Evidence Based Library and Information Practice

Research Article

"We Don't Like Unanswered Questions": Information Practices of Students Transitioning to Clinical Education

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Abstract

Objective – Health professions students are awash in large quantities of information, often conflicting, as they learn their professions. In order to navigate this information, librarians often engage with these students, usually in their didactic phase of education; however, the way students use information clinically may not be the same as the way they learn to do so in the classroom. This study investigated the information practices and experiences of health professions students early in the clinical phase of their education, in order to answer the following research questions: What are the information practices of health professions students at the transition to clinical education? How do these students understand how their practices have developed over their education?

Methods – A purposive sample of learners from six health-focused professional programs participated in individual in-depth interviews, created timelines, and completed follow-up diary entries. The data were analyzed using inductive thematic analysis.

Results – Students' information practices are characterized by three themes. They are motivated

to build competency to provide patient care; they operate in dual roles as student and clinician; and they navigate ambiguity, uncertainty, and doubt. They were able to describe the way they experienced information, problems they solved, and the development over time. Taken as a whole, this describes student experience with information as a method of making meaning from previous experience and learning with a focus on applying what they know and learn to improve patients' lives and health.

Conclusion – Insight into these students' practices, including affective and social domains of practice, can inform librarian-led instruction and outreach within health professions and other professional programs. Linking education about information to students' motivations to provide excellent patient care and their desire to operate scientifically in a world of doubt may provide more relevant instruction, leading to transference of learning to new environments.

Introduction

Health professions students are developing clinicians seeking to heal and help others. They will become physicians, pharmacists, dentists, physical therapists, physician assistants, occupational therapists, nurses, or a number of any other professions. In this process, many move through an education model with two phases. The first is a didactic phase, where they learn background information such as anatomy and biochemistry, followed by a clinical phase, where they learn how to apply this knowledge to clinical practice in a vastly different environment. During clinical education, students spend a period of months to years working within their chosen discipline with close supervision and mentoring, often rotating through a variety of locations and specialties. In this experiential phase, they learn how to effectively work with patients, navigate their professional identity development, deepen their responsibility for proper diagnoses and treatments, and apply previously learned knowledge to patient care. Unsurprisingly, the transition to this experiential phase is often fraught with difficulty and stress, which Atherley and colleagues (2019) categorized into educational, social, and developmental perspectives, urging educators to consider multiple perspectives when making changes to their educational approach.

Due to the high-stakes nature of healthcare and the promise of evidence based practice (EBP) to improve it, librarians have sought opportunities to partner in health professions curriculum to improve students' use of information in their practice (Adams, 2014). Information practice is a broad concept that incorporates emotions, context, and social interaction and "gives a central role to the social and cultural factors qualifying information seeking and devotes attention to the processes of information sharing" (Savolainen, 2007, p. 125).

Given all the literature that discusses students' information behaviour and how to influence it, few if any studies seek their perspective on the whole of their practices, especially as they begin clinical education. The transition between didactic and clinical education of these students is an exciting and fraught time, one where student perspective can illuminate what they know and wished they had learned earlier based on their present needs.

Literature Review

Information overload is a large stressor involved in health sciences and is of particular concern to health sciences librarians. The father of evidence based medicine, David Sackett, is quoted as saying,

> Half of what you'll learn in medical school will be shown to be either dead wrong or out of date within five years of your graduation; the trouble is that nobody can tell you which half—so the most important thing to learn is how to learn on your own. (Smith, 2003, p. 1431)

Here, Savolainen's (2007) definition of information practice can be useful, as studies indicating affective domains of information experience, as well as attitudes and beliefs, often fall in this category of information practice. However, few studies take this larger view, especially within health professions. Instead, the literature focuses on more easily measurable behaviours and skills, such as which sources health professionals and students consult and how often (Daei et al., 2021; Heer et al., 2024; Straub-Morarend et al., 2016), features of their searches (Chi et al., 2021), or impact of library instruction (Conlogue, 2019; Schweikhard et al., 2018), or researchers use a scale, such as the Fresno Test, to measure information-related skills (Bazrafkan et al., 2017; Boruff & Harrison, 2018; Silva et al., 2024). The efforts of this research to quantify information behaviour is valuable; however, they often focus on a small number of professions instead of taking a broad view. One study of health professions students more broadly, conducted by Mishra and colleagues (2015), found that students sought information to prepare for exams and enhance their knowledge and were stymied by a lack of time. While providing a valuable cross-disciplinary view of multiple fields, this study focused on students' uses of the library for coursework, rather than for clinical practice. Further, several additional components of information experience may provide valuable insight beyond what quantitative insight can provide.

Qualitative research on information behaviour of health professions students is similarly sparse and focuses on nursing and medicine (Brennan et al., 2014; Wahoush & Banfield, 2014). Sharun (2021) found that undergraduate students in a practicum environment experienced information through three lenses: as students who were learning and being graded, as employees using information to perform their work, and as professionals building their vocational identities. She noted the value that further qualitative research would have in adding context to studying student perspective, which would ultimately lead to better librarian-led instruction. Some qualitative research has been done on the experiences of students in EBP in a particular discipline. When discussing their experience with EBP, students felt a tension between what they had learned and what they experienced, sought mentorship and guidance from their clinical instructors, and ultimately were motivated to provide excellent care, whether they were practising nursing (Giesen et al., 2024), physical therapy (Olsen et al., 2013), or medicine (Ilic & Forbes, 2010).

More extensive qualitative research has been done in other higher education student populations. In her 2014 study of mature students' information seeking, Clark found that the affective dimension was important to her participants and should be addressed in instruction, as well as the reality that information seeking may occur in small bursts between other commitments. Similarly, Kocevar-Weidinger (2019) and colleagues noted that first-year students were curious, passionate, and social in their information-seeking habits. Additional studies that incorporate investigation of the affective experience of information would provide a valuable perspective that has yet to be fully explored in the context of information practice (Savolainen, 2020).

A broad view of information practice, incorporating the humanity of health professions students—both who they presently are as students as well as the practising clinicians they will become—provides an opportunity for librarians and other educators to guide the development of necessary skills and attitudes to navigate an increasingly complex world of mis- and disinformation.

Aims

The present study seeks to investigate the information experiences of health professions students early in their clinical education. At this junction, the students' perspective on their information practices can encompass their present reality, suppositions about their future directions, as well as how their recent education has prepared them for clinical practice. Investigating these experiences can help librarians see students in a more holistic, humanistic way, improving our practice as compassionate educators as well as facilitating transference of previously learned skills.

This study seeks to answer the following research questions: What are the information practices of health professions students at the transition to clinical education? How do these students understand how their practices have developed over their education? The present article focuses on the first question, with a further discussion of the second to come.

Methods

This study was deemed exempt by the University of Utah Institutional Review Board (IRB_00157722). I used a narrative inquiry approach which incorporated Dervin's Sense-Making theory and methodology in its development (Dervin & Naumer, 2018). Qualitative data from in-depth interviews and diaries were gathered from a stratified purposive sample of four students in six professional programs. Recruiting four students for each program was intended to provide some variety of their experiences, likely approaching saturation for that discipline (Guest et al., 2006), while cognizant that there may be commonalities across disciplines, making achieving saturation for each discipline unnecessary. The eligible population included students in the first or second clinical semester of one of six programs: dentistry, medicine, physician assistant, occupational therapy (OT), pharmacy, and physical therapy (PT). Due to my institution's integration of clinical and preclinical education in nursing, these students were not included in this study. I chose these disciplines as they represent some diversity of practice while sharing the common transition from didactic to clinical education.

Table 1 provides a summary of the eligible populations, including degrees they were earning, characteristics of their preclinical education, and time to graduation and practice. I calculated residency percentages based on the reports from the schools' and colleges' public webpages.

Table 1
Characteristics of Sample

Program	**Granted degree**	**No. of eligible students**	**Preclinical semesters**	**Years to practice**
Dentistry	DDS Doctor of Dental Surgery	53	4	2–8
Medicine	MD Doctor of Medicine	123	6	5–12
Occupational Therapy	MOT Master of Occupational Therapy	37	5	0.5
Pharmacy	PharmD Doctor of Pharmacy	56	9	1–3
Physical Therapy	DPT Doctor of Physical Therapy	49	6	1
Physician Assistant	MPAS Master of Physician Assistant Studies	69	4	1

I recruited the participants by coordinating with a staff member in each program, who sent out a Qualtrics survey. After students responded, I sent a link to SignUpGenius, a scheduling tool, to the first four respondents in each program. In cases where participants did not schedule within one week, I emailed the next participant on the list.

Each participant was provided with a $40 Amazon gift card upon completion of all research activities. These research incentives were funded by a $1,000 research stipend from the Midcontinental Chapter of the Medical Library Association. Participants selected their own pseudonyms, and identifying information was kept separate from the research data to ensure privacy and confidentiality.

The semi-structured interview guide and diary prompts were constructed using open-ended questions derived from Dervin's work in Sense-Making (Dervin & Naumer, 2018). I chose this model as its conception of people as actors moving through situations resonated with gathering student input on their authentic experiences. In developing the guide, I consulted with and tested it with those outside the sample population (i.e., librarians and PhD students who were knowledgeable about qualitative methods) and inside (i.e., a health professions student). The interview questions, which are available in the Appendix, asked participants how they use information, what is relevant to them in the moment, and how they use information to move through a problem. The interview guide remained the same over the course of the study. I conducted interviews with students in October 2022 and January 2023 and gathered diary entries in November 2022 and February 2023. I used Zoom to conduct, record, and transcribe the interviews using the auto-transcribe feature. One month after the interviews, participants were invited to complete two invited diary entries, one week apart, using Qualtrics. Due to the possibility of identifiable

information, even with anonymization, none of the data will be shared. The interview and diary questions are available in the Appendix.

As the two research questions are broad and complementary, I have included them both within this manuscript; however, the reporting of the results will be divided among two manuscripts, one per question.

Data Analysis

I used Dedoose (SocioCultural Research Consultants, 2024) to facilitate qualitative data analysis. After an initial review and clean up of the auto-transcribed interviews, I used inductive thematic analysis to analyze the text. I coded in two rounds, evaluating and consolidating the codebook in relation to the research questions and emergent themes. After coding was complete, themes were analyzed and explored in relation to the research questions, ensuring attention to the ways students' experiences, emotions, attitudes, and strengths impacted their information practices.

Positionality

I am not and never have been a healthcare provider, nor a student in these programs. I come from a middle-class background and hold a tenured faculty position. I am white, female, and well represented in my field.

Results

A total of 25 students participated in the study—four from each program, except medicine, which had five participants due to a recruitment error. Participants selected their own pseudonyms (see Table 2 for an overview). Each participant provided at least two diary entries (one dental student provided three) and one interview transcript.

Table 2
Participant Overview

Pseudonym	**Field**
a1	Pharmacy
Anna	Occupational Therapy
Ashley D.	Occupational Therapy
Barb	Dentistry
Cementoblastoma	Dentistry
Dr Strange	Medicine (MD)
Dwayne	Pharmacy
Evelyn	Medicine (PA)
Goldie Switzer	Medicine (PA)
Indiana Jones	Medicine (MD)
Izzy	Medicine (PA)
JB	Occupational Therapy

Kimberly	Medicine (MD)
Koy Jaspers	Physical Therapy
Lee	Physical Therapy
Moose	Physical Therapy
Queen	Physical Therapy
Rudi	Occupational Therapy
Scuba Steve	Dentistry
Shane	Pharmacy
SpicyMeatball	Medicine (PA)
Stacey	Pharmacy
Susan Smith	Medicine (MD)
The Flash	Medicine (MD)
Tofu	Dentistry

Analysis of the participants' interviews, diaries, and timelines yielded a wide variety of information practices, including attitudes, emotions, behaviours, needs, processes, and experiences. This paper will summarize and analyze the commonalities and high-level themes of their information practices broadly; further analysis is expected to produce more insights, especially on their understanding of their education.

Participants described their own information practices in a way that demonstrated an understanding of it as a broad concept, that is, they included a variety of information behaviours, motivations, and experiences in their answers. They spoke about sources they used, their types of information needs, and their motivation to use information over the course of their entire education, with a focus on their present situation.

Knowing which strategies and sources students use is part of the picture of their experience. The ways the students experience information in their practice were more sophisticated than a simple report of their motivations, needs, and sources could convey, given their context as learners in a clinical environment. I identified three themes regarding their experience with information: First, they were motivated to become competent in order to provide excellent patient care; second, their practice was shaped by various contexts, notably their dual and often competing roles as students and clinicians; and finally, they were learning to operate in ambiguity, uncertainty, and doubt (Table 3).

Table 3
Themes and Related Practices

Competent providers caring for patients	**Contextualized by dual roles**	**Operating in uncertainty**
• Patient care is primary motivation • Needs and sources driven by desire to be competent at patient care, including checking comprehension, clarifying terminology • Sharing information with patients and other providers	• Students as novices • Building competency and its impact on patient care • Students as experts • Need to succeed academically as well as clinically	• Information overload • Conflicting or poor-quality information • Lack of information

Competent Providers Caring for Patients

Competency in service of patient care pervaded the participants' discussion of their practice. Many made jokes around their desire for competence, such as Dr Strange, "I'm excited to be able to actually know what I'm talking about … so that I can actually convey and be a competent provider." While they approached this with levity, the way they reasoned through problems with care and effort showed a sophisticated level of competence. Student conceptions of what competence meant varied, with a1 saying, "I want to be a solid pharmacist," and others discussing efficiency, like Barb, "How can I be efficient but still listen to my patients and not feel like they're being rushed out my door?" JB described attaining competency as an almost automatic function of knowing what to do, "just helping [patients] in the moment with what they need help with, being a problem solver." Similarly, Scuba Steve reflected upon knowledge he has gained as, "It gets to a point where you don't have to continue to see this flashcard over and over again, it just becomes part of who you are, and it's part of your clinical judgment."

Motivation to Provide Patient Care

The students recognized and valued information to provide patient care. Ashley D. summarized,

> Information is critical to actually make a difference. … I want to be able to change people's lives. That's why you go into health care, right? I think information is crucial for best practice, and making things patient centered and providing them with the best tools they need to have a good quality of life.

Another student, a1, seemed to agree that knowing where to find information "translates into helping people better." Participants consistently linked their use of information with building competency and providing patient care. When asked what information was important, The Flash explained,

> The things that are important are both general information and very specific information. Encyclopedia-type information, where I'm looking up a specific disease and I want to understand the general idea about it … and then when I'm actually making a plan, I'll often need to go back and like, 'Okay, well, it says that I should be using [medication].

> So what dose should I be using for this particular patient in this condition?'

Sources that didn't fit with these needs, such as textbooks and, for some, videos, weren't as useful and were discussed less.

As part of providing care, participants used information to prepare for patient encounters, respond to questions, and continue building their clinical expertise. To prepare for an encounter, they used a combination of chart review, discussing with an expert, reviewing their notes, or seeking further information from scholarly or clinical sources. Point-of-care tools, primarily UpToDate, were heavily mentioned by students in medical and pharmacy specialties. These tools provide a high-level synthesis of a disease state, drug, or condition and are designed for clinical care. Evelyn's description was typical and shows the duality of pursuing competence in patient care: "We use [UpToDate] to supplement decision making, like when I'm trying to narrow a differential … and then just to generally increase my knowledge on a topic." The students also seemed very aware that their use of point-of-care tools was well-known: When asked about patient questions, Stacey said, "My quickest way would be UpToDate, Lexicomp, but that's boring." Other factors like access and others' behaviour factored in. Goldie Switzer experienced both when she wanted to use a specific resource because, "All my providers use it. I know I have a login and I can access a lot of this stuff through the library, and I do on my computer, but I don't have it set up on my phone." Guidelines were valuable, especially in medicine, physical therapy, and pharmacy. While they were useful, a number of PT students in particular discussed guidelines' limitations, including Moose:

> In clinical practice guidelines there's not exactly like, 'Here are the exercises. You should do this. This is exactly how to do it for every single person.' That's not the way that it is, so you have to use your creativity.

Needs and Sources

Needs varied by program, and specialized sources for particular domains were often mentioned. For example, pharmacy students discussed drug information sources, rehabilitation science students had their own organizations and guidelines, and medical and physician assistant students used sources to help inform their diagnostic process. Students in procedurally focused rotations or fields, like dentistry, often discussed viewing procedures on YouTube, as Cementoblastoma rationalized, "There's so much of a craftsmanship thing behind doing actual dentistry, so YouTube videos are nice." JB, like some other students in rehabilitation science, would use social media to get ideas:

> I follow some OTs on Instagram and TikTok that like do little informational things, like here is a video of all the different ways kids hold a pencil. That's kinda nice to just pop up and be like, 'Okay, cool. I'm learning something on my social media scroll.'

Interpersonal sources, especially supervisors, were prized for speed, reliability, and real-world experience. Rudi discussed her source options as "Google is the quickest, but it might not be the most helpful, whereas experience may be more helpful." Barb said, "My attendings are always my biggest source of information just because they've seen so much more and done every possible solution of the problems that come up." Supervisor experience was always spoken of positively, especially when reconciling differences between actual practice and other information, as Lee described: "I like to see [guidelines as] the most recent up to date information and then asking [supervisor], 'What do we actually

do?'" This combination of reliable, quick answers and relevant experience made supervisors consistently used sources.

Students also spoke about patients themselves in a humanistic way as motivating their use of information. Reflecting on how she used information in a clinical setting, Anna said she had "more motivation because it's real people." Other students were considerate of patient time, perspective, and comfort. Izzy discussed using chart review to get the patient's "story" because "they don't want to retell it." Barb wanted to ensure she understood a procedure before working on a patient because, as she said, "I never want to learn at the expense of a patient." Koy Jaspers, like the other participants, often considered patients themselves as information sources and stated, "Patients know their body better than we do. … It has been helpful just to ask the patient straight up, 'What's going on?'"

Sharing Information

Sharing information with patients, families, and other providers was another common practice that served patient care and competency. Many students had supervisors, either presently or in the past, who quizzed students or asked them additional questions to further their learning. Shane described one such experience with topic discussions as, "So I read about a topic and then create a handout outlining what we do for [topic], what is [it], how can we help patients with [it], etc. And then I just discuss it with my preceptor." Patients and other members of the healthcare team asked students similar questions that they would ask a provider in their specialty. For example, a1 said other providers asked "administration questions like, 'Oh, hey! Can we change this IV to an oral medication?' Or 'Can these two things go in the same line? Are there interactions?'"

Students working in situations where patient buy-in for treatment was difficult often shared information to influence patient behaviour. Moose reported that she would "definitely use a lot of background knowledge and information to explain why we're doing what we're doing to patients and their families." Using visual information was helpful for patients to understand difficult concepts or processes, as Cementoblastoma described:

> I know when I'm sitting there and trying to explain something—a physiological process, particularly with disease or pathology to the patient—they have no idea what I'm talking about. They just look at me. But if I have pictures, then that helps a lot.

SpicyMeatball found it helpful to discuss the result of scales and other data with patients to

> … help the patient understand why you're making these choices for them. I'll use it to see like what is this person's risk of having a heart attack in the next ten years, and if they're hesitant to go on [medication] or something like that, you can use that to have some information. … I think patients appreciate a data-driven approach, in some respects.

It was important for students to have a good understanding of the knowledge they were communicating to patients, as Rudi described, "Now I need to know that information rather than reading it straight off of a textbook. I gotta know it and know it in terms that [patients] would understand." Indiana Jones reflected more broadly, "The pinnacle of mastery of a set of knowledge is that you can convey that in a simplified and meaningful way to somebody else."

Information's Role in Building Competency

Most students refer to information to help improve their knowledge in a variety of ways, including understanding disease states, symptoms, diagnoses, lab tests, dosages, patient perceptions, and their own way of practising. Susan Smith described the intersection of motivation for using information to gain competence and provide patient care as "mak[ing] sure that we understood the patient's diagnosis and that we were providing appropriate treatment based on what that diagnosis was." In this way, seeking information and competency helped provide a backdrop of understanding for a confusing situation that required further reflection. Likewise, Anna said, "After thinking about the suggestions [supervisor] made, I realized I could come up with answers, but I didn't have a lot of evidence to back me up."

At times, furthering their understanding meant getting quick clarification. This occurred especially with drug names, as Indiana Jones said,

> I've heard of this drug, but I don't know what drug class it is, or a lot of times they use trade names for different drugs and that I've never heard of. It's easy to just do a quick Google search and it pops right up.

Other terminology was often confusing, as Lee described looking up "abbreviations I see in charts … and a surgical procedure I don't know anything about." Susan Smith also noted that diseases often lack intuitive names, or have otherwise confusing terminology, "I know one name for most diseases and then you're in clinic, and it's either pronounced differently, or … there are like five other names for the same disease." The students were all glad to have access to a variety of information sources. Evelyn, after using point-of-care tools and calling an expert to weigh in on a clinical problem, said, "If there was no Internet and no one to help, it would have been a bummer." These students' information practices are well understood in their pursuit of competency to provide excellent patient care.

Information Practices Are Contextualized by the Dual and Competing Roles as Student and Clinician

The students operate in a liminal space: They are acting as clinicians but still need to pass boards and graduate from school. They feel like novices much of the time, and yet their student status gives them interesting opportunities to contribute to patient care. These tensions also contextualize the way they use information. SpicyMeatball described this as,

> We all need to focus on figuring out this new role as a provider and what kinds of responses are helpful or unhelpful for patients. Some of it's trial and error, but we can also refer back to what we learned.

Students as Novices

Students were keenly aware of their status as novices and learners, often uncertain of the right quantity of information to learn or use. Evelyn was interested in more in-depth information but expressed that "there's so much to know … that anything supplementary, while interesting, I peruse it and then I just push it straight to the side, 'cause I'm just trying to get the basics." Other students focused on the difficulties present when they lacked knowledge or understanding in the clinical environment. Scuba Steve discussed having to quickly familiarize himself with a procedure a patient needed before he had formally learned to do it: "You go home, you review the lecture two weeks in advance, and you're like, 'Oh, yeah, we could do [procedure].'" Although he didn't know much about the procedure yet, he did

what he could to provide the patient the care they needed. Koy Jaspers expressed that he was grateful that his supervisor trusted him to see patients on his own,

> [The supervisor is] there if I need anything and totally available but gone to the point where he trusts me working with patients from a safety standpoint, which is really cool. [It] also feels like I can be myself a little bit more—it's kind of awkward whenever you have someone in the same room, kind of just looking over you.

Izzy evaluated her expertise compared to her supervisor, saying, "I'm excited about not having to look up everything, not having these sources constantly. … I don't see her constantly—or regularly, even—looking things up." After not being able to "get the diagnosis" for a patient, Kimberly reflected on her lack of experience with diagnosing rare conditions,

> There's so many of these things that we learn about that could be more rare, or sometimes we learn about the common things. Even those are hard to diagnose as third years. … [The unique diagnosis is] something I learned about in med school a bunch of times, so I thought it'd be more common than it actually was.

Even with their novice status, students like Goldie Switzer recognized their own progress: "I'm just now learning how to do this, but I can do this too, I just need more practice."

Building Competency and Its Impact on Patient Care

The inherently inauthentic nature of education was a source of stress because it slowed patient care, could not immediately transfer to clinical care, or the students were required to learn things for other external reasons, such as boards, that had unknown relevance to their practice.

At times, building competency conflicted with providing the best care. Tofu described building competency, "In … school we have to do everything very systematically, where everything else has to be done in a certain stepwise fashion," and this often resulted in patients needing more appointments and longer plans of care, whereas when the student becomes a provider, they would have the expertise and authority to make decisions to optimize the patient's care. The students were excited to be able to move more quickly in treating patients and were aware that patients were, at times, inconvenienced by their status as learners.

Their previous didactic and clinical experiences were also heavily on their minds. The primary comparison was in the shift from academic to clinical motivation. For example, Anna said, "I want to learn, and I want to figure out how to actually help these people instead of just like fumbling through until I can turn in my research project and be so glad it's over." They also recalled differences between didactic and what they see in clinic. For example, Shane had to cite research studies when writing notes in didactic,

> but I don't need to like cite anything [in the note now] … it would only be in very niche scenarios where this weird reaction happened, and the patient had a medication; or a new drug has come out, so there's not a lot of information on it yet.

Rudi was also struck by how, in practice, her focus was less on diagnoses and protocols for each one, but instead "the deficits that they're experiencing rather than the name of the diagnosis." Kimberly described that the resources she had relied upon were too detailed,

> I've been surprised at how I don't even really feel like I need [sources from didactic education] 'cause it goes really in depth. And I haven't really used a ton of textbooks much, either, usually a quick Google search will do.

However, quick searches weren't always sufficient, as Susan Smith said,

> I'm getting more and more to the point where Google search won't tell me what I need, UptoDate won't always tell me what I need. Sometimes there are things that it's hard to find a good resource for: somebody comes in with a disease that we don't have a good article on, or things are a little bit experimental and we don't have great data for it yet.

The depth and breadth of information needed seemed to vary by student and situation, which was often frustrating.

Board examinations and fulfilling requirements to graduate were a pervasive source of stress. Some students discussed boards testing foundational knowledge, like Scuba Steve, who said that the boards were based on "information that a dentist needs to know throughout their life." Others, like SpicyMeatball, talked about the disconnect between practice and board exams, "We're studying for the [board] and the [board] doesn't ask you for doses. Now that you're in clinic, you do need to know those numbers."

A few participants contrasted the learning environment they were in with what actual practice might be like. For example, the dental students worked in a clinic that, as Cementoblastoma describes, serves patients with

> tons of problems, and then they have a lot of dentition that is kind of all over the place. They're missing lots of teeth. They have lots of disease, lots of decay. … You get a huge crash course in more complex cases than you would in general practice.

Stacey described the way she approached clinical practice as,

> I'm thinking about everything at this point. Before I didn't think about that much, I was very focused on—Here's a patient. If I am only focusing on the questions they ask me, rather than me thinking about the patient as a whole.

The clinic was more complex than where they had come from and potentially where they were going. This was not seen negatively by the students, just acknowledged as a difference.

Students as Experts

The dilemma of needing to know niche information to pass exams, or having time and the appropriate expertise to perform detailed digging into a problem, was often an interesting strength that students had. Dr Strange noted:

> As a medical student, you may be able to answer some questions that the other members of your team can't, because you spend a lot of time studying for things that the attendings and residents of your specialty do not spend time thinking about.

Shane described working in a retail pharmacy and helping a patient identify next steps to take with a persistent health concern, based on her own experience. She then looked through the patient's medication records to help her out,

> [I put] all that information together in that moment to give her an answer and to refer her to a different [provider] this time. I also wrote down the names of the [medications] that she's been on because she's like, 'I don't remember which ones, but I know I've been on so many!'

JB also relied on previous experience and expertise, along with her knowledge of research, to troubleshoot a problem a patient had. She told a colleague, "I've seen this work before. We know from research that the more sensory input you get can raise people's attention to things. Let's try this and see if it works for him."

Another area of unique expertise came from students' positions as novice learners with time to search and present to their colleagues. A few students described using their developing clinical judgement to solve difficult cases, such as The Flash, who described it as, "I found myself in this position of looking up the primary research and the case reports of these children who have had this before and presenting that to my team." Similarly, Dwayne researched a drug side effect, finding a potential solution, then reflected, "It's cool to be able to do that. I felt like Sherlock Holmes." Although still novices, these students brought their developing expertise to their practice. They reflected positively on these experiences where they were able to make a difference.

Learning to Operate in Uncertainty, Complexity, and Doubt

The desire for certainty or the fear of ambiguity was universal, with every participant discussing it to some degree. As Dr Strange remarked, "In medicine, we don't like unanswered questions … because unknowns can become problems later." Dwayne worried that, "I don't have the right information or enough information, that I come to the right wrong answer, that I make the wrong recommendation." Certainty was desirable even when it wasn't possible, as Indiana Jones described the process of practice as "folks learning to be more comfortable operating within a degree of uncertainty." A number of factors contributed to uncertainty: the quantity of information and the fear of missing something, conflicting or poor-quality information, and a lack of information.

Information Overload

The large quantity of information, not just that students needed to learn but that they had to process, was brought up as a concern. Queen had a typical remark about the Internet's lingering impact on information:

> It's really, really great but also really, really hard, and for me it's kind of overwhelming. I could look something up and get one answer, but then I could look the same thing up and get ten other answers to it, and like, what's the truth of it? How do I know?

Students were also afraid of missing something, as Ashley D. expressed, "I get worried—like [if] I start basing all my practice on one therapeutic activity and then three years later, five years later, they're like, 'Actually, this is the worst thing you would ever do for someone.'"

Conflicting or Poor-Quality Information

The concern about missing information that would make a difference in patients' lives was nearly universal, especially when combined with the fear of causing harm. Izzy described discomfort with providing patient care while feeling less confident, "It can be nerve wracking to do a physical exam and be like, 'I think I didn't hear anything' but [shrugs] who knows?" Whether or not information was unclear, present, absent, or conflicting, this proved troublesome. Lee talked about a patient who wasn't able to participate in physical therapy due to a condition and the tension she felt: "I wanted her to be safe, but I also wanted her to progress her function after her surgery so that she could start to recover." Learning to balance these competing needs was a source of stress for many students.

Other conflicting information came from experts, such as Tofu discussing procedures: "Dr. [A] may say do this, and then Dr. [B] will be like 'Okay, I don't think I agree with that. You should do something else.'" This left the student with the responsibility to determine which expert was more correct and proceed that way. Students also noticed that some of their previous information may not be as reliable as they thought, such as a1, who said,

> I've had preceptors tell me UpToDate isn't [up to date]. … And then I've had preceptors who are like, 'No, it's fine to get information from UpToDate,' so I feel like you get a little bit of conflicting information of what resources people prefer.

Kimberly was similarly concerned with her reliance on UpToDate: "Sometimes I wish I knew places to go where I trusted information just as much as I trusted UpToDate." At times, the conflicting information was the student's clinical judgement and the patient's perspective. Queen had to integrate patient perspective into her clinical reasoning, which was challenging when these two were at odds: "What are my hopes and wishes for the patients versus what are the patient's and family's hopes and wishes?" She wanted to balance presenting her expertise ("I know if you just did this, you would feel better") with the patient's hesitance to take her recommendation.

A few participants discussed navigating mis- and disinformation. One such was Koy Jaspers, who was concerned that social media is "building this narrative that people's bodies are fragile," and he was interested in educating patients on what he perceived as a healthier outlook that incorporated exercise. The poor-quality information was not only from patients or the Internet; Tofu was skeptical of some continuing education because "there's a lot of people that literally are trying to sell you something and disguise [it] as educational content."

Lack of Information

Participants were also concerned with a lack of information, as Ashley D. said, "I just have to be okay with … I'm gonna do this even though there's no research backing it up." This was very frustrating, as Stacey described. She was working with a project where she was making a list of medications with temperature limitations and described her frustration with the lack of consistent information on package inserts as: "It is confusing and I hate it." Of course, this was most troubling when impacting patient care.

When describing a complicated case, The Flash said, "The most confusing thing was there wasn't an answer—there was no clear answer as to what we should be doing."

In order to navigate this uncertainty, students looked to experts. Moose described her appreciation for her supervisor:

> We see a lot of things that there's not much out there for, and we just have to do what we can do and figure it out. The evidence is not gonna have all of the answers for everything. The evidence isn't going to apply to every single case because everybody's different. [The supervisor] has some strategies that she's come up with in her time as a PT to approach those evaluations where it's a murky picture of what you're getting into.

Students moved through these areas of difficulty by a combination of their own investigations for more or better evidence and sharing knowledge with other experts.

Summary of Information Practices

As novices in their clinical practice, the students still demonstrated sophisticated thinking about how they experienced information. They were seeking competency in service of excellent patient care, navigating the dual role of student and clinician, and learning to operate and provide excellent care in ambiguous and uncertain situations. Goldie Switzer provided an excellent summary,

> Gathering information has always been more of a means to an end until now. Now my gathering of information is more to benefit me in my career. I feel like there's more pressure to know these things so I'm not harming people. It's no longer just about passing tests or boards. It's going to have an impact on human lives.

Discussion

While many of these findings are duplicated in the literature, few incorporate student perspectives. This study is unique in that it went beyond looking at what sources students used and why to delve into their information practices as a whole. As such, it provides a richer picture not just of what information students in clinical practice use and how they use it, but what it's like for them to do so. Students shared moving stories of how they used information to impact people's lives, which has, as yet, been a significant omission from the conversation around information use among students in the health professions.

Even as novices, students were able to take on roles with great responsibility. Students have demonstrated that they can take on complicated roles, such as providing patient education and serving as members of healthcare teams, improving outcomes and providing better care while potentially improving their own education (Kennie-Kaulbach et al., 2023; Vijn et al., 2017). As librarians, we can do well to remember that our students are not only novices, they also know more than we often give them credit for.

Students were well able to articulate their concerns with information. Their awareness of their responsibility to use information ethically and effectively as healthcare providers was developing, yet already sophisticated. The dual tension between student-novices and provider-experts is similar to Sharun's (2021) identification of students experiencing information as students, employees, and

professionals. The students showed evidence of critical thinking, reasoning, and evaluation when discussing their concerns with mis- and disinformation, identifying the pitfalls inherent in the information age with a large quantity of unregulated, unfiltered information and recognizing that their role is one of importance to patient health. This area has been studied extensively, especially after the emergence of COVID-19 as a global health threat (Suarez-Lledo & Alvarez-Galvez, 2021). Another worry the students outlined, uncertainty, is a concern across health professions (Moffett et al., 2021). The students also demonstrated knowledge of how information influences practice, allowing them to resolve or at least navigate the ambiguity they faced. These students showed capability to use critical thinking, reasoning, and evaluation as parts of their developing clinical judgement. This mirrors the findings of qualitative studies on how students experience EBP, especially the tension between being a novice and an expert, as well as basing their practice on what they see their supervisors doing (Ilic & Forbes, 2010; Olsen et al, 2013).

When framing information literacy as part of clinical reasoning and critical thinking, librarians and educators may garner more buy-in from learners. One common way is to examine learners' priorities and aligning our instruction to those values. Adams (2014) called for librarians to be "knowledgeable about the culture, values, and information practices" of health professions students (p. 233). Librarians have often done this by examining their own curricula for areas they could engage with learners, especially looking for commonalities among programs (Waltz et al., 2020). Identifying common areas of competency was a goal of this project to ensure relevant, sustainable instruction. Other work has been more discipline-specific, as projects in both dentistry (Schvaneveldt et al., 2021) and medicine (Brennan et al., 2020) have demonstrated. These projects aimed to align concepts in information literacy with disciplinary competencies to provide a tool that would improve librarian-led instruction. The same studies that look retrospectively at skills, such as within rehabilitation sciences, can also illuminate areas for librarian collaboration (Boruff & Harrison, 2018). While these approaches differ, they all describe similar competencies around question formation, searching, and assessing information quality in service of patient care that are common among a variety of professions.

As we better understand the authentic practices of our health professions students, librarians can modify our instruction to current and future needs of these students for quality information sources. Interestingly, a 2016 systematic review identified more studies using Ovid MEDLINE, a paid interface, than PubMed, which is freely available (Swanberg et al., 2016). This same review identified other interfaces where health professions students would find reliable information, including point-of-care tools, other databases such as CINAHL and PsycINFO, and the Cochrane Library. Many of these resources are more academically focused sources that are available to students at large institutions. The focus on these resources is especially concerning given that most health professionals do not work in university systems that subscribe to these resources. According to statistics on practice locations in the United States, only one of the studied professions was most frequently employed by hospitals: occupational therapists (29%). Instead, most worked in clinics or offices, as a large majority of dentists (77%) and physicians (70%) do; followed by physician assistants (54%), pharmacists (39%), physical therapists (35%), and occupational therapists (28%; Association of American Medical Colleges, 2024; U.S. Bureau of Labor Statistics, 2025). This makes it even more important for librarians to emphasize accessing and evaluating research from freely available resources, such as PubMed, TRIP, and Google Scholar.

Much librarian-led instruction happens in the didactic phase, both to provide a background to help students understand what happens in clinical education and because the academic projects where librarian involvement seems more natural also happens earlier in these programs. However, it's noteworthy that no student mentioned constructing detailed searches as an information practice. A recent

analysis found that even simple searches produce highly relevant results, although greater nuance and disciplinary insight is necessary to obtain more comprehensive results (Lowe et al., 2020). In light of this work and the ways database interfaces are evolving, we will likely need to adjust our learning objectives to remain relevant and accurate.

While integration in clinical education is more difficult, librarians are investigating ways to engage with their learners in meaningful ways. An Objective Structured Clinical Examination format, which is commonly used to assess students' clinical competence, has been used to measure medical students' actual search behaviour (Nicholson et al., 2020). These students relied heavily on point-of-care tools and often consulted one resource. This assessment method is especially beneficial as it is both familiar to students and allows librarians to examine students' actual behaviour, rather than attitudes or reported behaviour. With these data, a librarian could discuss interventions with subject faculty to further refine and practise student skills; with the practical assessment, students may encounter more authentic problems than a librarian lecture can provide. Studying authentic information practices, including their affective domains, can help us to empathize with the struggles and triumphs of these new clinicians and further refine our own practices to meet them where they are.

Librarians and students must both balance content that is clinically relevant with information that is more academically relevant. Some concepts are very difficult to connect to patient care, such as citation management, subject heading searching, and citation chaining. Indeed, students and clinicians tend to value resources that provide them the correct answer quickly, with as few barriers as possible (Brennan et al., 2014; Heer et al., 2024). Yet some academic projects often benefit from these tools and concepts. One middle ground is to offer these as shorter, less-emphasized sessions focused on the academic need and explicitly pointing out that they aren't the same as the students' developing strategies for clinical information seeking. However, these strategies are not without their usefulness: A learner may need to sift through literature for a complex case, write a case report, or strategically narrow a search in an area with changing terminology.

Beyond the transitions within education, new clinicians experienced similar concerns to students in the current study: the desire to make an impact, the overwhelm of clinical practice, and being outside of one's comfort zone (Biemans et al., 2024). Librarians can seek to mitigate this overwhelm by offering tools to help our learners stay current, although the uptake of those tools may vary depending on an individual learner's readiness to practise. Ambiguity is inherent to healthcare and the human experience, no matter how frustrating it may seem. Moffett and colleagues (2021) suggested that the experiential learning setting of clinical education would be a potential home for teaching about uncertainty, as well as other subjects like ethics and clinical reasoning. Even when merely guest lecturing, librarians can model navigating uncertainty and advise students when the evidence retrieved may not be as certain as the students hoped for.

We must also bear in mind the constraints of evidence based practice. A group of librarians created a framework to understand users' pain points around information access in a clinical environment, including a lack of time, consistency among platforms, ease of access, and financial resources (Laera et al., 2021). Librarians in general may find these barriers resonate in a variety of environments; however, it is especially important to those in healthcare to access accurate, relevant information quickly. Librarians and instructors can focus on fostering strategies to help learners navigate their needs to meet their goals of excellent patient care.

Finally, we can frame our instruction differently, continually asking how learners engage with uncertainty in clinical settings, or about times they sought information. Bringing in the students' experiences can help them connect relevant pieces of their education. It is important to remember that each discipline and each learner has their own vision of competency; we need not impose ours on them. Approaching our learners with curiosity about how we can guide them in their goals is far more humanistic than dictating a path they must follow.

Limitations

While this study sought to be representative across multiple disciplines, it is still a small, qualitative study and is thus less generalizable to other populations. Notably, nursing, one of the largest health professions (National Center for Health Workforce Analysis, 2024) was missing from this sample. Additionally, health professions education curriculum is constantly shifting. One trend is to integrate more clinical education earlier, such as in the longitudinal integrated clerkship model in medical education. Further investigation into how students use information over the course of their education as curricular models change may reveal different patterns than those described here.

Notably, the majority of interviews took place before the public introduction of ChatGPT (Open AI, 2022), which has greatly impacted the information practices of health professions students, among others. No participant mentioned artificial intelligence tools, and I did not follow up with participants to get information on their use of it; however, other studies seek to investigate this question.

Conclusion

This study sought to hear from students early in their clinical education about their experiences with information. By interviewing 25 participants in six fields, I believe I have determined some thematic patterns in their information practices, including their sources and behaviours. Further analysis into their attitudes to information and education is planned and may provide more insight. Understanding how these students characterize their practice may help us better reach them where they are.

As educators of these students, we may help ease any stressful educational transitions by ensuring our teaching is to authentic needs and motivations. Best of all, we can help these students become the healthcare providers they want to be by remembering their—and our—humanity. After all, we are all constantly learning and growing, facing complicated problems that we want to solve. Educators and students share the same motivation: to do well in our practice, to make a positive difference in the world, and to help others. As Queen asserted:

> As more information becomes available and as I continue to practise in this profession and get experience and learn from the patients that I'm with and from other caregivers, I'm just gonna get that much better at helping people, which is my main motivation.

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Appendix
Data Collection Instruments

Interview Questions

1. Do you have any questions before we begin?
2. Tell me about a typical day for you.
3. What types of information are important to you in your role? Less important?
4. How do you use information while in clinical practice?
5. Tell me about a time recently where you used information to solve an issue that arose in your practice.
    a. What issue were you dealing with?
    b. What led you to confront this issue?
    c. What did you hope to achieve?
    d. What was confusing about the situation?
    e. What answers helped you better understand the issue?
    f. What help did you want?
    g. What ideas or conclusions came to your mind?
    h. What emotions or feelings did you experience as you moved through this issue?

Thanks for discussing that recent problem! Now I'm going to ask you to think back over your education and experiences.

6. Now that you're in a clinical setting, how have the kinds of information problems you see changed from before?

Next, I'd like us to create a timeline of how you learned to use information, and how those problems have changed.

7. Think back on how you've learned to use information in your education. Walk me through what you learned, when you learned it, and how that's changed over time.
    a. What were significant events in how you learned to use information?
    b. What kinds of problems did you have at different times in this timeline?

Thank you - now I want you to think ahead to the rest of your clinical education and eventual practice.

8. When you think ahead to using information in your clinical education and clinical practice, what are you excited about? What are you worried about or unsure of?
9. Is there anything else about information you'd like to talk about?

Diary Entries

1. Tell us about your week. What kinds of problems have you run into where you've needed information?
2. How did you move through the problems?
3. What emotions or feelings did you experience when you were using information to solve your problems?
4. Is there anything else you'd like to share about how you used or needed information this week?