

Online Modules Prior to Orientation Increases Readiness for Residency

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Abstract

Background: The transition to residency is a period marked by increased risk for patient safety events. Since 2017, NYU Grossman School of Medicine (NYUGSOM) has provided incoming interns with WISE-OnCall (WOC), 12 online modules designed to boost clinical readiness for residency. While features such as individualized feedback, high-yield cases, or self-assessment questions are known to enhance web-based learning, the impact of reducing required content or providing learner choice on engagement with e-learning resources is unclear

Objective: To explore whether reducing the number of required modules and incorporating learner choice impacted interns' engagement with, and attitudes towards WOC.

Methods: In 2023, NYUGSOM reduced the number of required modules from 12 to 4, including a module of choice. We compared exit and six-month follow-up survey responses and time spent on the modules between the 2022 (12 modules) and 2023 (4 modules) cohorts to evaluate the impact of this shift.

Results: 458 interns completed WOC across both years, with 405 completing the exit survey (response rate: 2022=90%, 2023=87%). More interns in 2023 versus 2022 reported the modules prepared them for internship, provided clinical frameworks, and that they anticipated revisiting WOC during residency. 2023 interns spent more time on the modules. After six months, both cohorts similarly recommended WOC. Interns in both years recalled content that 'stuck', particularly systematic approaches to clinical reasoning; but more 2023 interns applied module content in practice.

Conclusions: Fewer assigned modules and providing learner choice enhanced engagement and perceived relevance, informing best practices for e-learning resources during residency preparation. Clinical Trial: N/A

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ABSTRACT

Background

The transition to residency is a period marked by increased risk for patient safety events.

Since 2017, NYU Grossman School of Medicine (NYUGSOM) has provided incoming interns with WISE-OnCall (WOC), 12 online modules designed to boost clinical readiness for residency. While features such as individualized feedback, high-yield cases, or self-assessment questions are known to enhance web-based learning, the impact of reducing required content or providing learner choice on engagement with e-learning resources is unclear.

Objectives

To explore whether reducing the number of required modules and incorporating learner choice impacted interns' engagement with, and attitudes towards WOC.

Methods

In 2023, NYUGSOM reduced the number of required modules from 12 to 4, including a module of choice. We compared exit and six-month follow-up survey responses and time spent on the modules between the 2022 (12 modules) and 2023 (4 modules) cohorts to evaluate the impact of this shift.

Results

458 interns completed WOC across both years, with 405 completing the exit survey (response rate: 2022=90%, 2023=87%). More interns in 2023 versus 2022 reported the modules prepared them for internship, provided clinical frameworks, and that they anticipated revisiting WOC during residency. 2023 interns spent more time on the modules. After six months, both cohorts similarly recommended WOC. Interns in both years recalled content that 'stuck', particularly systematic approaches to clinical reasoning; but more 2023 interns applied module content in practice.

Conclusions

Fewer assigned modules and providing learner choice enhanced engagement and perceived relevance, informing best practices for e-learning resources during residency preparation.

INTRODUCTION

Transition to residency is stressful for new physicians as they bear significantly increased patient care responsibilities. Simultaneously, program directors and hospital administrators raise concerns about patient safety¹. Data show that patient safety is especially vulnerable during the transition to residency. For example, fatal medication errors have been shown to spike by 10% when residency starts in July² and in one study, half of new interns across 24+ medical schools reported being involved in a serious patient error within the first two months of internship³.

To address these concerns, faculty and hospital leadership at New York University Grossman School of Medicine (NYUGSOM) developed *First Night On-Call* (FNOC), a patient safety orientation included as part of residency orientation that aims to prepare interns to address common patient safety issues.⁴ As part of FNOC, incoming interns across all specialties were provided with a series of 12 online educational modules [WISE-OnCall (WOC)] to review high-yield clinical content related to patient assessment and management at the bedside prior to commencing their residency. The modules designed for early interns address acute presentations of common clinical problems interns are likely to encounter early in their training (Table 1) and emphasize when to escalate concerns to clinical supervisors. Grounded in the cognitive apprenticeship framework⁵, each module presents a clinical framework through videos and simulations with faculty modeling, followed by opportunities to independently complete practice cases and receive immediate written feedback on their decisions. The WOC modules were deliberately timed to be completed by interns right before the start of internship to standardize foundational knowledge among incoming interns who come in with diverse exposures to patient safety content and to cultivate shared mental models for how to approach common clinical problems seen in practice—all with the aim of mitigating patient safety risks^{4,6}.

Several institutions have designed and implemented similar transition to residency online modules and have reported on outcomes such as learner acceptability, knowledge acquisition, preparedness for internship, and increased confidence and competence⁷⁻¹¹. In these studies, effectiveness was attributed to features such as immediate, individualized feedback¹⁰, a sense of psychological safety fostered through the privacy and security of web-based platforms¹⁰, provision of guidelines and decision-making frameworks⁹, use of high-yield cases⁹, and questions to solidify and assess learner knowledge¹¹. These findings provide us with a more nuanced understanding of what specific features make web-based learning effective, therefore contributing to the larger literature that has already demonstrated that web-based learning is as efficient as traditional teaching methods¹²⁻¹⁶. In fact, many adult learners have reported preferring asynchronous models to traditional didactics¹⁶.

Although techniques such as interactive learning, problem-based learning, self-directed learning, case-based learning, self-assessment, and feedback have been established as effective techniques of web-based education¹⁷, little research has examined whether the number of assigned online modules--particularly during transition to residency onboarding—affects learner engagement. In addition, while research has shown that offering learners with a choice to control learning is associated with enhanced learning performance and engagement¹⁸, few have explored whether this association persists with online learning modules. Understanding how these features influence learner perceptions and engagement could help improve how online educational content are designed and delivered.

To investigate this, we reduced the number of assigned WOC modules from 12 to four modules and provided learners with a choice to choose their fourth module. Comparing data from exit and follow-up survey responses and time spent on the modules between two

cohorts who differed in the number of modules assigned and the degree of control learners had in their learning experience, we sought to investigate the following research question: 1) Does reducing the number of mandatory modules and incorporating learner choice impact interns' engagement with, and attitudes towards, the modules?

METHODS

Modules administration/ Intervention

We began assigning a subset of five modules to interns in selected residency programs in 2017 as part of residency orientation. Starting in 2021, this approach was expanded so that all incoming interns across all residency programs at our institution were required to complete all 12 modules prior to commencing residency. This change was implemented because the modules were seen as an effective way to meaningfully orient and integrate incoming interns with varying levels of exposure to patient safety into our organization, while also cultivating shared mental models around patient care and safety.

In 2023, to help lessen the onboarding burden on interns (who were all required to complete approximately 20 hours of web-based learning as part of onboarding), we reduced the number of mandatory modules from all 12 modules to four, including 1) fever/sepsis, 2) hypotension, 3) documentation for patient safety, and 4) a module of their choice. We analyzed and compared residents' ratings of the modules on the exit and follow-up surveys as well as time spent on the modules between the 2022 cohort (assigned all 12 modules) and the 2023 cohort (assigned four modules with a module of choice) to explore the potential impact of assigning fewer modules on interns' attitudes towards, and engagement with the modules.

Attitudes towards the modules

Each year, interns complete a mandatory exit survey at the end of orientation that asked

about interns' attitudes towards the modules including, whether they found the modules increased their level of readiness for internship and provided them with a framework to organize clinical information, whether and why they anticipated re-watching the modules during residency, and whether they would recommend the modules to future interns. Interns were later surveyed six months into their intern year to understand the longer-term impact of the modules. The follow-up survey included questions such as what 'stuck' with interns from the modules six months into internship, whether they revisited the modules, whether they applied something they learned from the modules to the clinical setting, and suggestions for future improvement. Both exit and follow-up surveys were developed by FNOC leadership, and the surveys stayed the same each year, allowing us to compare changes in attitudes over time. See Appendix 1 for full exit and follow-up surveys.

We used chi-square tests to test for statistically significant differences in attitudes towards the modules between the two cohorts (i.e., whether there were differences between the two groups in whether they agreed/disagreed with any of the statements about the modules). Open-ended responses from both the exit and follow up surveys were analyzed using the framework method for content analysis¹⁹. Themes were primarily informed by the survey questions, but the team remained open to other themes that may have come up from the data. All authors independently read through all comments for each question and generated initial codes based on recurring key concepts. The team then compared and refined codes to develop a coding framework. Author CB applied the coding structure to all survey responses and identified themes were compared across the 2022 and 2023 cohorts to explore potential differences in attitudes towards the modules between the two groups. Our team was comprised of physicians and non-physician educational researchers with a variety of roles with WOC, FNOC and during the transition of residency, which helped us to interpret our data in an unbiased and holistic manner. All qualitative analyses were carried out using Excel Software (Microsoft, Redmond, VA).

Time spent on modules

We calculated aggregate time spent on the modules for each cohort and conducted non-parametric Wilcoxon tests to look for statistically significant differences in time spent on individual modules between the two groups. Given that distribution was not normally distributed, differences in time spent are reported as differences in median time spent. All quantitative data was analyzed using R Core Team (2025).

RESULTS

Initial Impressions: Perceived value of the modules following orientation

A total of 458 interns across 18 residency programs completed the WOC modules between 2022-2023 (2022=220, 2023= 238). 197 interns in 2022 and 208 interns in 2023 completed the exit survey (90% (197/220) vs. 87% (208/238) response rates, respectively) to report their attitudes towards the modules.

More interns in 2023 compared to 2022 agreed or strongly agreed that the modules prepared them for internship (2022=85% vs. 2023=94%, $p=.004$) and provided them with a framework to organize clinical information during orientation (2022=89% vs. 2023= 95%, $p=.03$). More interns in 2023 anticipated re-watching the modules during residency (2022=44% vs. 2023=56%, $p= .01$). Similar percentages in both groups recommended the modules to future interns (2022=65% vs. 2023=63%, $p= NS$).

Time Spent: Impact of assigning fewer modules on engagement with the modules

When comparing time spent on the modules between the 2022 and 2023 cohorts, interns in 2023 compared to in 2022 spent more time on each module that were required both years (fever/sepsis and hypotension; we excluded documentation of patient safety module since it changed in 2023). We found significant differences in median time spent (in minutes) on

fever/sepsis (2022=37.6 vs, 2023= 43.4, $p<.0001$) and hypotension (2022=34.9 vs. 2023= 41.9, $p<.001$). For modules that interns could choose to complete, interns in 2023 spent more time on a given module when they chose to complete it compared to in 2022 when it was required (mean= 5.2 minutes more, range= .2 -7.8). Increased time was spent across the various module activities (i.e., expository videos and practice cases). See Table 2 for differences in time spent between cohorts.

Enduring Impressions: Intern attitudes towards the modules six months later

Of the 171 interns who completed the follow-up survey across both years (2022=92 [42% response rate], 2023=79 [33% response rate]), 46% of interns still agreed or strongly agreed that the WOC modules prepared them for internship six months into residency (2022=44% vs. 2023=48%, $p=.59$), while 58% of interns still recommended the WOC modules to incoming interns six months into residency (2022=54% vs. 2023= 60.7%, $p=.98$). No significant differences in agreement with these statements were found between cohorts.

When asked whether any content from the modules had 'stuck' with them several months into internship, there were no differences between the two cohorts in the percentage of interns who answered 'yes' (2022=46% vs. 2023=53%, $p=0.4$). Of those that did report that something stuck with them from the modules, many interns across both cohorts described learning a systematic approach to creating a differential diagnosis. Few interns even described these systematic approaches as 'mental pathways' or "basic reflexes" they relied on to help manage clinical scenarios.

How to manage a patient and rule out possible diagnosis to understand the right diagnosis. (Resident #14, 2022)

Mental pathways to think of pathology. (Resident #51, 2022)

Basic reflexes on what to do when you find someone hypotensive/potentially in sepsis. (Resident #29, 2023)

Listing the chain of conditions that led to death... thinking through pre-renal, intrinsic, and post-renal etiologies of oliguria. (Resident #49, 2023)

In addition, several interns described how the modules helped them feel more confident and prepared to handle acute and urgent situations, particularly situations that interns had less experience with (such as certifying a death).

I remember feeling overwhelmed with "certifying a death" because it was a concept that made me the most uncomfortable (death exam and then documentation to follow, along with calling and speaking to family), but this was the most impactful module and I remember the scenarios well, particularly as I just finished my first ICU rotation. (Resident #67, 2022)

[I was] never exposed to this [certifying a death] before, but very intimidating when I actually had to do it and this [WOC certifying a death module] made me feel less intimidated than I would've felt." (Resident #62, 2023)

When asked whether they applied something they learned from the modules in the clinical setting, more interns in 2023 compared to in 2022 reported that they applied something they directly learned from the modules to their practice (2022=11% vs. 2023=27%, $p=.007$). Of the 18% of interns across the two cohorts that reported that they applied something from the modules to their practice, there were no differences in interns' qualitative descriptions of how they applied knowledge from the modules in their practice. Specific examples of applications included using clinical frameworks taught in the didactic videos to rule out certain diagnoses when developing a differential diagnosis, knowing how to effectively address certain clinical situations with appropriate labs or medications, and escalating situations appropriately to supervisors or other healthcare professionals such as respiratory therapists, nurses, etc.

I knew to escalate a hypotension case to a RRT and felt comfortable to do it without fear of judgement. (Resident #88, 2022)

I have checked the info from the pain management module to help adjust my patient's pain regimen. (Resident # 90, 2022)

I recall going through the chest pain differentials to rule out ACS. (Resident #73, 2023)

Although in medical school we were somewhat discouraged from prescribing opiates, I knew opiates were the right choice for a patient presenting with intractable cancer pain. I felt confident managing his pain. (Resident #9, 2023)

DISCUSSION

Our results provide insights on best practices for how to administer and use e-learning resources. Comparing time spent on, and attitudes towards, the modules between the 2022 and 2023 cohorts helped us to recognize the merits of assigning fewer modules upfront as interns in 2023 reported more positive agreement about the value of the modules and spent more time on each of the modules. In addition, more interns in 2023 compared to in 2022 reported that they had applied knowledge that they learned directly from the modules to their clinical practice and anticipated re-watching the modules throughout residency. As adult learners, incoming interns may have appreciated having a manageable number of modules assigned, which allowed them to engage more thoughtfully with the content. This finding was further supported by our data as we found similar percentages of interns in both cohorts who would recommend the modules, despite differing attitudes between the cohorts towards the modules' overall value. We hypothesize that this similarity in recommendation rates across both cohorts may be due to interns' general hesitation in assigning additional 'work' to others. This suggests that institutions should be mindful of not overburdening interns with excessive tasks and resources during the onboarding process. In addition, we found that learners spent more time, on average, on modules they chose to complete compared to those that were assigned. While this finding is confounded by the overall reduction in the number of assigned modules, it may suggest that offering learners a choice in their learning content can enhance engagement with online educational resources.

Considering data across the two cohorts in aggregate, our results from the exit survey also demonstrate the overall value of the WOC modules in helping our trainees develop a framework for organizing clinical information and boosting their confidence and readiness for internship since more than 85% of interns in both cohorts agreed or strongly agreed with those statements. Follow-up surveys six months later reinforced the enduring usefulness of

the modules, with around half of interns in both cohorts agreeing that the modules had effectively prepared them for residency. Many interns reported remembering and applying into their clinical practice lessons learned from the modules six months into internship. Several interns even described relying on “mental pathways” and “basic reflexes” for managing clinical scenarios, which highlights how the modules have provided interns with clinical frameworks that are now seamlessly integrated into their clinical thinking and decision-making. These results from 2002 and 2023 mirror data that we have seen at our institution from the past six years (2018-2023) we have been using the WOC modules. Of the 1154 interns who completed the WOC modules and the exit survey during the past six years, 88% of interns agreed or strongly agreed that the modules increased their readiness for internship, while 89% of interns agreed or strongly agreed that the modules provided them with a framework to organize clinical information during orientation²⁰. Taken together, these results demonstrate that the modules have always been effective in preparing interns for residency, but perhaps the shift to fewer modules combined with the incorporation of learner choice in 2023 further enhanced their impact—improving both learners’ engagement with and perceptions of the modules’ value.

The positive impact of the WOC modules on our interns’ preparation mirror findings from other institutions that have used e-learning resources to augment preparation for the transition to residency and have found that immediate feedback, guidelines and decision-making frameworks, exposure to high-yield cases, and opportunities to practice skills are effective and acceptable techniques for web-based learning¹¹. These same features are embedded in our WOC modules, and our interns similarly found them instrumental in their own preparation. The significance of our findings was that our WOC modules were provided to all incoming interns across most residency programs at our institution-- unlike previous studies which focused on the use of e-learning resources within single residency programs. In addition, findings from this study offer new best practices for leveraging asynchronous,

online resources for residency preparation--suggesting that assigning fewer modules and integrating learner choice may be effective approaches to enhancing learner engagement and are generally well-received and accepted by a wide range of learners.

Our study has several limitations. This study was done at a single site, therefore limiting generalizability to other institutions. However, as mentioned earlier, the WOC modules have been used at our institutions for the past six years with all incoming interns completing them over the past three years. This extensive use of the modules therefore provides us with confidence in the modules' acceptability and value. Second, isolating the specific impact of the modules on interns' knowledge retention and clinical practice is challenging due to numerous confounders, such as use of other educational resources and the natural learning that occurs being in residency. Another limitation is our reliance on self-reported data, which is inherently subjective and may be influenced by factors such as social desirability, memory recall or response bias. It is also possible that interns could have overestimated the perceived effectiveness of the WOC modules or may even be 'overconfident' of their own mastery of material, which could affect the accuracy of our findings. However, content covered in the modules are not new and were intended to help learners solidify patient safety content learned during medical school. This review could make learners' more confident in their understanding of the material and could potentially lead to more accurate self-assessments of their skills. Lastly, our current study did not explore whether the shift to few modules (or the WOC modules overall) had a direct impact on clinical outcomes, such as a reduction in medical errors committed by interns, which would be the ultimate measure of the WOC modules' effectiveness. This was considered beyond the scope of this current paper, which focuses on the importance minimizing cognitive load and the role of learner choice in enhancing learner engagement with online modules.

Our results have demonstrated the benefits of assigning fewer assigned modules; however

further research is needed to determine the appropriate number of online modules to assign to learners, especially during transition to residency onboarding. Additionally, more research is needed to explore whether providing learners with a choice to control their learning by personalizing which modules to watch enhances receptiveness towards and engagement with online resources. Understanding this could inform strategies to optimize the effectiveness of e-learning resources. Lastly, next steps for research should explore the impact of the modules on patient-level outcomes, such as reduction in medical errors committed by interns. As an initial step, we plan to partner with a single residency program to collect patient safety data and assess whether the implementation of these modules is associated with measurable decreases in medical errors.

CONCLUSIONS

Our results suggest that assigning fewer modules and providing learner choice can improve learners' receptiveness towards and engagement with learning resources. Opportunities for learners to control their learning should be built into future educational resources and experiences.

DECLARATIONS

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Conflict of Interest: The authors declare that they have no competing interests.

Availability of data and materials: Data for this study were collected as part of a quality improvement project at our institution, but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate: This project qualified as an educational quality improvement project through NYUGSOM's Institutional Review Board, and therefore resident consent was not required for participation in this project.

"This quality improvement (QI) project was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki, and all data collection procedures were approved by the local institutional review board (IRB), which deemed the study exempt from full IRB review due to its QI nature."

List of Abbreviations:

- New York University Grossman School of Medicine (NYUGSOM)
- First Night On-Call (FNOC)
- WISE-OnCall (WOC)

Author' contributions: All authors contributed to the design of the surveys used to evaluate the WISE-OnCall modules. CPB analyzed the survey data and all authors discussed and interpreted the survey data together. MWN analyzed and interpreted the data on time spent on the modules. CPB drafted the manuscript, and all authors substantively revised the manuscript. All authors read and approved the final manuscript.

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TABLES (embedded in main text but also included here below):

Table 1. List of the 12 WISE-OnCall modules

The WISE-OnCall modules focus on addressing acute presentations of the following common clinical problems:

- Abdominal Pain
- Acute Pain Management
- Certifying a Death
- Chest Pain
- Documentation For Patient Safety
- Dyspnea
- Fever and Sepsis
- Hypertension
- Hypotension
- Loss of Consciousness
- Lower Extremity Pain
- Oliguria

Table 2: Time spent on the modules, comparing cohorts 2022 (assigned all 12 modules) and 2023 (assigned 4 modules).

Module		2022 N completed module	2022 Avg mins spent	2023 Avg mins spent	2023 N completed module	Sig diff?
Required both years*:	Hypotension	239	35	42	233	P <.001***
	Fever and Sepsis	237	37	45	234	P <.001***
Could choose from in	Lower Extremity Pain	232	33	42	37	P <.05 *
	Oliguria	238	26	32	69	P <.01 **

2023:	Loss of Consciousness	238	23	31	32	NS
	Hypertension	237	29	36	29	NS
	Dyspnea	235	34	41	47	NS
	Acute Pain Management	236	38	42	40	NS
	Acute Chest Pain	238	50	54	36	NS
	Abdominal Pain	240	51	49	63	NS
	Certifying a Death	237	28	24	68	NS

***Documentation for Patient Safety was excluded from analysis because module changed in 2023**

Supplementary Files

Multimedia Appendixes

Exit and 6-month follow up survey questions asked in 2022 and 2023.

URL: <http://asset.jmir.pub/assets/02476fd56e6a18bd8c421027dbd6bb4c.docx>