

Teaching Students to Care (Coordinate): A Randomized Controlled Trial

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ABSTRACT

Introduction: Interdisciplinary rounds are a vital part of discharge planning; however, medical students receive little training in how to contribute effectively. Many existing discharge planning curricula are either prohibitively time consuming or narrowly focused. Addressing this gap can help improve interdisciplinary care and enhance the role of medical students on inpatient teams.

Methods: We developed a 30-minute curriculum on the purpose of interdisciplinary rounds, expected presentation content, and team members' roles and conducted a randomized controlled trial among medical students on their inpatient internal medicine rotation. Outcomes were measured using pre- and post-curriculum surveys and comparison of evaluations of student participation in interdisciplinary rounds.

Results: Eighty-six medical students participated in the study (59 intervention, 27 control), and we received 142 presentation evaluations (91 intervention, 51 control). There was significant post-curriculum improvement in all students' understanding of and comfort presenting in interdisciplinary rounds and knowledge of team members' roles. Presentation evaluations did not show a significant difference; however, students in the intervention group were better able to answer questions about their patients, with a difference approaching statistical significance (70% vs 57%, $P=0.069$).

Conclusions: A brief, just-in-time curriculum improved learners' knowledge of interdisciplinary discharge rounds and showed a trend towards improvement in their ability to answer questions during rounds. Our curriculum can empower medical students to help their inpatient teams by participating in discharge rounds and can be integrated into existing curricula with minimal disruption.

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INTRODUCTION

Medical students receive rigorous training in pharmacology, physiology, pathology, and physical exam techniques, but preparation for transitioning patients between phases of care is often lacking.¹ Many students are not exposed to the various factors that influence length of hospital stay and readmissions or the interdisciplinary teams involved in discharge planning until the start of their clinical rotations. Even during their clinical years, few students receive any formal training on planning transitions of care or participating in interdisciplinary care.¹

Interdisciplinary rounds have become a vital part of planning transitions of care from the inpatient setting. O'Mahony et al demonstrated that interdisciplinary rounds improved quality outcomes and led to better efficiency and communication among team members.² Subsequent studies by O'Leary et al reinforced that interdisciplinary rounding improved communication and reduced adverse event rates.³⁻⁵ These results have led to the

proliferation of interdisciplinary rounds to improve patient care and discharge planning. At our large Midwestern institution, interdisciplinary care coordination rounds (CCR) take place daily, with input from physicians, nursing staff, physical and occupational therapists, pharmacists, speech therapists, social workers, case managers, and dietitians. The medical teams are represented by attending physicians, advanced practice providers, resident physicians, or medical students. Physicians or their

representatives provide a brief summary of the patient's readiness for discharge and anticipated discharge needs. Each member of the interdisciplinary team then provides their input on discharge planning. Presentations and discussions must be succinct and discharge focused as each medical/surgical unit discusses up to 32 patients in a span of 60 minutes or less. Third- and fourth-year medical students on internal medicine clerkships and acting internships are expected to be able to present the team's patients at CCRs. Student participation in CCRs is a key part of their educational experience that also helps teams spread over multiple units engage with CCRs. However, nurses at our hospital reported that students were unable to deliver succinct discharge planning patient presentations at CCRs and were ill prepared to answer discharge-related follow-up questions from the interdisciplinary team.

In reviewing the existing curricula for interdisciplinary discharge planning, two major approaches emerged. On one side, comprehensive curricula aim to educate learners on all aspects of the discharge process. These programs may cover several sessions and often involve direct interaction between members of the interprofessional team.⁶⁻¹² Other models take a more focused approach, going into greater depth on a particular patient population or aspect of the discharge process.¹³⁻¹⁶ These methods both have proven successful, but challenges in teaching appropriate discharge planning remain. Many of these curricula are delivered in the beginning of the third year of medical school as part of transitioning to clerkship-type courses and students may not recall the content taught several months later when they start their internal medicine rotation. The time commitment and coordination between teams required of the more comprehensive programs are significant barriers to implementation, and although more focused curricula are easier to integrate into existing structures, they may only partially fill the educational gap.

With rising medical school enrollment across the country, 84% of medical student deans are concerned with finding a clerkship site for their medical students.^{17,18} One strategy to encourage facilities to accept medical students is to train students so they can lighten the workload for their clinical teams.¹⁹ Addressing the lack of training students receive in interdisciplinary care and discharge planning in the inpatient setting can empower students to take the lead in presenting their patients at CCRs and participating in the discharge process and making a concrete contribution to the patient care team. We developed a succinct, just-in-time curriculum designed to familiarize third- and fourth-year medical students with the discharge planning process, increase their knowledge of the roles played by interdisciplinary team members, and improve the quality of their presentations at CCRs. We used Kern's 6 steps of curriculum design as our framework for curriculum development and studied the impact of our curriculum in a randomized, controlled design. The objective of our study is to describe the impact of

our care coordination curriculum on cognitive and psychomotor outcomes in third- and fourth-year medical students on general internal medicine wards.

METHODS

Curriculum Development

We performed a targeted needs assessment by surveying interdisciplinary team members, including case managers and charge nurses (27 responses), and physicians, including hospitalists, internal medicine clerkship directors, and acting internship directors (25 responses). This needs assessment guided course objectives, curricular content, and evaluation questions. Based on the needs assessment, we developed a brief, in-person presentation (Appendix A) that included the purpose of CCRs, the expected content of student presentations, and the roles played by the different members of the interdisciplinary team. We designed this introductory material to require no prior knowledge beyond terminology covered in the first 2 years of medical school and followed it with discussion of example cases to provide practice in identifying both discharge needs and which interdisciplinary team members would be most helpful in implementing various aspects of the discharge plan. We intentionally created complicated sample cases to expose students to multiple facets of the care coordination process.

Study Design and Participants

We conducted a randomized controlled trial from March 2019 to October 2019 among third- and fourth-year medical students on their internal medicine rotation at our institution, a major multi-hospital Midwestern medical center. All students who rotated at the primary teaching hospital during the study period were eligible to participate, and those who rotated only at other sites were excluded. During their rotation, 1 to 3 students were assigned to one of 13 inpatient medical teams, and we randomly assigned each team to either the intervention or control group. The intervention group received the curriculum during the first week of their 1-month rotation, while the control group received it during the last week. Participation in the study was voluntary, and our protocol was evaluated and approved by the Medical College of Wisconsin (MCW) institutional review board.

Metrics

Our needs assessment identified understanding of the purpose of CCRs, lack of familiarity with interdisciplinary team members' roles, and expectations for presentation content as educational gaps; this data were used to develop our assessment tool (Appendix B). We used 5-point Likert scale questions to evaluate students' understanding of CCRs, their familiarity with participants' roles, and their comfort presenting at CCRs. We also included a series of questions in which students were asked to identify the team member best suited to help with a given discharge need. Pretests

were given at the beginning of the session and posttests were distributed immediately after the curriculum was delivered. We did not collect data on students' or teachers' perceptions of the curriculum.

To measure behavioral change, charge nurses completed a standardized checklist of medical students' performance at CCRs, with questions covering both the quality and content of presentations (Appendix C). Charge nurses were asked to include the students' team number on the evaluation but were blinded as to which teams were in the intervention or control groups.

Data Analysis

For Likert scale survey questions, we converted responses to numerical scores (ie, strongly disagree, very poor, or very unimportant=1; strongly agree, very good, very important=5) and calculated mean scores and standard deviations for each question. We used a *t* test to compare pre- and post-curriculum responses. We compared pre- and post-curriculum quiz scores using either a chi-square test or Fisher exact test based on the total number of responses. We used Fisher exact test to compare charge nurses' evaluations of intervention and control group presentations. Statistical significance thresholds for all comparisons were set at *P*<0.05.

RESULTS

Out of 146 eligible students, 86 (59%) participated in the study, with 59 randomized to the intervention group and 27 to the control group. Some students were called away for clinical duties prior to or during the curriculum session, leading to a lower participation rate and a lower number of post-curriculum surveys. We received a total of 142 charge nurse evaluations: 91 for the intervention group and 51 for the control group.

Following the curriculum, we found a statistically significant improvement in all students' understanding of and comfort with CCRs (Table 1). Both groups improved most in their awareness of the expected content of CCR presentations, followed by their familiarity with the composition of the interdisciplinary team and the roles of various interdisciplinary team members. We observed a larger difference between the two groups when students were asked about their familiarity with individual team members' roles (Table 2). The intervention group showed a significant improvement in their understanding of all team members' roles, except

Table 1. Familiarity With Care Coordination Rounds (1=Strongly Disagree to 5=Strongly Agree)

	Intervention			Control		
	Pretest n=59 Mean (SD)	Posttest n=50 Mean (SD)	<i>P</i> value	Pretest n=27 Mean (SD)	Posttest n=25 Mean (SD)	<i>P</i> value
I understand the purpose of care coordination rounds (CCR)	3.66 (0.28)	4.7 (0.13)	<0.001	4.19 (0.31)	4.72 (0.18)	0.006
I am familiar with the composition of the multi-disciplinary team	3.19 (0.30)	4.73 (0.12)	<0.001	3.81 (0.37)	4.72 (0.18)	<0.001
I am familiar with the roles of various members of the multidisciplinary team	3.08 (0.31)	4.6 (0.15)	<0.001	3.85 (0.32)	4.68 (0.19)	<0.001
I am aware of what is expected of me when I present at CCRs	2.80 (0.31)	4.62 (0.14)	<0.001	3.48 (0.4)	4.68 (0.19)	<0.001
I feel comfortable presenting at CCRs	3.12 (0.31)	4.24 (0.22)	<0.001	3.74 (0.34)	4.48 (0.2)	<0.001
CCRs are valuable for patient care	4.17 (0.20)	4.76 (0.13)	<0.001	4.07 (0.31)	4.56 (0.28)	0.027
CCRs are a valuable learning experience for medical students	3.90 (0.25)	4.58 (0.21)	<0.001	3.63 (0.34)	4.44 (0.30)	<0.001

Table 2. Familiarity With Roles of Team Members (1=Very Poor to 5=Very Good)

	Intervention			Control		
	Pretest n=58 Mean (SD)	Posttest n=50 Mean (SD)	<i>P</i> value	Pretest n=27 Mean (SD)	Posttest n=25 Mean (SD)	<i>P</i> value
Case management	3.28 (0.27)	4.24 (0.18)	<0.001	3.37 (0.32)	4.48 (0.20)	<0.001
Social work	3.79 (0.22)	4.34 (0.17)	<0.001	3.85 (0.27)	4.52 (0.20)	<0.001
Physical and occupational therapy	4.16 (0.20)	4.66 (0.16)	<0.001	4.41 (0.24)	4.76 (0.17)	0.023
Respiratory therapy	3.76 (0.25)	4.32 (0.21)	0.001	4.19 (0.31)	4.56 (0.26)	0.076
Dietitian	3.83 (0.22)	4.48 (0.18)	<0.001	4.19 (0.23)	4.76 (0.17)	<0.001
Speech therapy	3.76 (0.23)	4.42 (0.19)	<0.001	4.07 (0.32)	4.72 (0.18)	0.001
Pharmacy	4.22 (0.18)	4.64 (0.17)	0.001	4.56 (0.20)	4.76 (0.17)	0.124

for the pharmacist, which had the highest pre-curriculum score. Students in the control group only showed significant improvement in their familiarity with the roles of case managers, social workers, and dietitians.

In the quiz portion of the survey, intervention group members improved significantly in their ability to identify the appropriate role for case management, physical therapy, and the charge nurse (Table 3). The control group also showed significant improvement in 3 areas, improving their scores on questions related to the role of social work, case management, and pharmacy (Table 3). Our pre- and post-curriculum results show evidence of a Kirkpatrick Level 2 (knowledge gain) impact.

Charge nurse evaluations did not reveal a significant difference in presentation quality between the intervention and control groups (Table 4). A majority in both groups were familiar with their patients' reason for admission, potential discharge date, and barriers to discharge. Students in the intervention group were bet-

ter able to answer questions regarding their patients' plan of care appropriately, with the difference between groups approaching statistical significance (70% vs 57%, $P=0.069$).

DISCUSSION

This brief, just-in-time curriculum on interdisciplinary rounds showed a Kirkpatrick Level 2 impact by improving learners' knowledge of the composition of the interdisciplinary team and the roles played by each of its members. Although the difference did not rise to the level of significance, students in the intervention group were better able to answer questions about discharge planning during rounds, suggesting that a larger study may have found a Kirkpatrick Level 3 (behavioral change) impact. These results are promising in that they show that discharge planning education can be implemented efficiently and can allow medical students on inpatient teams to effectively assist in the daily task of care coordination without major disruptions to existing curricula.

Our institution has encouraged residents and faculty to better prepare students to participate in CCRs, but students' education had been inconsistent due to variations in educators' approaches to CCRs and difficulty finding time on busy medical services to focus on an additional topic. This inconsistency prompted the development of our curriculum. Students in the control group received the curriculum at the end of their rotation and had higher pre-curriculum scores for comfort level with and knowledge of CCRs compared to students in the intervention group, but the improvement in their scores on the post-curriculum assessment suggests our intervention added value beyond the existing informal instruction that occurs on medicine wards.

The primary limitation of our study was a small number of participants, particularly in the control group. We delivered the curriculum to the intervention group at the beginning of the rotation during other orientation sessions, which appears to have improved attendance. By contrast, sessions for the control group were scheduled at the end of the month when students had transitioned away from the orientation setting and were more involved in the day-to-day functions of their medical teams. Although it was the most feasible option in terms of logistics, our randomization process likely also introduced bias into our results, as all students on each team were in the same experimental group. Because

Table 3. Quiz Results Matching Role to Task (% Correct Responses)

	Intervention			Control		
	Pretest n = 57	Posttest n = 50	P value	Pretest n = 27	Posttest n = 25	P value
Guardianship	71.9	82.0	0.2194 ^a	55.6	92.0	0.0044 ^b
Home health care	45.6	58	0.2009 ^a	29.6	80.0	<0.001 ^b
Durable medical equipment	19.3	44.0	0.0058 ^a	11.1	64.0	<0.001 ^b
Out of bed mobility	84.2	96.0	0.0581 ^b	81.5	100.0	0.0515 ^b
Discharge huddle	54.4	90.0	<0.001 ^b	55.6	68.0	0.3567 ^a
Patient with hand weakness	43.9	58.0	0.1444 ^a	59.3	76.0	0.1985 ^a
Home intravenous medications	61.4	76.0	0.1057 ^a	63.0	92.0	0.0201 ^b
Poor oral intake	82.5	88.0	0.4224 ^a	77.8	84.0	0.7289 ^b

^aChi-square test.

^bFisher exact test.

Table 4. Charge Nurse Evaluation of Presentations

		Intervention (n = 51)	Control (n = 90)	P value
Familiar with patient's hospital course and reason for admission	Yes	79%	78%	1
	Partial	21%	22%	
	No	0%	0%	
Identified potential discharge date	Yes	70%	59%	0.3424
	Partial	27%	37%	
	No	3%	4%	
Identified barriers to discharge	Yes	64%	69%	0.8679
	Partial	31%	27%	
	No	5%	4%	
Presentation was succinct	Yes	75%	74%	0.2248
	Partial	24%	20%	
	No	1%	6%	
Able to answer questions appropriately	Yes	70%	57%	0.0697
	Partial	29%	35%	
	No	1%	8%	

of variability in teaching provided and emphasis placed on CCRs by different attending physicians and residents, it is possible that not all the difference seen between groups was attributable to the curriculum.

The low number of charge nurse surveys returned was another limitation that may have affected our ability to find a behavior-level change. It is impossible to determine how many surveys theoretically could have been filled out due to the fact that not every student would present at CCRs every day; however, considering that hundreds of CCR meetings occurred over the course of the study, 141 student evaluations likely represents a low response rate. Given the many responsibilities charge nurses have during CCRs, evaluating medical student participation was likely low on their list of priorities. Designating a separate evaluator may have improved our response rate.

Despite these limitations, our study showed that a succinct curriculum on interdisciplinary rounds improves both students' knowledge of discharge planning and their contributions to patient care. While details of the curricula, such as the specific

roles of case managers and social workers, were specific to our institution, the content would be adapted easily to fit other interdisciplinary rounding models, and the overall concept of introducing a brief discharge planning curriculum is readily generalizable. A short curriculum can be seamlessly integrated into orientation and could be delivered by nearly any faculty member. Given the increased use of asynchronous and virtual sessions, future studies should investigate the impact of an interdisciplinary rounding curriculum delivered as an online module to further facilitate its implementation. Dedicated education on interdisciplinary rounding should become a core part of medical training as we prepare learners to provide safe and efficient transitions of care for their patients.

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REFERENCES

1. McBryde M, Vandiver JW, Onysko M. Transitions of care in medical education: a compilation of effective teaching methods. *Fam Med*. 2016;48(4):265-272.
2. O'Mahony S, Mazur E, Charney P, Wang Y, Fine J. Use of multidisciplinary rounds to simultaneously improve quality outcomes, enhance resident education, and shorten length of stay. *J Gen Intern Med*. 2007;22(8):1073-1079. doi:10.1007/s11606-007-0225-1
3. O'Leary KJ, Buck R, Fligiel HM, et al. Structured interdisciplinary rounds in a medical teaching unit: improving patient safety. *Arch Intern Med*. 2011;171(7):678-684. doi:10.1001/archinternmed.2011.128
4. O'Leary KJ, Haviley C, Slade ME, Shah HM, Lee J, Williams MV. Improving teamwork: impact of structured interdisciplinary rounds on a hospitalist unit. *J Hosp Med*. 2011;6(2):88-93. doi:10.1002/jhm.714
5. O'Leary KJ, Wayne DB, Haviley C, Slade ME, Lee J, Williams MV. Improving teamwork: impact of structured interdisciplinary rounds on a medical teaching unit. *J Gen Intern Med*. 2010;25(8):826-832. doi:10.1007/s11606-010-1345-6
6. Ouchida K, LoFaso VM, Capello CF, Ramsaroop S, Reid MC. Fast forward rounds: an effective method for teaching medical students to transition patients safely across care settings. *J Am Geriatr Soc*. 2009;57(5):910-917. doi:10.1111/j.1532-5415.2009.02203.x
7. Bray-Hall S, Schmidt K, Aagaard E. Toward safe hospital discharge: a transitions in care curriculum for medical students. *J Gen Intern Med*. 2010;25(8):878-881. doi:10.1007/s11606-010-1364-3
8. Little M, Gammack J. Safety first! Transitions from hospital to post-acute care. *MedEdPORTAL*. 2014;10:9789. doi:10.15766/mep_2374-8265.9789
9. Bradley SM, Chang D, Fallar R, Karani R. A patient safety and transitions of care curriculum for third-year medical students. *Gerontol Geriatr Educ*. 2015;36(1):45-57. doi:10.1080/02701960.2014.966903
10. Card S, Sparrow C, Sheppard MS, Chipperfield D, Ward H. The safe discharge challenge: an interactive educational module for collaboration orientation. *MedEdPORTAL*. 2015;11:10191. doi:10.15766/mep_2374-8265.10191
11. Richmond A, Burgner A, Green J, et al. Discharging Mrs. Fox: a team-based interprofessional collaborative standardized patient encounter. *MedEdPORTAL*. 2017;13:10539. doi:10.15766/mep_2374-8265.10539
12. Kesselheim JC, Stockman LS, Growdon AS, Murray AM, Shagrin BS, Hundert EM. Discharge day: a case-based interprofessional exercise about team collaboration in pediatrics. *MedEdPORTAL*. 2019;15:10830. doi:10.15766/mep_2374-8265.10830
13. Eskildsen M, Flacker J. Care transitions workshop for first-year medical students. *MedEdPORTAL*. 2010;6:7802. doi:10.15766/mep_2374-8265.7802
14. Ohuabunwa U, Flacker J. Interprofessional collaboration and care coordination in the care of the discharged elderly patient. *MedEdPORTAL*. 2014;10:9821. doi:10.15766/mep_2374-8265.9821
15. Widmer K, Bhansali P, Noffsinger J. Discharge education curriculum for residents rotating on an inpatient pediatric ward. *MedEdPORTAL*. 2015;11:10079. doi:10.15766/mep_2374-8265.10079
16. Nonailhada J. Rehab concepts and discharge dispositions: workshop for medical students. *MedEdPORTAL*. 2018;14:10785. doi:10.15766/mep_2374-8265.10785
17. Enrollment up at U.S. medical schools. News release. Association of American Medical Colleges. December 16, 2020. Accessed July 29, 2022. <https://www.aamc.org/news/press-releases/enrollment-us-medical-schools>
18. Association of American Medical Colleges. AAMC medical school enrollment survey: 2019 results. September 2020. Accessed August 8, 2022. <https://www.aamc.org/media/47726/download>
19. Theobald M, Ruttner A, Steiner B, Morley CP. Preceptor expansion initiative takes multitactic approach to addressing shortage of clinical training sites. *Fam Med*. 2019;51(2):159-165. doi:10.22454/FamMed.2019.379892