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Evaluating Implementation of the Collaborative Assessment and Management of Suicidality (CAMS) Training for Rural Suicide Prevention Among Mental Health and Healthcare Professionals

Paul E. Norrod, DrPH RN^a , Mary MacDonald, MA, MS^b , Kim Link, DNP APRN^c  and Melinda J. Ickes, PhD^d 

^aDepartment of Population Health, College of Nursing, University of Cincinnati, Cincinnati, Ohio, USA; ^bDepartment of Educational, School, and Counseling Psychology, College of Education, University of Kentucky, Lexington, Kentucky, USA; ^cInstitute for Rural Health, School of Nursing and Allied Health, Western Kentucky University, Bowling Green, Kentucky, USA; ^dCollege of Education, University of Kentucky, Lexington, Kentucky, USA

ABSTRACT

This study aimed to evaluate the feasibility and efficacy of the Collaborative Assessment and Management of Suicidology (CAMS) training among mental health and healthcare professionals in rural communities. Using a quasi-experimental design and convenience sampling, participants underwent CAMS training, with evaluations conducted through pre- and post-training surveys. Descriptive statistics and a paired-sample t-test were used to assess the outcomes. A total of 11 nurses participated in the CAMS training and completed the pre- and post-test surveys. Significant improvements were observed in participants' organizational facilitated self-efficacy for understanding one's responsibility for risk assessment with moderate effect post-training ($M=3.64$, $SD=0.50$, $t(10) = 3.98$, $p=0.02$, $d=1.20$) compared to pre-training ($M=2.18$, $SD=0.98$). Additionally, participants showed statistically significant improvement in their ability to maintain a collaborative and empathetic stance toward suicidal clients post-training ($M=3.27$, $SD = 0.65$, $t(10) = 2.89$, $p=0.01$, $d=0.87$) compared to pre-training ($M=2.82$, $SD=0.60$). The study findings suggest that CAMS training improves nurses' knowledge, attitudes, skills, and competency of nurses to address suicide in rural communities. Expanding such training may help address suicide mortality in largely rural states like Kentucky.

In the US, there are 3.4 million farmers and ranchers who produce over \$543 billion in agricultural products (National Agricultural Statistics Service, 2019). The stressors of farming and ranching have been linked to suicide with farmer and rancher suicide rates steadily rising since 2003 (Miller & Rudolphi, 2022; Norrod et al., 2023). The elevated risk for suicide in farmers and ranchers is frequently attributed to uncontrolled stressors, like commodity market prices, machinery breakdown, and adverse weather patterns (Fraser et al., 2005; Gregoire, 2002; Rudolphi et al., 2024). These stressors are also coupled with reports of social and geographical isolation (Alston, 2012; Malmberg et al., 1999). Consequently, farmer and rancher suicide risk may be compounded by limited health access and a shortage of trained professionals in rural areas, with 62% of national mental health provider shortages occurring in rural areas (Bureau of Health Workforce & Health Resources & Services Administration, 2024; Fiske et al., 2005; Miller & Rudolphi, 2022; Rudolphi et al., 2020, 2024).

In states such as Kentucky, a rural state with 125,000 farmers, the suicide rates are higher than in the rest of the nation, with 109 farmer suicides from 2003-2017. (National Agricultural Statistics Service, 2019; Kaiser Family Foundation (KFF), 2023;

Norrod et al., 2023). Factors contributing to suicide include limited access to mental health services because of provider shortages, geographic isolation, and emergency departments serving as points of intervention rather than outpatient and community-based crisis services (Appalachian Regional Commission (ARC), 2021; Kentucky Hospital Association, 2021). These disparities highlight the need for evidence-based suicide intervention training for mental health providers in rural areas, as well as further evaluation of such training (Fiske et al., 2005; Kaiser Family Foundation (KFF), 2023; Maganty et al., 2023; Varia et al., 2014).

In Australia, Mental Health First Aid was piloted to improve the mental health literacy of primary care providers who assisted farmers affected by natural disasters, but the feasibility and impact among providers were not evaluated (Yunker & Radunovich, Yunker & Radunovich, 2021). In contrast, Oldham et al. (2023) piloted agricultural suicide prevention training using Question-Persuade-Refer (QPR) gatekeeper training and measured gatekeeper comfort to prevent suicide with laypeople and community members (Oldham et al., 2023). While participants supported gatekeeper skills, they did not support the idea of additional suicide prevention training or engaging with strangers in

suicide prevention. Despite the introduction of gatekeeper training in agricultural communities, there remains a gap in evaluating suicide prevention training among rural mental health and healthcare providers (Younker & Radunovich, 2021). The lack of evidence highlights the need to assess training that equips providers to identify and intervene in suicide risk within clinical practice.

Suicide prevention training has been shown to impact health provider knowledge, attitudes, and confidence in treating suicidal individuals (Chan et al., 2008, 2009; Jacobson et al., 2012). Chan et al. (2008) documented that suicide prevention education for registered nurses improved their ability to assess, communicate with, and assist suicidal patients (Chan et al., 2008). Nurses reported increased confidence and competence, as well as a better understanding of their responsibility and role in coordinating care for suicidal patients and their families (Chan et al., 2008, 2009). In contrast, a 2-day suicide prevention training program in the US showed enhancements in clinicians' attitudes, confidence, and skills, with positive changes lasting four months (Jacobson et al., 2012). Although suicide intervention training has shown promise among providers, the feasibility and effectiveness of evidence-based suicide prevention among mental health and healthcare professionals serving in rural areas have not been evaluated, warranting further research.

The Collaborative Assessment and Management of Suicidology (CAMS) is an evidence-based intervention for managing suicide thoughts and behaviors while providing suicide-focused care (Jobes, 2012). The training focuses on understanding the underlying reasons for suicidal feelings and addressing them through various therapeutic methods. Swift et al. (2021) documented that CAMS reduced suicidal ideation, general distress, and hopelessness with higher treatment acceptability compared to other interventions (Swift et al., 2021). Given the high suicide risk and rates in Kentucky (Kaiser Family Foundation (KFF), 2022, 2023; Norrod, 2021; Norrod et al., 2023), evaluating CAMS training for mental health and healthcare providers serving rural and farm communities could provide better insights into its feasibility and efficacy.

To address the gap in suicide training and evaluation, the study aimed to provide training for rural mental health professionals and psychiatric-mental health nurse practitioner (PMHNP) students in the Collaborative Assessment and Management of Suicidality (CAMS). Additionally, we sought to evaluate the feasibility and acceptability of CAMS, and its preliminary outcomes on enhancing providers' knowledge, attitudes, and competencies related to suicide prevention.

Methods

In this exploratory study, we used a quasi-experimental design and convenience sampling to recruit mental health professionals and Psychiatric Mental Health Nurse Practitioner (PMHNP) students. Specifically, we evaluated the feasibility and acceptability of CAMS training, i.e. provider satisfaction, its impact on provider attitudes toward

suicidal patients, competency in providing suicide-focused care, and knowledge of suicide. The University of Kentucky Institutional Review Board approved the current study.

Participants and sampling procedures

The current study is part of a larger project to develop and deliver a multi-layered menu of training focused on farmer mental health and suicide prevention. To recruit mental health professionals and nurses, study investigators leveraged project partnerships with key mental health and academic stakeholders who serve Kentucky's Life Skills mental health region (Kentucky Department for Behavioral Health & Intellectual Disabilities, 2024). Mental health professionals and PMHNP students were recruited in February 2024 by email invite to register for the CAMS training. All participants, including PMHNP students, were informed via approved consent procedures that participation in the research study was voluntary. All registered trainees were eligible to participate in the training and research study if they held a professional license or were enrolled in the partnering university's PMHNP program. No exclusions were made by biological sex, gender, age, or race/ethnicity.

Registered CAMS trainees were subsequently invited to participate in the research study, and a survey link was included with consent to participate. Individuals could still participate in the CAMS training without consenting to the research study (i.e. survey completion). Participants were given access to the CAMS foundational videos one month before attending the live virtual role-play training and encouraged to complete them. Study participants were emailed the online CAMS baseline (pre-) survey one week before the training using Qualtrics in March 2024. Participants were emailed the post-follow-up survey one month after the live role-play training in April 2024.

CAMS framework and training

CAMS is a clinical suicide intervention designed for mental health and medical professionals (Jobes, 2012). The CAMS approach relies on the Suicide Status Form (SSF) to guide the clinician in assessing, treating, and tracking patient suicidality. Moreover, the CAMS training framework employs a comprehensive approach to learning and applying skills, blending several training elements.

Becoming CAMS-trained begins with watching eight foundational videos led by Dr. Jobes. These videos showcase real-life applications of the CAMS Framework across 12 sessions and take 3h to complete, providing a solid understanding of CAMS. After the foundational videos, trainees participate in a synchronous 7-h role-play training session remotely via Zoom. This session aims to deepen participants' grasp of CAMS philosophy and theory while refining their suicide assessment and treatment skills through interactive role-playing exercises. A CAMS-care training consultant leads the live session with unscripted role-plays based on actual patient scenarios, including using the SSF. Following each demonstration, participants

engage in paired role-play guided by the CAMS-care consultant, who offers personalized support, answers questions, and provides constructive feedback. This training experience helps ensure the effective integration of CAMS principles into clinical practice. After the role-play training, CAMS trainees must participate in four CAMS consultation calls with a CAMS-care consultant to become CAMS-trained.

Measures

Participant demographics included county of residence, sex, gender, race, ethnicity, age (in ten-year increments), highest degree and certification, and field of education for the highest degree. Other demographic measures included the participants' occupational status, primary area of practice, current job years, and years as a licensed professional. Specific to farming, information was gathered on whether the participant had ever lived or worked on a farm and, if so, for how many years.

Self-reported survey measures gathered information about sociodemographic and farming characteristics along with pre- and post-measures for the twelve-item Occupational Suicide Assessment Questionnaire (OSAQ-12) and the Suicide Competency Assessment Form (SCAF) (Cramer et al., 2013, 2020; Ramberg et al., 2021). Post-training measures included an abbreviated version of the Acceptability, Feasibility, and Appropriateness Scale (AFAS) (Cho et al., 2022). The AFAS was used to assess participant perception of CAMS social validity followed by one multiple-choice question to assess suspected barriers to using or applying CAMS, and two open-ended questions for participants to provide qualitative feedback on their experience in training.

OSAQ-12

The OSAQ-12 is an instrument designed to evaluate three domains, namely attitudes toward prevention, attitudes toward suicidal persons, and organizational-facilitated self-efficacy among healthcare professionals, with four items in each domain (Ramberg et al., 2021). Items in each domain are scored using a 4-point Likert scale: 1 = (do not agree at all), 2 = (hardly agree), 3 = (almost agree), and 4 = (agree completely). Confirmatory factor analysis was used to assess the validity and reliability for each domain on the OSAQ-12 (i.e. attitudes toward prevention, attitudes toward suicidal persons, and organizational-facilitated self-efficacy).

SCAF

The SCAF is an instrument designed to evaluate suicide prevention skills training among behavioral health providers. It uses 10 items corresponding to the 10 core competencies, followed by a global competency rating (Cramer & Kapusta, 2017). The 10 items/competencies assessed include: 1) managing personal attitudes toward suicide, 2) maintaining an empathic and collaborative stance with clients, 3) understanding and assessing evidence-based risk and protective factors, 4) focusing on the client's current suicidal ideation

and intent, 5) determining the level of risk, 6) developing and enacting evidence-based treatment plans, 7) involving other supportive persons, 8) documenting clinical decisions, 9) knowing the relevant laws concerning suicide, and 10) engaging in debriefing and self-care practices. Items are rated on a 4-point Likert scale: (1) signifies "Unacceptable," indicating that the individual has not been trained or is unable to perform the task; (2) represents "Working Toward Competency," denoting partial training or education on the task; (3) indicates "Competent," reflecting adequate training and skill in the task; and (4) signifies "Advanced," representing exceptional skill in the most current practices.

AFAS

The AFAS is a self-report instrument designed to evaluate perceptual implementation outcomes as a measure of the quality of training, which can be crucial to the success of provider training (Cho et al., 2022; Proctor et al., 2011). This study used an abbreviated, eight-question version of the original 14-item scale to assess participant perceptions of CAMS social validity (Cho et al., 2022). Three of the six original items were used to determine acceptability: 1) To what extent are you satisfied with the training you received and the practices covered?; 2) How credible did you find the presenters/consultants?; and 3) How satisfied are you with the content of the training and practices covered? All three original scale items were used to assess feasibility, including 1) How useful are the information and practices from the training to you in your everyday clinical practice?; 2) To what extent do you expect to be able to incorporate the concepts and techniques from the training into your daily work activities?; and 3) How compatible do you expect the practices from the training to be with the practical realities and resources of your agency/service setting? Finally, two of the original five items were used to assess appropriateness, including 1) How relevant are the information and practices to your client population?; and 2) How well do the information and practices from the training fit with your overall approach to service delivery and the setting in which you provide care? Each domain item was measured on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely) (Cho et al., 2022).

Analysis

The pre- and post-evaluation responses for the OSAQ-12 and SCAF were matched using the study participant's unique identifier. Descriptive statistics were used to describe demographic, professional, and farm characteristics along with post-training ASAF scores. A paired-sample t-test was employed to evaluate pre- and post-training outcomes on the OSAQ-12 and SCAF, while the magnitude of the difference was assessed using Cohen's *d* (Estrada et al., 2019). To account for Type I error due to multiple paired t-test comparisons with a small sample, the Benjamini-Hochberg procedure was applied to control the False Discovery Rate (FDR) with the FDR set at 0.05 (Benjamini & Hochberg, 1995). All data analysis used R for Windows (R Core Team, 2023).

Results

A total of 24 mental health and healthcare professionals registered and attended the training. Trainees who did not consent to participate in the study were excluded, resulting in only 11 PMHNP students consenting to and participating in the study. Table 1 presents the demographic, professional, and farm characteristics of the PMHNP students, all of whom are nurses. Most participants were female (76%), white (77%), and between 45 and 54 (53%). The primary

Table 1. Demographic, professional, and farm characteristics of health professionals participating in CAMS training.

Baseline demographics	Full sample	
	N	%
Sex		
Female	10	90.9
Male	1	9.1
Age group		
18–24	0	0
25–34	2	18.2
35–44	2	18.2
45–54	5	45.5
55–64	1	9.1
65+	1	9.1
Race		
White	8	72.7
Non-White	3	27.3
Field of highest degree		
Nursing	11	100
Professional practice setting		
Correctional facility		
Hospital/medical center	1	9.1
Psychiatric hospital	2	18.2
Outpatient clinic/private practice	1	5.9
Veterans affairs medical center	5	45.5
Farming history		
Worked on farm	5	45.5
Lived on farm	6	54.5
Relative owns farm	5	45.5

Note. Demographic distributions are presented for participants who consented to and participated in our baseline (pre-) and post-test survey ($N=11$).

professional practice settings included outpatient clinic/private practice (41%) and hospital/medical center (29%). Additionally, over a third of participants had lived (41%) or worked on a farm (35%).

Pre- and post-test measures

Evaluation of nurses' attitudes toward prevention, attitudes toward suicidal persons, and organizational facilitated self-efficacy on the OSAQ-12 showed improvements on several item outcomes. Table 2 shows that participant attitudes toward prevention improved regarding actions for suicidal individuals post-test ($M=1.45$, $SD=0.82$), $t(10) = -1.15$, $p=0.86$, $d=-0.35$, 95% CI $(-0.95, 0.27)$) compared to pretest ($M=1.73$, $SD=0.79$). Similarly, attitudes about suicidal individuals succeeding at suicide despite receiving treatment showed overall improvement post-test ($M=1.91$, $SD=1.14$), $t(10) = -0.76$, $p=0.86$, $d=-0.23$, 95% CI $(-0.82, 0.38)$) versus pretest ($M=2.18$, $SD=1.08$).

Participant attitudes toward suicidal persons post-training improved on several items. In particular, participants reported increased sympathy toward persons who previously attempted suicide post-training ($M=1.73$, $SD=1.19$, $t(10) = 1.00$, $p=0.34$, $d=0.30$, 95% CI $(-0.31, 0.90)$) compared to pre-training ($M=1.45$, $SD=0.69$). Participants also showed improvement in their attitude about suicidal persons stealing time on the posttest ($M=1.36$, $SD=0.67$, $t(10) = -1.00$, $p=0.86$, $d=-0.30$, 95% CI $(-0.90, 0.31)$) compared to pretest ($M=1.45$, $SD=0.69$).

In contrast, participants demonstrated significant improvements in the organizational facilitated self-efficacy domain following the training. Confidence when working with suicidal individuals increased post-training ($M=3.45$, $SD=0.52$, $t(10) = 2.19$, $p=0.08$, $d=0.66$, 95% CI $(-0.01, 1.30)$) with a marginally moderate effect compared to pre-training scores

Table 2. Pre and post-training differences on the occupational suicide attitude questionnaire (OSAQ-12) among CAMS training participants.

Confidence items by domain	Pretest		Post-test		$t(df)$	p FDR-adjusted	Cohen's d (95% CI)
	M	SD	M	SD			
Attitudes toward prevention							
It is possible to prevent suicides.	3.36	0.67	3.45	0.69	1(10)	0.34	0.30 $(-0.31, 0.90)$
It makes no difference what is done for suicidal individuals-they succeed sooner or later anyway.	1.73	0.79	1.45	0.82	-1.15(10)	0.86	-0.35 $(-0.95, 0.27)$
If people really want to kill themselves, they will succeed despite receiving the best treatment.	2.18	1.08	1.91	1.14	-0.76(10)	0.86	-0.23 $(-0.82, 0.38)$
Once people have made up their minds to commit suicide, you cannot stop them.	1.45	0.82	1.45	0.69	0.00(10)	0.86	0.00 $(-0.59, 0.59)$
Attitudes Toward Suicidal Persons							
Some suicidal individuals are abusing the health-care system.	1.73	0.79	1.55	1.04	-0.61 (10)	0.86	-0.19 $(-0.78, 0.42)$
I feel more sympathy for first-time suicide attempters than for those who have made several attempts.	1.45	0.69	1.73	1.19	1.0(10)	0.34	0.30 $(-0.31, 0.90)$
Suicidal persons often steal time from other persons with greater need for support and help.	1.45	0.69	1.36	0.67	-1.0(10)	0.86	-0.30 $(-0.90, 0.31)$
Those who use non-lethal methods to attempt suicide only seek attention.	1.45	0.69	1.36	0.67	-0.56(10)	0.86	-0.17 $(-0.76, 0.43)$
Organizational Facilitated Self-Efficacy							
The division of responsibilities for risk assessment is clear and distinct.	2.18	0.98	3.64	0.50	3.98(10)	0.02*	1.20 $(0.40, 1.97)$
I feel confident when working with suicidal individuals.	2.73	1.01	3.45	0.52	2.19(10)	0.08	0.66 $(-0.01, 1.30)$
I have enough support in work with suicidal individuals.	2.82	1.08	3.73	0.47	2.89(10)	0.05*	0.87 $(0.15, 1.56)$
The co-operation concerning suicidal individuals is well-functioning.	2.64	0.92	3.45	0.52	2.52(10)	0.06	0.76 $(0.07, 1.42)$

Note. $N=11$. Abbreviations: M = mean; SD = standard deviation; df = degrees of freedom; OASQ-12 = Occupational Attitudes and Suicide Questionnaire; FDR = False Discovery Rate. *indicates statistical significance $p \leq 0.05$.

Table 3. Pre and post-training and total score differences on the suicide competency assessment form (SCAF) among CAMS trainees.

SCAF items	Pretest		Post-test		t(df)	p FDR-adjusted	Cohen's <i>d</i> (95% CI)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Know and manage your attitude and reactions toward suicide.	2.73	0.79	3.00	0.45	0.82 ₍₁₀₎	0.22	0.25 (−0.36, 0.84)
Maintain a collaborative, empathetic stance toward the client.	2.82	0.60	3.27	0.65	2.89 ₍₁₀₎	0.01*	0.87 (0.15, 1.56)
Know and elicit evidence-based risk and protective factors.	2.27	0.47	2.91	0.30	4.18 ₍₁₀₎	< 0.01*	1.26 (0.44, 2.05)
Focus on current plan and intent of suicidal ideation.	2.45	0.52	3.00	0.45	3.46 ₍₁₀₎	< 0.01*	1.04 (0.28, 1.77)
Determine level of risk.	2.45	0.52	2.91	0.30	2.89 ₍₁₀₎	0.01*	0.87 (0.15, 1.56)
Develop and enact collaborative evidence-based treatment plan.	2.27	0.47	2.82	0.41	3.46 ₍₁₀₎	< 0.01*	1.04 (0.28, 1.77)
Notify and involve other persons.	2.91	0.70	3.27	0.47	1.79 ₍₁₀₎	0.06	0.54 (−0.11, 1.16)
Document risk, plan, and reasoning for clinical decisions.	2.36	0.67	3.27	0.47	4.30 ₍₁₀₎	< 0.01*	1.30 (0.47, 2.10)
Know the law concerning suicide.	2.27	0.47	3.00	0.00	5.16 ₍₁₀₎	< 0.01*	1.56 (0.65, 2.44)
Engage in debriefing and self-care.	2.45	0.52	3.09	0.30	3.13 ₍₁₀₎	< 0.01*	0.94 (0.21, 1.65)
SCAF total	25.00	4.52	27.27	2.33	1.59 ₍₁₀₎	0.07	0.48 (−0.16, 1.09)

Note. (*N* = 11). Abbreviations: *M* = mean; *SD* = standard deviation; *df* = degrees of freedom; SCAF = Suicide Competency Assessment Form; FDR = False Discovery Rate. *indicates statistical significance $p \leq 0.05$.

($M = 2.73$, $SD = 1.01$). Additionally, participants reported feeling more supported in their work with suicidal individuals after the training ($M = 3.73$, $SD = 0.47$, $t(10) = 2.89$, $p = 0.05$, $d = 0.87$, 95% CI (0.15, 1.56)) with a large effect compared to pre-training ($M = 2.82$, $SD = 1.08$). In terms of participants understanding the division of responsibility for assessing suicide risk, they showed a substantial post-training increase ($M = 3.64$, $SD = 0.50$, $t(10) = 3.98$, $p = 0.02$, $d = 1.20$, 95% CI (0.40, 1.97)) with a large effect compared to pre-training ($M = 2.18$, $SD = 0.98$).

The SCAF results showed improvements in several areas following the training. Table 3 displays trainee reported increased competency in maintaining a collaborative and empathetic stance toward suicidal individuals post-training with a moderate training effect ($M = 3.27$, $SD = 0.65$, $t(10) = 2.89$, $p = 0.01$, $d = 0.87$, 95% CI (0.15, 1.56)) compared to pre-training ($M = 2.82$, $SD = 0.60$). Similarly, there was an improvement in the trainee's ability to know and elicit evidence-based risk and protective factors post-training ($M = 2.91$, $SD = 0.30$, $t(10) = 4.18$, $p < 0.01$, $d = 1.26$, 95% CI (0.44, 2.05)) with a large effect size versus pre-training ($M = 2.27$, $SD = 0.47$). Participants' intention to engage in self-care also showed statistically significant gains with a large effect post-training ($M = 3.09$, $SD = 0.30$, $t(10) = 3.13$, $p < 0.01$, $d = 0.94$, 95% CI (0.21, 1.65)) versus pre-training ($M = 2.45$, $SD = 0.52$).

In contrast, there were no statistically significant gains post-training ($M = 3.00$, $SD = 0.45$, $t(10) = 0.82$, $p = 0.22$, $d = 0.25$, 95% CI (−0.36, 0.84)) in the trainee's reported ability to manage personal attitudes and reactions toward suicide. Post-training differences in suicide competence using the SCAF also showed a non-significant increase in overall competency scores post-training ($M = 27.27$, $SD = 2.33$, $t(10) = 1.59$, $p = 0.07$, $d = 0.48$, 95% CI (−0.16, 1.09)) versus pre-training ($M = 25.00$, $SD = 4.52$).

Post training measures

Feasibility and acceptability of CAMS

Table 2 shows participants expressed high satisfaction with the training ($M = 4.64$, $SD = 0.67$) and elevated perceived

Table 4. Assessment of acceptability, feasibility, and appropriateness scale (ASAF) of CAMS training.

ASAF items	Sample	
	<i>M</i>	<i>SD</i>
To what extent are you satisfied with the training you received and the practices covered?	4.45	0.82
How credible did you find the presenters/ consultants?	4.82	0.41
How satisfied are you with the content of the training and practices covered?	4.64	0.67
How useful are the information and practices from the training to you in your everyday clinical practice?	4.45	0.82
To what extent do you expect to be able to incorporate the concepts and techniques from the training into your daily work activities?	4.73	1.19
How compatible do you expect the practices from the training to be with the practical realities and resources of your agency/service setting?	4.27	1.19
How relevant are the information and practices to your client population?	4.55	0.93
How well do the information and practices from the training fit with your overall approach to service delivery and the setting in which you provide care?	4.18	1.08

Note. (*N* = 11). *M* = mean; *SD* = standard deviation.

usefulness in everyday clinical practice ($M = 4.45$, $SD = 0.82$) (Table 4). Moreover, the presenter's credibility was rated high ($M = 4.82$, $SD = 0.41$). Participants also indicated a strong intention to incorporate the training concepts into their daily work activities ($M = 4.73$) and found the training relevant to their client population ($M = 4.55$, $SD = 0.93$). Participants were optimistic about CAMS' compatibility with their practical realities and resources, scoring high on expected compatibility ($M = 4.27$, $SD = 1.19$).

Barriers to implementation

Participants noted two barriers to using or applying CAMS on the items assessing suspected barriers. The two items reported included time constraints in their clinical practice and a lack of administrative support.

Discussion

Study investigators aimed to address the evaluation gap for suicide prevention training by examining the feasibility and

acceptability of CAMS, and its ability to enhance mental health and healthcare provider knowledge, attitudes, and competency about suicide. In addition, investigators assessed barriers to implementing CAMS in clinical practice. The study findings suggest that CAMS training is feasible and preliminarily effective in improving the attitudes and confidence of licensed nurses enrolled in a PMHNP certificate program, particularly those serving rural areas with experience in farming.

Nurses make up the largest percentage of the healthcare workforce in the U.S. (Bureau of Labor Statistics, 2023) and often spend the most time interacting with patients while providing holistic care that focuses on physical and mental health. This study demonstrates that providing nurses with CAMS training has the potential to increase their knowledge, confidence, and feelings of being supported when working with suicidal individuals living in rural communities. Due to shortages of healthcare providers in rural settings, this study suggests that nurses can become leaders in efforts to promote suicide prevention in their communities.

Participants showed positive changes in their attitudes toward suicide prevention and working with suicidal individuals on the OSAQ-12 and showed improvements in organizational facilitated self-efficacy post-training. The delineation of responsibilities for risk assessment post-training suggests that the CAMS framework provides a structured and comprehensible approach for clinicians. Similar findings were documented by Chan et al. (2008) and Jacobson et al. (2012), where suicide risk training improved provider attitudes and confidence in working with suicidal persons, with participants in both studies reporting greater confidence in assessing and managing individuals at risk of suicide (Chan et al., 2008; Jacobson et al., 2012).

Improvements in participant confidence and suicide competency were also observed on the SCAF. Specifically, participants reported increased competence in maintaining a collaborative and empathetic approach toward individuals at risk of suicide. In addition, participants demonstrated improved knowledge and skills in determining risk and understanding protective factors for suicide. The gains in confidence and competency highlight the significance of CAMS, as it focuses on understanding the factors that contribute to suicide. Moreover, participants' increased confidence in working with suicidal individuals after participating in CAMS could enhance client engagement and bolster successful suicide interventions in rural areas. Our research findings indicate that CAMS training may help develop self-efficacy in nurses by enhancing their competence in managing suicide risk.

Our findings have implications for use of CAMS in the Kentucky healthcare system, which is crucial due to the shortage of mental health and healthcare providers and the increasing pressure on Emergency Departments to manage individuals exhibiting suicidal behaviors (Appalachian Regional Commission (ARC), 2021; Health Resources and Service Administration (HRSA), 2024; Kaiser Family Foundation (KFF), 2023; Kentucky Hospital Association, 2021; University of Wisconsin Population Health Institute, 2022). Outpatient nurse provider confidence in suicide risk assessment abilities is key to potentially helping reduce unnecessary emergency

room visits and hospitalizations, especially in rural and farming communities.

Farmers, ranchers, and persons who live in rural communities are more likely to perceive the stigma associated with seeking out mental healthcare (Baker et al. 2022; Guada & St. James, 2024). Nurses in outpatient settings can use CAMS training to establish rapport and display empathy with individuals and serve as a gateway to getting them the vital assistance needed to help prevent suicide from occurring. Not only will this improve individual patient outcomes, but by providing suicide intervention for farmers and ranchers, the nurse is playing a role in impacting their local agricultural community and economy by improving farmer and rancher healthcare outcomes.

Acceptability and barriers to implementation

In our post-training survey, participants found CAMS to be an acceptable and feasible intervention to implement in their practice, which mirrors findings documented by Swift et al. (2021) that CAMS is highly acceptable as a clinical-based suicide prevention training (Swift et al., 2021). The measure of acceptability/feasibility showed positive results, indicating that providers felt capable of integrating CAMS into their practice. However, participants identified time constraints and lack of administrative support as barriers, which have been reported among nurses caring for suicidal patients (Chan et al., 2008, 2009).

The practice challenges nurses face may not be uncommon in rural healthcare settings where nurses experience limited resources, lower job satisfaction, and decreased shared decision-making (Cosgrave et al., 2018; Playford et al., 2020; Terry et al., 2021; Health Resources and Service Administration (HRSA), 2024). Addressing nursing practice barriers may be essential for nurses to implement CAMS. Potential solutions might involve advocating for administrative support and shared decision-making, integrating CAMS training into professional development programs, and exploring telehealth options to reduce time burdens and expand provider availability (Terry et al., 2021; Gajarawala & Pelkowski, 2021; Cosgrave et al., 2018).

Strengths and limitations

The study has several strengths. Study investigators sought to fill the gap in suicide training and evaluation by training rural mental health professionals and PMHNP students in CAMS. Additionally, it assessed the feasibility and effectiveness of this training and its ability to improve providers' knowledge, attitudes, and competency related to suicide. To our knowledge, no other studies have examined the effect of CAMS training in these domains. While CAMS is a well-supported suicide-focused intervention framework, strengthening participant suicide-related knowledge, attitudes, and confidence could further improve the efficacy of CAMS (Swift et al., 2021). Additionally, this study helps increase the number of healthcare providers trained to intervene and care for people experiencing suicidality (Health Resources

and Service Administration (HRSA), 2024). By increasing the number of trained providers in suicide prevention in rural Kentucky, our broader goal is to help reduce suicide mortality in Kentucky (Health Resources and Service Administration (HRSA), 2024).

Several limitations should be considered when interpreting the findings. The study employed convenience sampling with a small sample size, allowing for timely recruitment but limiting the generalization of results. The study sample was homogeneous and comprised of female nurses serving rural settings. Therefore, the findings do not broadly apply to mental health outside of nursing and nursing professionals outside Kentucky. A controlled trial would provide more substantial evidence of CAMS training by reducing selection bias and allowing for controlled comparison.

Self-reported data can be subjective and prone to recall bias related to under and over-reporting of their competence, attitudes, and knowledge about CAMS skills and suicide (Little et al., 2020). In addition, the study employed a brief follow-up period of one month, which limits the understanding of long-term outcomes regarding our evaluation of the CAMS training. Although improvements were noted one month after training, whether the changes are sustainable is unclear. Evaluating the direct impact of CAMS training on patient outcomes, such as reductions in suicide rates or improvements in patient well-being, would provide a more comprehensive understanding of its effectiveness. Finally, participants reported barriers to implementation, such as time constraints and lack of administrative support, indicating systematic and organizational obstacles. Such barriers could limit the application of CAMS among trainees in rural settings and potentially decrease its effectiveness in real-world practice settings.

Conclusion

Our study findings underscore the feasibility and preliminary effectiveness of CAMS training for nurses with farming experience who serve rural communities. Nurses demonstrated significant improvements in suicide-related knowledge and attitudes and greater confidence in working with patients in suicide crises. The study results are timely, given rural Kentucky's critical shortage of mental health providers, where nurses are key to healthcare service delivery. Additionally, training participants expressed high satisfaction with the training and its application to their clinical practice, which emphasizes the relevance of CAMS in rural clinical practice. Despite the limitations, our findings support the use of CAMS as a suicide prevention training for nurses in clinical practice. Moreover, the results highlight the potential of CAMS to better prepare nurses to address suicide crises as frontline providers in outpatient settings, especially in underserved rural and farming communities.

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ORCID

Paul E. Norrod  <http://orcid.org/0000-0002-1018-7927>
 Mary MacDonald  <http://orcid.org/0000-0003-0202-990X>
 Kim Link  <http://orcid.org/0000-0002-6687-7986>
 Melinda J. Ickes  <http://orcid.org/0000-0003-3198-2812>

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