sectional
- Chart review

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Methods: Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> • Age ≥18 years • Incarcerated <u>or</u> • Residing in a post-incarceration prerelease program <u>or</u> • Discharged from prerelease program into the community after being presented at the telehealth ECHO 	<ul style="list-style-type: none"> • No medication recommendations were made during the ECHO
<ul style="list-style-type: none"> • Case presented at Corrections Collaborative teleECHO™ between March 1, 2016 and January 9, 2018 	
<ul style="list-style-type: none"> • Any mental illness diagnosis <u>plus</u> • Substance use disorder diagnosis 	

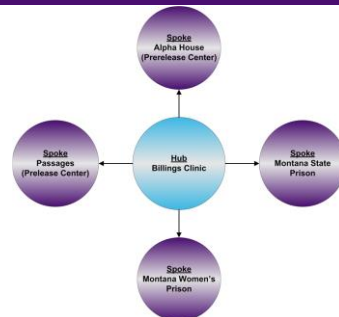
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Methods: Study Group

- Subjects with dual diagnoses of mental illness and substance use disorder that included medication therapy recommendations from the hub team during the telehealth ECHO

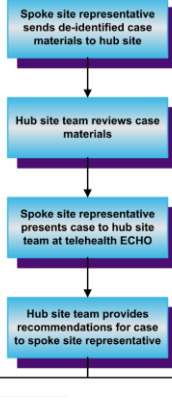
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Methods: Study Centers



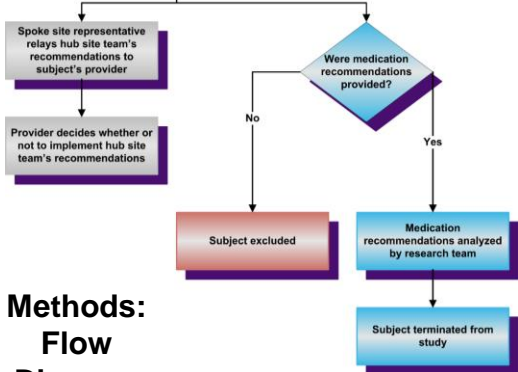
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Methods: Flow Diagram



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Methods: Flow Diagram



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Methods: Primary Outcome

- Number and type of medication recommendations made during the ECHO
- Drug therapy problems (DTPs) that led to recommendations, categorized as:
 - Adherence
 - Appropriateness
 - Effectiveness
 - Safety

• Patient-Centered Primary Care Collaborative Web site. Available at: <https://www.pccc.org/>.

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Methods: DTP Categories

Categories	Subcategories
Adherence	• Non-adherence
Appropriateness	• Additional medication required • Indication required • Unnecessary medication
Effectiveness	• Consider different medication • Dose too low
Safety	• Adverse event occurrence • Dose too high

DTP: drug therapy problem

• Patient-Centered Primary Care Collaborative Web site. Available at: <https://www.pccc.org/>.

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Methods Secondary Outcomes

- Number and type of medication recommendations made for:
 - Different mental illness diagnoses
 - Different types of substance use disorders

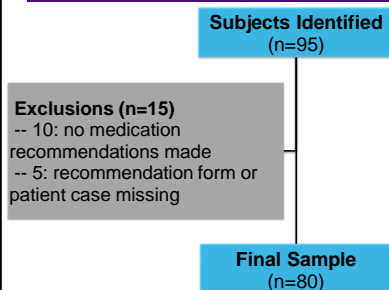
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Methods: Statistics

- Sample size
 - Convenience sample
 - 95 subjects
- Statistical tests
 - Descriptive statistics
 - Chi-square test
 - T-test

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Results: Study Subjects



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Results: Baseline Characteristics

Characteristic	All (n=80)	Males (n=26)	Females (n=54)	P Value
Age (years), mean \pm SD	36.5 \pm 10.5	34.6 \pm 10.7	37.5 \pm 10.4	0.253
Female, n (%)	54 (67.5)	0 (0)	54 (100)	---
Medications, mean \pm SD	3.6 \pm 3.6	2.2 \pm 2.5	4.3 \pm 3.9	0.012
Mental Illness Diagnoses, mean \pm SD	2.4 \pm 1.2	1.5 \pm 0.9	2.9 \pm 1.1	<0.001
Substance Use Diagnoses, mean \pm SD	2.3 \pm 1.2	2.1 \pm 1.1	2.5 \pm 1.2	0.188

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Results: Baseline Characteristics

Mental Illness Diagnoses, n (%)	All (n=80)	Males (n=26)	Females (n=54)	P Value
Post-Traumatic Stress Disorder (PTSD)	45 (56.3)	3 (11.5)	42 (77.8)	<0.001
Personality Disorder (PD)	36 (45)	8 (30.8)	28 (51.9)	0.077
Bipolar Disorder (BD)	26 (32.5)	8 (30.8)	18 (33.3)	0.819
Attention Deficit Hyperactivity Disorder (ADHD)	16 (20)	9 (34.6)	7 (13)	0.023
Mood Disorder Not Otherwise Specified (NOS)	16 (20)	1 (3.9)	15 (27.8)	0.012
Major Depressive Disorder (MDD)	14 (17.5)	7 (26.9)	7 (13)	0.124
Generalized Anxiety Disorder (GAD)	12 (15)	1 (3.9)	11 (20.4)	0.053
Other	9 (11.3)	1 (3.9)	8 (14.8)	0.146

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Results: Baseline Characteristics

Substance Use Disorder Diagnoses, n (%)	All (n=80)	Males (n=26)	Females (n=54)	P Value
Alcohol	51 (63.8)	18 (69.2)	33 (61.1)	0.475
Methamphetamine	44 (55)	7 (26.9)	37 (68.5)	<0.001
Marijuana	41 (51.3)	14 (53.9)	27 (50)	0.747
Opioids	25 (31.3)	5 (19.2)	20 (37)	0.108
Cocaine	9 (11.3)	2 (7.7)	7 (13)	0.485
Tobacco	2 (2.5)	2 (7.69)	0 (0)	0.039

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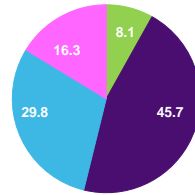
Results: Baseline Characteristics

Assessment Scales, mean ± SD	All (n=80)	Males (n=26)	Females (n=54)	P Value
Adverse Childhood Experiences (ACE), n=58 (72.5%)	4.2 ± 3.1	1.8 ± 2.2	5.2 ± 3	<0.001
Patient Health Questionnaire-9 (PHQ-9), n=6 (7.5%)	10.2 ± 9.1	4 ± 0	11.4 ± 9.6	--
Generalized Anxiety Disorder-7 (GAD-7) n=6 (7.5%)	10.8 ± 9.7	0 ± 0	10.8 ± 9.7	--

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Results: Primary Outcome

Recommendation Types



Recommendation Types	
Total = 258, n (%)	
Adherence	21 (8.1)
Appropriateness	118 (45.7)
Effectiveness	77 (29.8)
Safety	42 (16.3)

■ Adherence ■ Appropriateness ■ Effectiveness ■ Safety

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Results: Primary Outcome

	All (n=80)	Males (n=26)	Females (n=54)	P Value
Number of Recommendations, mean ± SD				
Total	9.4 ± 3.7	10 ± 3.4	9 ± 3.8	0.253
Medication-Related	3.2 ± 1.5	2.6 ± 1.5	3.4 ± 1.5	0.023

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Results: Primary Outcome

	All (n=80)	Males (n=26)	Females (n=54)	P Value
Types of Recommendations, n (%)				
Adherence	19 (23.8)	8 (30.8)	11 (20.4)	0.306
Appropriateness	63 (78.8)	18 (69.2)	45 (83.3)	0.149
Effectiveness	56 (70)	17 (65.4)	39 (72.2)	0.532
Safety	28 (35)	7 (26.9)	21 (38.9)	0.293

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Results: Recommendation Types by Mental Health Diagnosis

Type, n (%)	ADHD (n=16)	BD (n=26)	GAD (n=12)	MDD (n=14)
Adherence	6 (37.5)	7 (26.9)	3 (25)	3 (21.4)
Appropriateness	13 (81.3)	22 (84.6)	10 (83.3)	11 (78.6)
Effectiveness	13 (81.3)	20 (76.9)	9 (75)	12 (85.7)
Safety	6 (37.5)	11 (42.3)	4 (33.3)	5 (35.7)
P Value	0.652	0.461	0.991	0.928

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Results: Recommendation Types by Mental Health Diagnosis

Type, n (%)	Mood Disorder NOS (n=16)	PD (n=36)	PTSD (n=45)
Adherence	2 (12.5)	7 (19.4)	8 (17.8)
Appropriateness	12 (75)	32 (88.9)	37 (82.2)
Effectiveness	10 (62.5)	23 (63.9)	34 (75.6)
Safety	7 (43.8)	11 (30.6)	18 (40)
P Value	0.66	0.568	0.457

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Results: Adherence by Mental Health Diagnosis

Diagnosis	≥1 Adherence Recommendation, n (%)	P Value
ADHD (n=16)	6 (37.5)	0.149
BD (n=26)	7 (26.9)	0.644
GAD (n=12)	3 (25)	0.912
MDD (n=14)	3 (21.4)	0.822
Mood Disorder NOS (n=16)	2 (12.5)	0.237
PD (n=36)	7 (19.4)	0.413
PTSD (n=45)	8 (17.8)	0.155

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Results: Appropriateness by Mental Health Diagnosis

Diagnosis	≥1 Appropriateness Recommendation, n (%)	P Value
ADHD (n=16)	13 (81.3)	0.785
BD (n=26)	22 (84.6)	0.374
GAD (n=12)	10 (83.3)	0.674
MDD (n=14)	11 (78.6)	0.986
Mood Disorder NOS (n=16)	12 (75)	0.682
PD (n=36)	32 (88.9)	0.045
PTSD (n=45)	37 (82.2)	0.389

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Results: Effectiveness by Mental Health Diagnosis

Diagnosis	≥1 Effectiveness Recommendation, n (%)	P Value
ADHD (n=16)	13 (81.3)	0.272
BD (n=26)	20 (76.9)	0.348
GAD (n=12)	9 (75)	0.682
MDD (n=14)	12 (85.7)	0.158
Mood Disorder NOS (n=16)	10 (62.5)	0.464
PD (n=36)	23 (63.9)	0.281
PTSD (n=45)	34 (75.6)	0.219

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Results: Safety by Mental Health Diagnosis

Diagnosis	≥1 Safety Recommendation, n (%)	P Value
ADHD (n=16)	6 (37.5)	0.815
BD (n=26)	11 (42.3)	0.342
GAD (n=12)	4 (33.3)	0.896
MDD (n=14)	5 (35.7)	0.951
Mood Disorder NOS (n=16)	7 (43.8)	0.412
PD (n=36)	11 (30.6)	0.451
PTSD (n=45)	18 (40)	0.288

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Results: Recommendation Types by Medication Class

Type, n (%)	Antidepressants (n=50)	Antipsychotics (n=14)	Anxiolytics (n=31)
Adherence	10 (20)	6 (42.9)	10 (32.3)
Appropriateness	13 (26)	5 (35.7)	7 (22.6)
Effectiveness	9 (18)	1 (7.1)	9 (29)
Safety	27 (54)	7 (50)	18 (58.1)
P Value	<0.001	<0.001	<0.001

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Results: Recommendation Types by Medication Class

Type, n (%)	Mood Stabilizers (n=19)	Adjunctive Agents (n=1)	Other (n=40)
Adherence	4 (21.1)	0 (0)	12 (30)
Appropriateness	3 (15.8)	1 (100)	11 (27.5)
Effectiveness	6 (31.6)	0 (0)	9 (22.5)
Safety	11 (57.9)	1 (100)	22 (55)
P Value	<0.001	0.51	<0.001

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Results: Adherence by Medication Class

Diagnosis	≥1 Adherence Recommendation, n (%)	P Value
Antidepressants (n=50)	10 (20)	0.309
Antipsychotics (n=14)	6 (42.9)	0.064
Anxiolytics (n=31)	10 (32.3)	0.155
Mood Stabilizers (n=19)	4 (21.1)	0.752
Adjunctive Agents (n=1)	0 (0)	0.574
Other Medications (n=40)	12 (30)	0.189

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Results: Appropriateness by Medication Class

Diagnosis	≥1 Appropriateness Recommendation, n (%)	P Value
Antidepressants (n=50)	37 (74)	0.18
Antipsychotics (n=14)	9 (64.3)	0.145
Anxiolytics (n=31)	24 (77.4)	0.817
Mood Stabilizers (n=19)	16 (84.2)	0.505
Adjunctive Agents (n=1)	0 (0)	0.053
Other Medications (n=40)	29 (72.5)	0.172

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Results: Effectiveness by Medication Class

Diagnosis	≥1 Effectiveness Recommendation, n (%)	P Value
Antidepressants (n=50)	41 (82)	0.003
Antipsychotics (n=14)	13 (92.9)	0.04
Anxiolytics (n=31)	22 (71)	0.881
Mood Stabilizers (n=19)	13 (68.4)	0.863
Adjunctive Agents (n=1)	1 (100)	0.51
Other Medications (n=40)	31 (77.5)	0.143

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Results: Safety by Medication Class

Diagnosis	≥1 Safety Recommendation, n (%)	P Value
Antidepressants (n=50)	23 (46)	0.008
Antipsychotics (n=14)	7 (50)	0.195
Anxiolytics (n=31)	13 (41.9)	0.301
Mood Stabilizers (n=19)	8 (42.1)	0.457
Adjunctive Agents (n=1)	0 (0)	0.46
Other Medications (n=40)	18 (45)	0.061

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Results: Case Study

Case	Sex	Age (yrs)	ACE Score	Mental Illness	Substance Use	Total Medications
133	F	47	2	BD GAD PD PTSD	EtOH Marijuana Methamphetamine Opioids	3
134	F	45	3	BD GAD PTSD	EtOH Marijuana Methamphetamine Opioids	7
172	F	43	7	MDD PD	EtOH	5

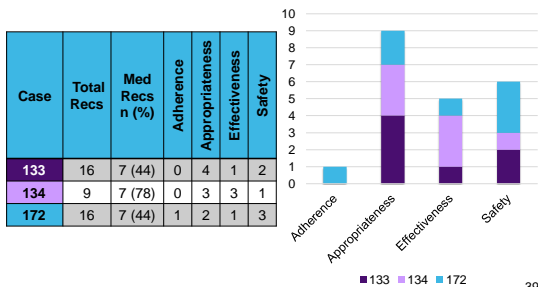
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Results: Case Study

Case	Antipsychotics	Antidepressants	Anxiolytics	Mood Stabilizers
133	Ziprasidone	Amitriptyline	X	Divalproex
134	X	Mirtazapine Nortriptyline Sertraline	Prazosin	Divalproex
172	X	Citalopram	Buspirone Clonidine Hydroxyzine	Lamotrigine

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Results: Case Study



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Discussion

- Females more likely to have medication recommendations
 - Possibly due to higher quantity of diagnoses and medications
 - More likely to be prescribed medications
- Significantly higher ACE scores in female population

ACE: Adverse Childhood Experiences

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• Mateuffel M, et al. J Women's Health. 2014;23(3):112-9.

Discussion

- Most common type: Appropriateness
- No statistical difference:
 - Types of DTPs between sexes
 - Number of DTPs between mental illness diagnoses and substance use disorders
- Significant association:
 - Personality disorder and appropriateness

DTP: drug therapy problem

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Discussion

- Significant association between
 - Effectiveness in patients prescribed antidepressants or antipsychotics
 - Consideration to appropriate doses (too low)
 - Suggestions of alternative agents
 - Safety in patients prescribed antidepressants
 - Consideration to appropriate doses (too high)
 - Identification of adverse drug reactions and side effects

DTP: drug therapy problem

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Limitations

- Cross-sectional study
 - Unknown outcome of recommendations
- Unconfirmed diagnoses in some cases
 - Non-psychiatrist provider
 - Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)
- Patient case forms completion by non-medical personnel
 - Not medical facilities

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Conclusions

- Approximately 30% of total recommendations are related to medications
- Females may be more likely to have DTPs
- Consider effectiveness of antidepressants and antipsychotics
 - Alternative agents or too-low doses
- Consider safety of antidepressants
 - Adverse drug reactions or too-high doses

DTP: drug therapy problem

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Next Steps

- Quality improvement project
 - Developed a process for following up on case recommendations and clinical outcomes of ECHO patients using a standardized form
- Further pharmacist involvement in more ECHO clinics with other focuses

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Acknowledgements

- Co-investigators
 - Michelle Reinhardt, PharmD, BCPP
 - Sarah Porter-Osen
 - Emily McMillan, MD
- Statistical Analysis
 - Ya-Huei Li, PhD
- Study Coordinator
 - Melanie Townsend, PharmD, BCPS

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Questions?

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- Mateuffel M, et al. *J Women's Health*. 2014;23(3):112-9.

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Supplementary Slides

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Results: Recommendation Types by Substance Use Disorder

Type, n (%)	Alcohol (n=51)	Cocaine (n=9)	Marijuana (n=41)
Adherence	16 (31.4)	2 (22.2)	9 (19.5)
Appropriateness	39 (76.5)	5 (55.6)	35 (85.4)
Effectiveness	36 (70.6)	9 (100)	28 (68.3)
Safety	19 (37.3)	3 (33.3)	11 (26.8)
P Value	0.334	0.577	0.549

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Results: Recommendation Types by Substance Use Disorder

Type, n (%)	Methamphetamine (n=44)	Opioids (n=25)	Tobacco (n=2)
Adherence	9 (20.5)	4 (16)	1 (50)
Appropriateness	36 (81.8)	20 (80)	1 (50)
Effectiveness	33 (75)	19 (76)	1 (50)
Safety	16 (36.4)	8 (32)	1 (50)
P Value	0.851	0.754	0.779

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Results: Adherence by Substance Use Disorder

Diagnosis	≥1 Adherence Recommendation, n (%)	P Value
Alcohol (n=51)	16 (31.4)	0.034
Cocaine (n=9)	2 (22.2)	0.909
Marijuana (n=41)	8 (19.5)	0.361
Methamphetamine (n=44)	9 (20.5)	0.444
Opioids (n=25)	4 (16)	0.272
Tobacco (n=2)	1 (50)	0.377

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Results: Appropriateness by Substance Use Disorder

Diagnosis	≥1 Appropriateness Recommendation, n (%)	P Value
Alcohol (n=51)	39 (76.5)	0.509
Cocaine (n=9)	5 (55.6)	0.071
Marijuana (n=41)	35 (85.4)	0.138
Methamphetamine (n=44)	36 (81.8)	0.458
Opioids (n=25)	20 (80)	0.854
Tobacco (n=2)	1 (50)	0.314

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Results: Effectiveness by Substance Use Disorder

Diagnosis	≥1 Effectiveness Recommendation, n (%)	P Value
Alcohol (n=51)	36 (70.6)	0.879
Cocaine (n=9)	9 (100)	0.037
Marijuana (n=41)	28 (68.3)	0.733
Methamphetamine (n=44)	33 (75)	0.281
Opioids (n=25)	19 (76)	0.429
Tobacco (n=2)	1 (50)	0.532

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Results: Safety by Substance Use Disorder

Diagnosis	≥1 Safety Recommendation, n (%)	P Value
Alcohol (n=51)	19 (37.3)	0.575
Cocaine (n=9)	3 (33.3)	0.911
Marijuana (n=41)	11 (26.8)	0.116
Methamphetamine (n=44)	16 (36.4)	0.777
Opioids (n=25)	8 (32)	0.705
Tobacco (n=2)	1 (50)	0.652

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Results: Primary Outcome

Recommendation Types	Recommendation Subtypes		P Value
	Total = 258 n (%)	Total = 258 n (%)	
Adherence	21 (8.1)	Non-adherence 21 (8.1)	
Appropriateness	118 (45.7)	Additional medication required 92 (35.7)	
		Indication required 9 (3.5)	
Effectiveness	77 (29.8)	Unnecessary medication 17 (6.6)	
		Consider different medication 41 (15.9)	
Safety	42 (16.3)	Dose too low 36 (14)	
		Adverse event occurrence 32 (12.4)	
		Dose too high 10 (3.9)	

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Results: Primary Outcome

	All (n=80)	Males (n=26)	Females (n=54)	P Value
Number of Recommendations, mean ± SD				
Total	9.4 ± 3.7	10 ± 3.4	9 ± 3.8	0.253
Medication-Related	3.2 ± 1.5	2.6 ± 1.5	3.4 ± 1.5	0.023
	Males (n=26)	Females (n=54)	P Value	
Types of Recommendations, mean ± SD				
Adherence	0.4 ± 0.6	0.2 ± 0.5	0.3	
Appropriateness	1.2 ± 1.2	1.6 ± 1.2	0.14	
Effectiveness	0.8 ± 0.7	1.1 ± 0.9	0.14	
Safety	0.4 ± 0.6	0.6 ± 0.9	0.19	

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