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1 **Expanding Medical Education to Include Substance Use Disorders During Pregnancy and**
2 **Postpartum: Preliminary Effectiveness of a Pilot Curriculum for Medical Students**

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46 **ABSTRACT**

47

48 **OBJECTIVE**

49 To effectively combat the simultaneous overdose and maternal mortality crises, a multimodal
50 approach is needed. The aim of this study is to evaluate the preliminary effectiveness of a pilot,
51 experiential learning, substance use disorder (SUD) curriculum embedded into a third-year
52 medical student Obstetrics and Gynecology clerkship to improve self-reported confidence in SUD
53 clinical skills.

54

55 **METHODS**

56 This SUD curriculum was designed and implemented in an outpatient clinic which provides
57 integrated obstetric, gynecologic and addiction medicine services for pregnant and parenting
58 people with SUD. Third year medical students on their OBGYN clerkship rotated one full day
59 through the OB MOTIVATE clinic between August 2020-April 2022 and completed this
60 curriculum. Students completed pre-clinic assignments and in-clinic tasks (e.g., practicing SBIRT
61 under supervision: Screening, Brief Intervention, Referral to Treatment). Paired t-tests assessed
62 changes in outcomes, with increasing scores demonstrating improvement.

63

64 **RESULTS**

65 Sixty-three students rotated through the OB MOTIVATE clinic; 57 completed the curriculum and
66 surveys. Results from the self-assessment tools demonstrated significant improvements in
67 confidence in SUD clinical skills, including: performing SBIRT (2.46 ± 0.80 vs 4.07 ± 0.59 , $p < 0.01$),
68 motivational interviewing (2.98 ± 0.86 vs 4.16 ± 0.65 , $p < 0.01$), using evidence based medicine
69 (2.91 ± 1.09 vs 4.23 ± 0.66 , $p < 0.01$) and collecting a SUD history (3.25 ± 1.04 vs 4.35 ± 0.55 , $p = 0.01$).

70

71 **CONCLUSION**

72 The integration of interventional curriculums into medical school and residency programs could
73 be an effective avenue to reinforce addiction knowledge and teach new skills. This practical one-
74 day pilot curriculum demonstrated preliminary effectiveness at introducing third year medical
75 students to the complexities of SUD in pregnancy and postpartum. Further investigations of
76 feasible and acceptable SUD educational interventions are warranted.

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82 INTRODUCTION

83 In the United States, substance use disorder (SUD), namely opioid overdose, is a leading cause of
84 pregnancy-associated deaths.¹ To effectively combat the simultaneous overdose and maternal
85 mortality crises, a multimodal approach is needed.² In response to this call, professional societies
86 and health systems nationally have been leading efforts to improve access to training and resources
87 for medical trainees.³ However, medical student training in SUD prevention, screening,
88 assessment, treatment and recovery is not as robust as warranted.⁴ The American College of
89 Physicians specifically calls for the inclusion of SUD focused training in medical education to
90 expand the workforce qualified to treat SUD. Medical school curricula commonly overlook
91 addiction medicine training, often leading to medical students graduating without the knowledge
92 or skills to diagnose and treat complications related to substance use in their patients.

93

94

95 With the unique needs of pregnant and postpartum patients, the US medical education system has
96 not adequately adapted to prepare its students to meet these needs of this growing patient
97 population, notably lacking in experiential learning opportunities.⁸ To address this gap, we
98 developed a experiential learning based SUD curriculum embedded into a third-year medical
99 student Obstetrics and Gynecology clerkship. We report on the development, feasibility and
100 acceptability of this curriculum elsewhere.⁹In this study, we evaluated its preliminary effectiveness
101 to improve self-reported confidence in SUD clinical skills (primary objective) and self-reported
102 competence in SUD knowledge (secondary objective). Lastly, we also explored changes in
103 student-held SUD stigma before and after completion of this novel curriculum.

104

105 METHODS

106 This SUD curriculum was designed and implemented at the OB MOTIVATE clinic at Virginia
107 Commonwealth University which provides integrated obstetric, gynecologic and addiction
108 medicine services for pregnant and parenting people with SUD.¹⁰ The curriculum is based on the
109 principles of Kolb's experiential learning.¹¹

110

111 Third year medical students on their OBGYN clerkship rotated one full day through the OB
112 MOTIVATE clinic between August 2020-April 2022 and completed this curriculum.⁹ Students
113 completed pre-clinic assignments (see Supplemental Digital Content 1, to see an example of the
114 curriculum used including a recorded online lecture and readings) and in-clinic tasks (e.g.,
115 practicing SBIRT under supervision). Students were expected to see patients (either in-person or
116 virtual) while completing the following tasks: (1) collect a substance use history, (2) complete
117 SBIRT and (3) perform motivational interviewing.⁹ For collecting a substance use history, we
118 provided students a template to guide their questions that was originally developed in conjugation
119 with a medical student.⁹ For SBIRT and motivational interviewing, attendings (NP and OB/GYN)
120 instructed students to practice these learning objectives in the context of tobacco/nicotine use, with
121 additional practice (as available) for other substance or alcohol use. Because tobacco/nicotine use
122 is prevalent in our population, this approach allowed students ample opportunity to practice SBIRT
123 and motivational interviewing skills. This approach also allowed for practicing this skill set even
124 among patients who were referred to OB MOTIVATE for SUD treatment after already being
125 screened for a SUD.

126

127 Students completed tailored pre-and post-surveys remotely via REDCap which is a secure web
128 application for building and managing online surveys (see Supplemental Digital Content 2, to see
129 an example of the survey). For the primary outcomes of self-reported confidence in SUD clinical
130 skills, these surveys included 5 items using a 5-point Likert scale (ranging from strongly agree,
131 agree, neutral, disagree, strongly disagree). Survey questions are listed in Supplemental Material
132 2 (example: *“I am confident in my ability to collect a thorough substance use disorders history*
133 *independently”*). For the secondary outcomes of self-reported competence in SUD knowledge,
134 surveys included 5 items using the same 5-point Likert scale (example: *“I am well versed in*
135 *identifying the signs and symptoms of substance use disorders including during pregnancy and*
136 *postpartum”*). These questions were adapted from a prior curriculum study by the research team
137 conducted among OBGYN residents.¹² A medical student was involved in this design of all this
138 study’s components, including piloting the surveys. The survey also explored SUD stigma using
139 the Medical Condition Regard scale (Likert scale descriptors included strongly agree, agree,
140 slightly agree, slightly disagree, disagree, and strongly disagree, higher scores indicate less stigma;
141 example item: *“Insurance plans should cover patients with substance use”*).¹³ Paired t-tests
142 assessed changes in outcomes, with increasing scores demonstrating improvement.

143

144 **RESULTS**

145 Sixty-three students rotated through the OB MOTIVATE clinic; 57 completed the curriculum and
146 surveys (response rate 90%). Overall, students’ confidence in the core SUD clinical skills assessed
147 increased between the baseline and follow-up surveys. For SBIRT, confidence increased by 32%
148 (pre and post Likert scales: 2.46 ± 0.80 vs 4.07 ± 0.59 , $p < 0.01$), for motivational interviewing by

149 23% (2.98 ± 0.86 vs 4.16 ± 0.65 , $p < 0.01$), SUD history taking by 22% (3.25 ± 1.04 vs 4.35 ± 0.55 ,
150 $p = 0.01$), evidence based medicine by 26% (2.91 ± 1.09 vs 4.23 ± 0.66 , $p < 0.01$).

151
152 The secondary outcomes related to competence in SUD knowledge also increased between
153 baseline and follow-up. For versed in issues related to epidemiology, confidence increased by 33%
154 (2.19 ± 0.74 vs 3.86 ± 0.67 , $p < 0.01$), for versed in issues related to physiology, by 29% (2.56 ± 0.95
155 vs 4.02 ± 0.35 , $p < 0.01$), for versed in identifying the signs and symptoms, by 29% (2.63 ± 0.90 vs
156 4.09 ± 0.51 , $p < 0.01$) for versed in diagnosing, by 33% (2.42 ± 0.91 vs 4.07 ± 0.68 , $p < 0.01$) and for
157 versed in treating, by 42% (1.95 ± 0.77 vs 4.05 ± 0.61 , $p < 0.01$). Regarding our exploration of student
158 held stigma, total scores from the Medical Condition Regard Scale changed by 8%, indicating
159 decreased SUD stigma held by students (4.62 ± 0.68 vs 5.10 ± 0.61 , $p < 0.01$).

160

161 **CONCLUSION**

162 To support addiction treatment expansion efforts in the simultaneous overdose and maternal
163 mortality crises, medical students need clinical exposure to and structured education on SUDs in
164 the perinatal period. The integration of interventional curriculums into medical school and
165 residency programs could be an effective avenue to reinforce addiction knowledge, teach new
166 skills, and mitigate stigma.¹⁵ This novel one-day pilot curriculum demonstrated preliminary
167 effectiveness at introducing third year medical students to the complexities of SUD in pregnancy
168 and postpartum.

169

170 The inherent limitations of this study included the small sample size and the limited amount of
171 time the students had in the clinic. With the reliance on self-report measures, bias was possible.

172 Additionally, this study did not evaluate the impact of the intervention on patient care related
173 outcomes. The data was collected anonymously from the students to reduce the risk of social
174 desirability bias, but bias is not inherently negligible. This data collected was restricted to a
175 singular institution and may not generalize to students at other institutions. Nonetheless, this study
176 provides preliminary data showing potential benefits of incorporating a SUD curriculum focused
177 on the perinatal period into a medical student rotation, despite the intervention's limited exposure.
178 Future research is warranted to evaluate the impact of SUD curricula, that emphasize practicality
179 for both teachers and students, on outcomes at the patient, provider and systems levels.

180

181 Implementing integrated SUD curricula using experiential learning models into medical training
182 could equip trainees to provide evidence-based care and reduce provider bias. Future research
183 should focus on adapting SUD curricula, like the one evaluated in this project, at other institutions
184 using multi-modal assessments (e.g., teacher and student evaluations). In doing so, outcomes
185 should incorporate SUD knowledge assessments, measurements of impact on patient care
186 processes and deeper investigations of how to best tailor a curriculum intervention to the needs of
187 students and teachers (e.g., optimal length of exposure to materials and clinical work).

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- 233

234 **Table 1.** Pre and post-survey results of students' self-reported knowledge and confidence in
 235 substance use disorder clinical skills (n=57)

236

Mean Self- Assessment Scores (SD)				
SUD Clinical skills Confidence	Baseline	Post	Difference	P
SUD History taking ^a	3.25 (1.04)	4.35 (0.55)	+ 1.11	< 0.01
Screening, Brief Intervention, Referral to Treatment ^a	2.46 (0.80)	4.07 (0.59)	+ 1.61	< 0.01
Motivational Interviewing ^a	2.98 (0.86)	4.16 (0.65)	+ 1.18	< 0.01
Evidence-Based Medicine ^a	2.91 (1.09)	4.23 (0.66)	+ 1.32	< 0.01
SUD Knowledge Competence				
I am well versed in issues related to SUD epidemiology	2.19 (0.74)	3.86 (0.67)	+1.67	<0.01
I am well versed in issues related to SUD physiology	2.56 (0.95)	4.02 (0.35)	+1.46	<0.01
I am well versed in identifying the signs and symptoms of SUD	2.63 (0.90)	4.09 (0.51)	+1.46	<0.01
I am well versed in diagnosing SUD	2.42 (0.91)	4.07 (0.68)	+1.65	<0.01
I am well versed in treating SUD	1.95 (0.77)	4.05 (0.61)	+2.11	<0.01
Student-held SUD Stigma				<0.01
SUD Stigma ^b	4.62 (0.68)	5.10 (0.61)	+ 0.48	< 0.01

237 ^a Rated on a 5-point scale (1=low confidence, 5=high confidence).

238 ^b Rated on a 6-point scale (1=high stigma, 6=low stigma).

239

240 **Supplemental Digital Content**

241 **Supplemental Digital Content 1.pdf**

242 **Supplemental Digital Content 2.doc**