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Clinical problem solving and social determinants of health: a descriptive study using unannounced standardized patients to directly observe how resident physicians respond to social determinants of health

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Abstract

Objectives: While the need to address patients' social determinants of health (SDoH) is widely recognized, less is known about physicians' actual clinical problem-solving when it comes to SDoH. Do physicians include SDoH in their assessment strategy? Are SDoH incorporated into their diagnostic thinking and if so, do they document as part of their clinical reasoning? And do physicians directly address SDoH in their "solution" (treatment plan)?

Methods: We used Unannounced Standardized Patients (USPs) to assess internal medicine residents' clinical problem solving in response to a patient with asthma exacerbation and concern that her moldy apartment is contributing to symptoms – a case designed to represent a clear and direct link between a social determinant and patient health. Residents' clinical practices were assessed through a post-visit checklist and systematic chart review. Patterns of clinical problem solving were identified and then explored, in depth, through review of USP comments and history of present illness (HPI) and treatment plan documentation.

Results: Residents fell into three groups when it came to clinical problem-solving around a housing trigger for asthma: those who failed to ask about housing and therefore did not uncover mold as a potential trigger (*neglectors* – 21%; 14/68); those who asked about housing in negative ways that prevented disclosure and response (*negative elicitors* – 24%, 16/68); and those who elicited and explored the mold issue (*full elicitors* – 56%; 28/68). Of the *full elicitors* 53% took no further action, 26% only documented the mold; and 21% provided resources/referral. In-depth review of USP comments/explanations and residents' notes (HPI, treatment plan) revealed possible influences on clinical problem solving. Failure to ask about housing was associated with both contextual factors (rushed visit) and interpersonal skills (not fully engaging with patient) and with possible differences in attention ("known" vs. unknown/new triggers, usual symptoms vs. changes, not attending to relocation, etc.,). Use of close-ended questions often made it difficult for the patient to share mold concerns. Negative responses to sharing of housing information led to missing mold entirely or to the patient not realizing that the physician agreed with her concerns about mold. Residents who fully elicited the mold situation but did not take action seemed to either lack knowledge or feel that action on SDoH was outside their realm of responsibility. Those that took direct action to help the patient address mold appeared to be motivated by an enhanced sense of urgency.

Conclusions: Findings provide unique insight into residents' problem solving processes including external influences (e.g., time, distractions), the role of core communication and interpersonal skills (eliciting information, creating opportunities for patients to voice concerns, sharing clinical thinking with patients), how traditional cognitive biases operate in practice (premature closure,

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tunneling, and ascertainment bias), and the ways in which beliefs about expectancies and scope of practice may color clinical problem-solving strategies for addressing SDoH.

Keywords: asthma; clinical problem solving; clinical reasoning; diagnosis; medical education; social determinants of health; unannounced standardized patient.

Introduction

Clinical reasoning and decision-making are complex, multistep processes that require skilled evaluation of and action on information gathered during a clinical encounter. Such problem-solving processes call upon a combination of analytic skills, knowledge, and reasoning, all of which are developed through medical training and practice. A rich body of research, based on well-designed, rigorous studies focusing on fixed aspects of clinical decision-making, has documented how cognitive biases may interfere with diagnosis and treatment [1, 2]. Others, however, have called for the use of a more ecologically valid paradigm to complement these studies – one that accounts for the adaptive and interdependent nature of decision-making, the ways in which clinical decisions are often made under real world constraints (e.g., time, stress, and resources), the influence of the physician-patient relationship, and the norms of the clinic [3].

The need to more fully explore clinical problem-solving processes is perhaps greatest in areas where physicians' traditional scope of practice is expanding. While psycho-social aspects of patients' lives have always been an essential part of clinical care, recent appreciation for the influence of social determinants of health (SDoH) has led to increased pressure for physicians to more fully incorporate SDoH into clinical problem-solving. Social determinants, or the structurally determined conditions under which people are born, work, live, and grow, influence the healthiness of individuals' living/ working environments, access to care and other important resources, and the effectiveness of clinical care [4]. Health care systems are now mobilizing to address SDoH. However, few studies have explored best practices for individual physicians to "address" SDoH. Addressing SDoH is a complex process that includes identifying SDoH, understanding their relationship to the clinical problem *and* the solution, and taking action to implement or facilitate solutions – all of which present cognitive challenges when compared to more narrowly-defined medical problems. Patients are not mere "vessels" of information. Physicians must use appropriate communication and interpersonal skills in order to create situations where patients are able and motivated to share critical information. Current studies, however, show that many physicians are not fully sure of how best to talk to their patients about SDoH [5–10].

If we posit that what physicians are expected to "do" in response to SDoH is not yet well defined, then, as suggested by Croskerry [11], physicians' cognitive dispositions to respond may have outsize influence. Cognitive disposition to respond (CDR) is a catch all, non-judgmental way of framing the factors that may determine how physicians approach clinical problems. "CDR" encourages an analytic approach to understanding how physicians reach particular sets of clinical decisions for given patients. The broad range of factors considered within CDR include the context of care, past experiences (expertise, availability heuristic, and biases), patient factors, fatigue/sleep, team characteristics, and affective state [11–14]. These factors, alone and in combination, influence how physicians tackle SDoH in their clinical decision-making.

We developed a program of Unannounced Standardized Patient (USP) assessment and feedback in order to refine the training curriculum and provide residents with targeted data on their practice behavior surrounding SDoH. In particular, we introduced an asthma scenario where the patient was concerned about the role of bathroom mold in triggering worsening asthma symptoms. We chose asthma because it is a chronic condition closely linked to factors associated with structural inequalities in housing conditions (e.g., mold, poor ventilation, and air quality) [15]. We expected virtually all of our residents to uncover the mold issue. The patient was primed to discuss her mold concerns if asked about her housing situation in the context of asthma. However, we found that many residents either did not elicit the issue or if they did, they did not adequately incorporate it into their clinical decision-making.

Therefore, we sought to understand our residents' clinical problem-solving processes. Because Unannounced Standardized Patients (USPs) provide an opportunity to directly observe physician response to a standardized clinical problem (standardized scenario, history, and patient characteristics) in their actual, real-world clinical settings, free from observation bias (unannounced), we used this methodology to describe resident physicians' clinical problem-solving in terms of identifying and incorporating an essential social determinant into clinical decision-making.

Following Croskerry's call to perform cognitive and affective "autopsies" (root cause analyses) in the face of diagnostic "failures," [11] we conduct a cognitive and affective "biopsy" (the "living tissue" of clinical problem solving in real world contexts) to take a deep dive into how a sample of resident physicians respond to the clinical problem-solving challenge of addressing SDoH. While the

USP methodology does not tell us everything about physicians' clinical-problem solving (e.g., internal cognitions, mood, fatigue, knowledge, and previous experience), it provides in-depth information on what happens during physician-patient encounters (while controlling for patient presentation) and therefore serves to supplement the limited views of clinical decision-making provided by sole reliance on chart reviews and other clinical data [16, 17].

Our broad aim is to describe patterns of clinical problem-solving in the context of a social determinant directly linked to symptoms and solutions. We seek to answer three core questions: 1) Do resident physicians include SDoH in their assessment? 2) Are SDoH incorporated into diagnostic thinking and if so, do they document as part of their clinical reasoning? 3) And do physicians directly address SDoH in their "solution" (treatment plan)? We then explore the results in the context of "cognitive dispositions to respond," identifying approaches to this particular clinical problem that suggest the need for additional education and training.

Methods

From 2017 to 2019, USPs were sent to two public, safety-net adult ambulatory practices to assess medicine resident physicians' practices in caring for a patient presenting with a common SDoH-related issue. Data reported covers residents who provided consent as part of our IRB-approved Medical Education Research Registry.

USPs were trained to portray a 20-something female asthmatic new patient with an increasing frequency of attacks (Table 1). She works a service job, lives with her boyfriend in a decaying, moldy apartment, and fears public asthma attacks due to recent acute symptomology. At the time of the visit, the patient has attempted to contact her landlord to resolve her mold concern but was ignored. USPs shared substantial information on their chief complaint but discussed their poor quality housing only when explicitly asked, although providers need not ask directly about housing-related triggers. Evidence-based guidelines are clear that exposure to mold has long-term effects on asthma prognosis [18, 19], that timely removal of indoor mold is important to prevent symptoms [20], and that longitudinal follow-up is essential for prevention and management of symptoms [21–24]. The patient does not understand differences between "rescue" and control inhalers. Minimum appropriate treatment in this case is defined as educating the patient about inhaler use, prescribing a control inhaler (*Flovent*) and ensuring timely follow-up. Residents may also refer to the Asthma clinic. Actors received 4 h of training to ensure consistent case portrayal and 2 h of checklist training to ensure accurate assessment.

Provider practices in eliciting, responding to, and documenting the presented housing concerns were collected via two tools: a behaviorally-anchored post-visit checklist completed by the USP and post-visit chart review of the clinical note conducted by trained staff (Table 2). USP-assessed items focused on how well the provider addressed their housing concerns during the visit. USPs were asked to elaborate on these practices via open-ended prompts for explanation. Chart review items included review of whether and how residents documented housing concerns in the history of present illness (HPI) and/or treatment plan and then actual actions taken to address the mold (e.g., referral to social services). Ongoing quality assurance monitored consistency of portrayal and accuracy of assessment using digital recordings from devices hidden in USPs belongings. The detection rate, as monitored through routine resident surveys, is low (about 10%) and almost always occurred after the visit.

Table 1: Description of Unannounced Standardized Patients (USP) case.

Sex, age	Female, 23–28 years old
Chief complaint	Acute and persistent asthma
Current life situation	– Works an active job (babysitter/waiter). – New to New York, has been living in the city for around a year. – Symptoms (coughing, wheezing, and shortness of breath) have increased in the past few months, especially at night. – Takes albuterol as needed, use has increased substantially. – Doesn't fully understand use of rescue vs. control inhalers. – Lives with boyfriend in shared, dilapidated apartment *with visible mold growth (Social Determinant of Health)*
Prior medical history	– Diagnosed with asthma as a child. – No other illnesses, all vaccinations are up to date. – No surgical history.
Substance use	– Never smoker, and no one at home or work smokes. – Occasionally enjoys a beer.
Challenge for the resident	– Take a focused, new patient history concerning asthma symptoms now and since moving to New York. – Explore patient's home life, unpack underlying root causes of asthma symptom exacerbation (*mold*). – Address mold by educating patient, counseling patient about ameliorating mold (e.g., talk to landlord), provide information on resources for addressing housing quality issues, refer to direct services (e.g., social work). – Document housing trigger (mold) for continuity and follow-up. – Determine initial treatment plan.

Analyses focused on first describing resident physicians' practices in response to the visit, then grouping those into broad patterns (i.e., 1) neglectors, 2) negative elicitors, 3) full elicitors), and finally, conducting in-depth analyses of those patterns in terms of resident characteristics (PGY/program), specific practice behaviors (assessment, treatment plan, and actions) and written documentation (HPI, treatment plan), and USPs' open-ended explanatory comments. Patterns were then interpreted in light of possible biases and predispositions that may have shaped residents' approaches.

Results

There were 79 visits to categorical (CAT) and primary care (PC) medicine residents between 2017 and 2019. Eighty-six percentage of those residents provided consent (n=68). Residents were distributed across three post-graduate years (PGYs): PGY 1 16%, n=11; PGY 2 46%, n=31; and PGY 3 38%, n=26. 74% (n=50) of visits were at a hospital-based and 26% (n=18) a community-based ambulatory practice, both within the same healthcare system.

In terms of treatment decision-making, almost all residents recommended the patient use and prescribed a preventive inhaler (*Flovent*) (93%; 63/68); about half educated the patient about how asthma medications work (37/68), though only 20 fully assessed the patient's understanding and corrected her misunderstanding. About half referred the patient to the asthma clinic (32/68). Of those that asked about housing, 22/54 documented mold in the patient's note (41%).

Figure 1 summarizes how residents addressed the patient's mold situation. A majority asked about housing (54/68), but 21% did not (14/68). In visits where the resident asked about housing, 70% (38/54) of them acknowledged and explored the patient's response that mold might be an issue. However, 11% did not ask about housing in a way that allowed the patient to fully share housing concerns (6/54) and 19% (10/54) did not respond or responded negatively when she mentioned the mold concern. Finally, in terms of addressing SDoH, of the 38 residents who obtained full information, 21% provided resources or a referral for addressing (8/38), 26% did not provide resources/referral but did document the mold in the HPI or treatment plan, and more than half (53%; 20/38) took no action. Overall, only 8 (of 68) residents engaged in best practices for *all stages* of addressing SDoH: fully eliciting information, exploring and acknowledging, and addressing directly by providing/referring.

Tables 2–4 provide a summary of in-depth information on the clinical problem-solving processes of residents in each of three core groups: 1) Residents who did not ask about housing (*neglectors*), 2) Residents who asked about housing but with negative consequences (*negative elicitors*), and 3) Residents who asked about housing and acknowledged mold as a possible trigger of the patient's exacerbation of asthma symptoms (*full elicitors*).

Categorical (CAT) residents were over-represented among the 14 residents who did not ask about housing – 25% compared to 12% of Primary Care (PC) residents (Fisher's Exact=66.33, p<0.01). PGY two residents were slightly more likely to neglect housing (23 vs. 18% of PGY1 and 19% of PGY3). Rates of treatment decisions were similar between the two groups around the preventive inhaler. Review of the residents' HPI demonstrated that *neglectors* tended to spend more of the HPI describing symptoms/functioning (vs. triggers) and/or health maintenance elements, identified "known" triggers like cats, smoke and colds but not the possibility of new triggers, and generally did not note that the

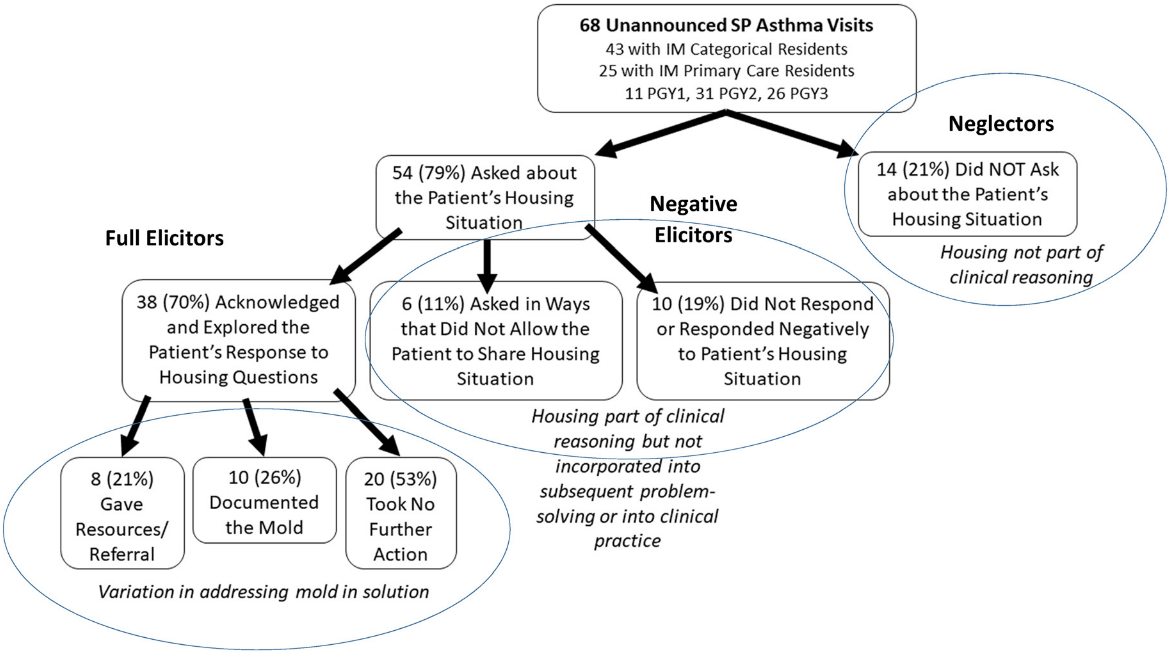

Figure 1: Resident physicians' responses to housing issue in asthma case (n=68 residents).

Table 2: Neglectors – residents who did not ask about housing (Group 1, n=14/68).

Differences in track and PGY between those who did not and did ask about housing

	Did not ask about housing (n=14)	Asked about housing (n=54)	Chi Sq. (p)
Primary Care IM	12% (3)	88% (22)	66.33 p<0.001
Categorical IM	25% (11)	73% (32)	
PGY1	18% (2)	82% (9)	10.44 p=0.005
PGY2	23% (7)	77% (24)	
PGY3	19% (5)	81% (21)	

Rates of clinical decisions between those who did not and did ask about housing

	Did not ask about housing (n=14)	Asked about housing (n=54)	Chi Sq. (p)
Recommended use of preventive inhaler	86% (11)	94% (51)	3.09 p=0.035
Prescribed preventive inhaler	100% (14)	96% (52)	2.42 p=0.092
Recommended short term steroids	21% (3)	37% (20)	9.93 p<0.001
Referred to respiratory (asthma) clinic	29% (4)	52% (28)	19.52 p<0.001

Differences in HPI (clinic note)	Did not ask about housing (n=14)	Asked about housing (n=54)
Symptoms/functioning vs. triggers	– Focus on symptoms & functioning	– Review more possible triggers
Known vs. unknown triggers	– If triggers asked about, focus on known	– Clarification of known vs. unknown triggers
Health maintenance vs. asthma	– More of HPI on health maintenance	– More of HPI on asthma
Asthma symptoms worsening/different	– Description of current status	– Comparison of new to previous
Move to NYC	– Not generally noted	– Usually noted

USP comments[a] for residents who did not ask about housing (n=14)

Theme: Visit Rushed

Explained when I would have a follow up appointment and what I could do in the meantime if I feel better decrease the puffs for the preventive inhaler [tx plan]. Only felt a bit *rushed because she/he really got right down to the point very quickly* so not so much because she/he rushed it [pt centeredness]. According to her/him there are so many other steps that can be taken if necessary. For now, I will try to use both inhalers and see how I progress [pt activation]. She/he was personable, had good bedside manner. Didn't feel judged by her/him. And was thorough in troubleshooting [did well]. Maybe she/he could *take her/his time more by asking more open-ended questions so that she/he may get even more information from her/his patients* [improve].

I was impressed that she/he almost immediately figured out what needed to be done. I think she/he *could have taken a little more time* to ask about symptoms etc. instead of me having to volunteer it but it also was clearly a busy day [tx plan]. She/he *talked quite fast.* I think that is what may have *made it feel rushed.* But her/his confidence definitely made me trust her/his guidance [pt centeredness]. I liked that she/he provided me with a specific group that works with asthma. That made me feel as though I could get in touch with someone who would have a thorough explanation of my symptoms and ways to prevent them from continuing on [pt activation]. She/he kept it light, which I appreciated. She/he was efficient with time and apologized for me having to wait. She/he also was very *thorough with the physical part of the breathing exam* [did well]. She/he could improve her/his pace. Slow down and maybe ask a few more questions [improve].

Resident did say she/he was behind *schedule and most likely rushed* through some things because of that [pt centeredness]. made me feel comfortable talking to her/him, had good eye contact, made me feel confident she/he would find a treatment for me [did well]. **T***o not allow being behind schedule to make her/him rush through visits* [improve].

I felt *rushed at the end of the visit.* Maybe it was because her/his printer wasn't working, and she/he wanted to figure out how to print out papers. I'm not sure [pt centeredness]. Since there was some confusion whenever she/he explained how the new pump/medication would work, I didn't feel as confident with my understanding or management of my asthma [pt activation]. Summarized what I said to clarify information often. Good eye contact. I felt like she/he cared about helping me. She/he was very personable [did well]. *Medical knowledge of asthma,* and how to best explain the medication to a patient in the simplest terms [improve].

Theme: Not Patient-Centered (Not Fully Engaged with the Patient)

The entire encounter felt fair from a patient-centered experience [pt centeredness]. She/He listened to multiple points on my lungs bilaterally [did well]. The biggest point was to *actually pay attention to the patient. She/he seemed to be listening only enough to ask her/his next question and missed many opportunities to not only help her be more effective in her/his diagnosis/prognosis* but also being a patient-partnering physician present in the room [improve].

Table 2: (continued)

I don't remember her/him asking me if I had any more questions [tx plan]. She/He did very well in this dept. [pt centeredness]. There was a bit of confusion as to whether or not I would still need the albuterol, but she/he realized it and then said to use it as a rescue but it'll prob get used less because of the steroid inhaler [pt activation]. Made me feel comfortable. Seemed to be knowledgeable. Was friendly & professional [did well]. She/He could *double check the answer to questions first before answering* – i.e., how many times/day I need to take the steroid inhaler [improve].
USP comments[a] for residents who did not ask about housing (n=14)
She/he explained where to find the pharmacy in great detail [tx plan]. Provider didn't engage patient as a partner in her care [pt activation]. Provider asked to clarify asthma symptoms. She/he found a moment to engage me about how my job as a server must expose me to many people (re: getting the flu shot) [did well]. She/he consistently *missed opportunities to engage me as a partner* in care [improve].
She/he partially explained the treatment plan, regarding her/his recommendation of using a long-term preventative inhaler like Flovent, not only a rescue inhaler [tx plan]. The resident realized I was having anxiety about my asthma. I wish *she/he would have reassured me more and explored the reasons behind that anxiety* [pt centeredness]. I feel 50/50. I got some education on what I'm doing wrong, *but I still feel uneasy about why I'm having asthma attacks* [pt activation]. Good history taking, good health recommendations, and nice job at explaining the importance of long-term asthma medications [did well]. Could improve interpersonal skills with statements of reassurance [improve].
Dr. ______was knowledgeable but I felt like just another patient on her/his schedule [did well] [improve].
Theme: Side-Tracked/Competing Focus
She/He gave me the phone number to call to set up a follow up appointment [tx plan]. She/he seemed *to dive right into all asthma questions right away*. Had me do an *asthma control survey* to see where I was at very early in the visit [pt centeredness]. She/He got *down to asking the important asthma questions quickly*. When she/he wasn't staring at *the computer screen for too long* she/he was very personable. She/He had a lot of knowledge [did well]. Be more engaging with the patient. The computer will always be there [improve].
The provider was very friendly and made some jokes and set me at ease. She/He was also really good at *addressing not just my main concern, but going off script in a way and taking care of my cold, which I hadn't even come in to address. She/He really unpacked the cold with me* and clearly wanted to make sure it wasn't worse [did well]. She/He did not have me recite the treatment plan back to her/him or walk me through it one more time before I left. *She/He also did not uncover my housing situation at all or discover the mold (even though I had marked mold on the form).* However, I think she/he felt she/he already had enough information about my asthma because it seemed pretty clearly linked to allergies based on my cold. The head physician also told my provider when she/he was out of the room that the pollen is really bad this year, which my provider then explained to me. So *I think she/he equated my asthma to the seasons rather than discover how it could be related to my grandmother's apartment* [improve].

[a]All pronouns in the USP written comments changed to include both masculine and feminine pronouns to ensure resident confidentiality (USPs used perceived gender in their comments). Comments came from the following five questions: 1) Tx plan – *Comments about the provider's management and treatment skills? 2)* Pt Centeredness – *Comments about the provider's patient centeredness skills?* 3) Pt Activation – *Comments about the provider's patient activation skills?* 4) Did Well – *Things the Provider did well?* 5) Improve *One thing the provider could improve on?* USPs did not provide comments in all cases. Comments are consolidated together at the resident level and sorted into three major themes: visit was rushed, open-ended questions/patient-centeredness, and other.

patient had recently moved to a new apartment. Those who fully elicited the mold concerns tended to note the recent move, emphasized the change in/worsening of asthma symptoms, distinguished between "known" or "usual" triggers and new triggers, and focused on asthma rather than health maintenance and/or review of systems.

Review and content coding of USPs' comments about *neglectors* identified three major plausible explanations in 11/14 visits: the visit was rushed (4/14: e.g., "Resident did say [he/she] was behind schedule and most likely rushed through"), the visit was not sufficiently patient-centered (5/14; e.g., "[she/he] seemed to be listening only enough to ask [their] question"), and the resident was side-tracked by a competing focus (2/14: e.g., the computer "staring at the computer screen for too long" and alternative trigger for asthma "really unpacked the cold with me").

Table 3 provides USP comments for *negative elicitors* who asked about housing but did so in ways that had negative consequences for solving the clinical problem because they did not permit the patient to reveal mold concerns (n=6) or did not respond or responded negatively (n=10). In the former group, use of close-ended questions appeared to be the main culprit (cited by the USP in 5/6 visits). In one case, the USP reported not being able to explain concerns because the physician did not respond when she raised those concerns. Other *negative elicitors (4/10)* appeared to have missed the connection ("didn't believe my housing situation was affecting my health") – and did not document "mold" in their note. The other six *negative elicitors* were "non-responsive" – the patient couldn't tell what the physician thought about this issue. 4/6 of these residents documented mold as a possible trigger in their note.

Table 4 provides USP comments for *full elicitors* – those who found out about the mold and fully explored it (38/68). *Full elicitors* were divided into three groups – those who did not take action (n=20), meaning they did not document or provide resources/referrals, those who ONLY documented

Table 3: Negative elicitors – residents who asked about housing but with negative consequences (n=16).

Asked about housing in ways that did not allow the USP to share mold (n=6)	Asked about housing situation and then did not respond/responded negatively (n=10)
Why were you not able to share your story?	*Please elaborate on the experience regarding your housing situation (ex. reaction, tone, actions taken, etc.,)*
Theme: Open-Ended Questions She/he asked about where I was living, and I said in my grandmother's old apartment, with my boyfriend, *but she did not ask how it was or what it was like, so I was not able to reveal the potential mold.* She/he asked *closed ended questions* – who do I live with? Do I have any of my triggers (smoking and cats) in the apartment? – *rather than open ended questions where I could share the mold problem.* *She/he asked close ended questions about my housing situation.* Only about specifics rather than open question like – "tell me about you housing situation" or something like that. She/he asked *2 closed ended question – "Who do you live with? Do you have pets?"* which only allowed me to answer those direct questions. I offered the concerns about my housing situation (provider didn't directly ask). She/He *asked a few follow-up questions but not in a way that allowed me to give full story.* **Theme: Did Not Acknowledge** She/he knew my living situation but when I *expressed concerns she/he did not acknowledge* them.	**Theme: Missed Mold as an Issue (NB: 4/4 Did Not Document Mold)** I volunteered the information about my housing and we talked a little about it but it *felt dismissive*. [Did NOT Document in Note] I volunteered the information about my housing situation and we didn't continue to talk about it much at all. *Switched topics almost immediately*. [Did NOT Document in Note] It seemed that *she/he didn't believe my housing situation was affecting my health*. I was clear that I take care of my space. I think she/he trusted that. [Did NOT Document in Note] When we were discussing my housing situation, *she/he didn't respond at all to the mold story*. Since this was in the context of "how to mitigate asthma triggers at home" she/he re-iterated washing sheets and not sleeping in street clothes and keeping dust-free as much as possible. Didn't address the mold issue. [Did NOT Document in Note] **Theme: Not Responsive (NB: 4/6 Documented Mold in Note)** She/He asked about my housing situation. She/He was trying to figure out what was causing and/or aggravating my asthma issue *but didn't respond to mold*. [Documented in Note] The MD asked about my situation *but did not respond empathetically* or give me any help in solving my concerns. [Documented in Note] The provider asked if there was also evidence of mold in the space where I sleep. She/he also asked more detailed questions about how long I had noticed the mold. *She/he didn't respond to my concerns* that the super hadn't addressed the issue or how/that it could be contributing to my compromised health status. [Documented in Note] She/He *didn't acknowledge my concern*. She/He instead said that it sounded like a typical super thing to not do or NYC thing to happen (not checking mold). [Documented in Note] With regards to action for the social issues of note and housing situation, *the provider seemed not to respond*. [Documented in Note] I mentioned that I kept my apartment very clean, so I didn't think it was that, but I vocalized my concern to my super and they did nothing. *Provider didn't really explore*. [Did NOT Document in Note]

[a]All pronouns in the USP written comments changed to include both masculine and feminine pronouns to ensure resident confidentiality (USPs used perceived gender in their comments).

(n=10), and those who took action (n=8) by providing resources/referrals to address the mold. PC and CAT residents were equally distributed across these three groups but PGY2s were over-represented in the *no action* group (76% of PGY2s compared with 38% of PGY1s and 31% PGY3s). Among those who didn't take action, three themes were apparent: 1) the sense that there was not much that could be done to address the mold (10/20; "sympathized and chalked it up to being a classic New York City housing problem"); 2) that the problem was the patient's responsibility (4/20; "something I should try to get fixed"); and 3) the mold was simply not really responded to (2/20; "sort of glazed over" and "it didn't seem to register"). One resident explicitly prioritized the mold as something to be addressed once the medication issues were resolved.

Among the *full elicitors* who documented the mold but did not provide resources, similar themes emerged. The "what can be done?" theme was present for one resident where the patient reported that failure to provide resources seemed to be a knowledge gap ("didn't know of any resources [she/he] could point me to"). Half of (5/10) encouraged the patient to address the mold problem themselves. And in three of the visits, USP comments suggested that the resident was more focused on the diagnosis than the solution ("focus was more on the connection [with the mold]").

Table 4: Full elicitors – residents who asked about housing and acknowledge and explored the mold situation (n=38).

(Did not document and did not provide resources/referrals) (n=20)	Documented (but did not take action) (n=10)	Took action (resources/referrals) (n=8)
Theme: What Can be Done? She/he was empathetic and understood my concerns but it *doesn't seem many know how to respond to a landlord* not answering re: mold. I mentioned that I thought it might be my apartment and she/he suggested that I was probably correct. It was a sort of *mutual lament that landlords don't do anything* when you ask them to. She/he was definitely very concerned with my living situation. She/he asked a lot of questions if I thought it could be excessive dust, how long I've lived there, if my boyfriend is a smoker. Once I told her/him I kept the house clean and that I mentioned *potential mold to the landlord but he wouldn't do anything, she/he dropped the case.* Provider reported that [her/his] *"colleague" wasn't able to help give him help regarding the housing situation beyond 'stay on top of your super'.* She/He heard my concerns about my apartment. I brought it up when she/he asked about dust and if that was a trigger, and I said that I tried to keep my apartment clean but I was worried there was mold, and *I had told my super but my super didn't seem to do anything about it.* __________ *laughed at this–classic supers–but that was it, we then moved on.* She/He did not press the mold situation or refer me to a house and home person or bring it up again. She/He *completely acknowledged my concern but did not take any action*. She/He noted that my situation may be affecting my condition but did not give me any sort of referral. She/He *sympathized and chalked it up to being classic New York City housing problem*. Which I understand. She/He told me to be on the lookout for smokers in the building who may be affecting my condition as well. The provider *acknowledged my concern* but that was all. I received no resources for my worries. The Dr. *acknowledged that mold could contribute to my asthma, but that's as much as she/he said or did*. **Theme: It's Your Problem** The provider essentially said, *"you should get that fixed"* in response to my concern that I haven't been able to get the super to take action. Provider acknowledged the concern but dismissed it as *"something I should try to get fixed for my bathroom"*. She/He asked me a lot more questions about my housing situation than I normally am asked.	**Theme: What Can be Done?** The provider expressed that she/he *didn't know of resources [she/he] could point me to but believed that it would be related to the recent asthma* exacerbation. This very much seemed like a KNOWLEDGE GAP issue rather than her/him not thinking that providing this kind of information or pointing me to this kind of resource was within the scope of her/his work & responsibility. **Theme: It's Your Problem** She/He recommended that I get the *super to do something* about the mold. She/He was very sympathetic and indicated that mold might be one contributing factor to the asthma exacerbation and *indicated I should step up pressure on the landlord* and maybe get neighbors involved to bring attention to the issue. No social work resources were provided. She/He reminded me that it was *urgent to get the Super to take care of this possible mold issue* as it could be worsening my asthma. She/He just recommended for me *to follow up with my super* and make sure he checks my bathroom for mold. That could be the reason for my asthma worsening and we want to figure it out. She/He just made it clear that we need to stop any and all of the possible triggers, and one being the mold in the bathroom. She/He *urged me to get the super to check it out.* **Theme: Focus on Diagnosis not Solution** Her/His focus was more on the *connection (with the mold)* to my asthma. She/He responded with her/his reaction and tone to say that the *mold could affect my asthma, but that's about it.* She/he *acknowledged it and mentioned how mold could be the asthma culprit* but didn't provide any resources to help with my mold living situation.	**Theme: Concern and Concrete Help** Not only did she/he provide a note for the employer, she/he also drafted a note for my landlord regarding the perceived mold in the apartment. She/He collaborated with me in drafting both letters. She/he also offered that if the letter did not inspire action that when I *come back for my follow up visit there are social workers who can be brought in for help as well as legal clinic is needed*. She/He was VERY concerned about my housing. *She/He was super worried and gave me a referral*. She/He wanted the hospital to take care of things, and when I said I could handle it on my own and would talk to my super, she/he wouldn't take no for an answer (in the nicest possible way.) *She/He was very concerned with this aspect of my story and really took steps to help me make it better.* The doctor's note she/he wrote me expands on the urgency of my condition. She/He made sure to remind me at the end of the visit that if the Super did not take a look at or take care of the mold *that I could come back to the clinic and they can help me escalate the situation* because by law the super is supposed to rectify the situation if it is mold. She/He mentioned *that it was imperative that my super take a look* at the bathroom because mold can exacerbate my asthma. She/He did not actually end up giving me a referral, BUT she/he did mention it and was appalled with my super. She/He also gave me a lot of tips for cleaning my apartment and getting rid of rugs and such. *The talk of my living situation definitely spanned over most of the appointment* and she/he was really attentive to my needs and gave me info. The provider *referred me to a social worker to help* with the housing situation. She/he gave me the name of a *website to go to that helps*: airnyc.com. They help with these situations if you have Medicaid. She/He explained to me what they can do for people.

Table 4: (continued)

(Did not document and did not provide resources/referrals) (n=20)	**Documented (but did not take action) (n=10)**	**Took action (resources/referrals) (n=8)**
She/He asked if my apartment has carpets. She/He asked if I've seen cockroaches because cockroaches can leave behind a dust that causes allergies to flare up. *She/He encouraged me to speak to my landlord again about it.* Provider only recommended that I try to *clean it up myself.* **Theme: Glossed Over** {_______________} was great and asked about where I was living, but *I was not presented with the opportunity to talk through the mold in the apartment. We sort of glazed over.* It was pretty much a non-starter. I told her/him *about my housing but it didn't seem to register with [*her/him] at all. **Theme: Not a Priority** She *acknowledged it but reminded me that we probably need to treat the other underlying issues first* like proper medication.		

[a] All pronouns in the USP written comments changed to include both masculine and feminine pronouns to ensure resident confidentiality (USPs used perceived gender in their comments).

Lastly, among *full elicitors* who took action (provided resources or made a referral) (n=8), the USP comments revealed little directly about the underlying thinking of the residents. However, comments did reflect a sense of urgency ("VERY concerned about my housing" and "mentioned that it was imperative that my super take a look").

Discussion

We utilized a mixed-method approach to explore resident practices when caring for a patient whose SDoH is integral to diagnosis and treatment. Residents often overlooked connections between housing and the presenting illness. Our findings align with previous research on SDoH being frequently ignored during the clinical encounter [25, 26]. Among SDoH responders, few took action and documentation was low. Thematic analyses of comments based on resident groupings (*neglectors, negative elicitors, full elicitors*) provided further insight into clinical reasoning influences. In many cases, residents overlooked the critical diagnostic clues needed to make the appropriate connections, which, had this patient been real, would have directly affected patient care.

USP-reported experience with *negative elicitors* reflected aspects of common clinical biases [1], including "pre-mature closure" or "ascertainment" biases – or a pre-decided assessment of the situation followed by interacting with the patient in ways that confirmed initial assessment, a CDR that appears to be heightened when the visit is rushed or computer use pre-occupies the resident. Such biases pose substantial risk to patient safety by increasing diagnostic error [27]. We discovered instances where *neglectors* intended to increase medication regimens to include steroids or additional inhalers because they did not recognize the role of the mold, perhaps because of an overly exclusive focus on only the asthma symptoms and not the environment. Educating medical trainees to be open to diagnostic clues from patients with SDoH-related concerns could prevent ineffective, unsafe treatment. Biases go beyond ascertainment and pre-mature closure and include anchoring effects – the tendency to follow initial impressions of a patient's presentation–among many others. Reducing diagnostic error directly associated with biases and affiliated CDR requires a multi-pronged educational approach that addresses awareness of biases and impact on patient outcomes through direct feedback and training on best practices [2]. Our results provide insight into curricular enhancements needed to train our residents to be effective clinical problem solvers in the context of SDoH.

The USP methodology provided opportunities to look closely at communication skills. Poor information gathering skills (e.g., use of close-ended questions or dismissive responses) prevented residents from collecting essential information. And USPs noted that while they suspected some "negative elicitor" residents appreciated the importance of mold (some even documenting in their note), they did not share that with the patient – which would have left a real patient to conclude that the mold probably wasn't a real problem and/or to undermine their understanding of their disease. The role of patient-provider communication in history taking, patient understanding of disease, treatment adherence and patient outcomes is well-established and regularly assessed [28, 29]. Direct feedback for learners who fail to meet these communication standards is critical as residents using close-ended questions or inadvertently neglecting to give patients space to voice concerns will not be effective even if they have excellent clinical reasoning.

Full elicitors successfully uncovered and explored the full implications of mold but varied in what they did with that information. Some did nothing, perhaps because they did not know what to do or because they felt not much could be done, it was the patient's problem, or was "out of scope" for them. From a cognitive perspective, residents may know about available options but not believe in their efficacy [30]. Or some residents might be predisposed toward less activist approaches to care, more generally. Our data cannot directly answer these questions but suggest avenues for future research.

Those *full elicitors* who did document but did not take action at least recorded their clinical reasoning, setting the stage for addressing mold in subsequent visits, although it may also be that these residents struggled to carry that reasoning over into planning "solutions." On the other hand, we know that failing to document SDoH is widespread [25, 26] – and has led to the embedding of structured SDoH assessment into care (e.g., EHR). Our study pinpoints that failure to document is not the only problem. Residents need more training on why tracking SDoH from initial assessment forward is essential to long-term care in order to make clinical connections between specific SDoH and their implications for health. In addition, while our findings provide support for using structured screening tools [26, 31], specifically for patients who are able and willing to share relevant information, simply including SDoH fields in the EHR may not be sufficient. Some or our residents asked about housing in ways that made it hard for the patient to share specific concerns.

Ultimately a very small group took action by providing a resource or referral. Were they particularly concerned about the likely impact of the mold on symptoms or did they simply have access to information on or reinforcement regarding SDoH resources? Did their sense of urgency spur the cognitive effort needed to retrieve information to take action? One resident reported asking a colleague about resources but the colleague couldn't provide any information – this resident's clinical problem solving process may have been curtailed by social norms (or shared understanding) about available options. The discovery that only eight referrals were made even after discussion of concerns suggests the need for information on appropriate responses and/or evidence on the importance of acting promptly on SDoH. Increasing options for addressing SDoH is essential – not only to help resolve the patient's problems but also to show physicians that intervening is possible and effective – which may serve to reinforce effective clinical reasoning when it comes to SDoH.

Our study is not without limitations. While USPs are a defined tool for describing our health system, our sample size and focus on one residency program and one healthcare system reduces generalizability. USPs present to the clinic as new patients, and are sent into an already stretched public healthcare system. Microsystem factors such as clinical load (as evidenced by the USP report of some visits being rushed or with preoccupied providers) might impact provider willingness to engage in detailed discussions on SDoH, even during visits where patients are clearly affected by their living situation. We did not collect data on residents' internal clinical reasoning and problem-solving processes.

Conclusions

Using USPs to directly observe practice behaviors in gathering information about, documenting and taking action on a standardized housing issue closely linked to symptoms is the first piece of the puzzle needed to better understand education and training to prepare physicians to address SDoH. In our study, residents missed clues about the patient's clinical problem, did not always use effective communication skills to gather information or educate patients, and did not take action to directly address the SDoH. From an educational needs perspective, our findings suggest that there were multiple explanations for these clinical problem solving failures – deficits in clinical reasoning, beliefs about scope of practice/responsibility, neglecting causes for a focus on symptoms, overly narrow medical perspectives, expectancy/efficacy beliefs around the futility of addressing SDoH, and poor communication skills/practices. Future research should explore the influence of the clinical microsystem (e.g., screening tools, availability of resources, team workflows) on physicians' clinical problem solving as it relates to SDoH, explore individuals' cognitive thought processes to more specifically identify biases, and evaluate interventions designed to support accurate information gathering and clinical reasoning processes in actual practice in the context of SDoH.

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