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| Theme | Definition | Examples | Quotes |
| Trust  Themes re: building trust or mistrust in predictive info | | | |
| Positive Sentiments | This refers to statements made that reflect positive feelings or opinions about predictive info. Includes statements that describe building or already having trust in predictive info. | * Helpful when the data isn’t giving a clear picture or unsure of course of action * When tied to an intervention and/or clinical decision making * Education of studies, validation, etc. via ground rounds | *“But I think it would be helpful just to give like a background, like if this was going to be implemented, if there was a background that was given to—where there were like huddles held for nursing units and there was information given out on that there was a study based off clinicians and they just—they advocated for X, Y and Z to be looked at, I think that would be most beneficial because I think sometimes in—like with nursing specifically, sometimes there’s pushback like does this work. But a lot of times when people know the importance and know that where this is coming from then they understand why they’re doing it.” (Bedside 3)*    *“I’m someone that attends grand rounds and evidence-based medicine presentations, so I would be a participant in something like that. And so, that would be a useful way to get the information out. Any information that helps to determine how it was made, I think, whether it’s from studies done at the hospital, or from evidence taken—reviewed from different articles. I think things like that really do carry a lot of weight, especially if there’s something in an algorithm that doesn’t immediately intuitively make –isn’t what you thought it would be. It’s helpful to have information to understand how you got to that point, because then you learn something.” (Ordering 6)* |
| Negative Sentiments | This refers to statements made that reflect negative feelings or opinions about predictive info. Includes statements that describe losing trust or mistrust in predictive info. | * Feeling like they want to go based off other their own gestalt rather than trusting an alert * Frequently dismissing alerts | *“So, I would like to see something that doesn’t trigger every single time there’s a small heart rate change because maybe my patient just went for a walk with physical therapy or is getting out of bed and their heart rate is 120, but they’re also getting out of bed for the first time in two weeks” (Bedside 4)*    *“Because some of our patients, being as sick as they are, just are tachycardic at baseline, in the 110s. So if a patient’s normally at 110 and now they’re 120, I’m not gonna be very impressed. And it might be a little bit frustrating if they keep getting a alert, even if it’s something that isn’t actually on our differential, in terms of if they are infected.” (Ordering 2)* |
| Previous Experience  Themes re: past interactions with and utilization of predictive info | | | |
| UPHS Sepsis Alerts | This refers to discussion of sepsis-specific alerts that were previously or are currently implemented at Penn. This does not include general sepsis risk scores such as SIRS. | * Not usually referred to by a specific name in the transcripts, but it will become apparent when they are speaking about an alert they have encountered while at PennMed * EWS is a proper name (sometimes called EWS 1.0 or EWS 2.0) | *“I don’t know if this is still available and in EPIC, and just not at Penn anymore, but I know there used to be a sepsis—a screener tool based on the data that used to pop up. I don’t know if you’re familiar with that. I remember entering certain vital signs and getting a notification that this patient is at risk for sepsis. But I think that was helpful in identifying trends early and that are so slight that nursing probably wouldn’t think anything of. I think they did away with it, at one point, just because of how frequently it was going off and it wasn’t always 100 percent accurate.” (Bedside 2)*    *“My experience at Penn actually was I got one marker one time since I’ve been working here that popped up, and it was like, does your patient have sepsis? And it was the one time where I was like, no, they don’t, they’re fine. [Laughs] So it was like I’m in the room with them, they’re doing great, no thanks.” (Ordering 3)* |
| Risk Scores and Predictions | This refers to discussion of risk scores and predictions that clinicians have experience utilizing. This includes predictive info for both general sepsis risk scores and any other clinical predictions. | * Wells criteria * SIRS/qSOFA * Ranson score * CHADSVASC | *“I mean in the nursing standpoint like shift assessment includes things like [inaudible] scores and Glasgow Coma Scale and there is little tools here and there that we use to, I guess, score in that way and to predict something and therefore intervene prophylactically. But is it really valued, and is it actually utilized and do people really determine their interventions based on these numbers? Not really in real life.” (Bedside 4)*    *“In terms of risk scores, I would say in my practice the only one that I would really use is just classifying whether someone fits like SIRS sepsis, severe sepsis and septic shock. … I would argue for a novice provider that’s enough to scare them into acting quicker and feeling more urgency. To me, I think I can look at them and look at the information presented in front of me and mortality is—and I would never say to a family your family member has a 15 percent chance of dying based on this scale.” (Ordering 5)* |
| Model Build  Themes re: the who/what/where/when of model/alert build and deployment. | | | |
| Content  *[explanatory/algorithm]* | This refers to the clinical information contained in a potential alert that would illustrate the reasons an outcome may occur. Additionally, any resources that would be available or linked within an alert | * Vitals trends * Quantitative Presentation * Links to antibiotic decision tree or antibiotic stewardship info | *“…if somehow like an algorithm could catch how fast someone is declining I think that would be really helpful for the nurse, especially for newer nurses. Like again, to incorporate the idea of a trend. Like how new is this abnormality, and abnormality meaning combining not just vital signs, but lab values and orientation status and all of these things that come with sepsis.” (Bedside 4)*    *“And I think like the vital sign trend might be the biggest signifier of that, like if it told you these vitals are trending in the septic direction and however many percent of patients who have this kind of vital sign trend turn to sepsis –which makes the antibiotic decision easier…” (Ordering 4)* |
| Platform delivery | This refers to the interface, vector for delivery, timing of delivery and placement of a potential alert. | * Text alerts * Within a specific lab value * EPIC BPA * Sepsis tab | *“Just stick it in with the chart advisories. It pops up every once in a while. Not every single time you open EPIC, but the first time after it generates the chart advisory, you have to acknowledge it, give a reason like provider notified. And then it goes away for a while. It doesn’t keep coming up every time you open the goddamn chart.” (Bedside 5)*    *“So, I think initially, it’s always good to have that come up when a patient first comes in. And then, maybe if you sent–the information starts to change over the course of a patient’s hospitalization, some providers might need a little flag to let them know that things have changed and–so, that could –those are two instances, I think, that could be helpful.” (Ordering 1)* |
| Predictions | This refers to clinical outcomes that might occur in patients who are at risk or have developed sepsis. Predictions are discussed as potential “reasons” for the alert. | * Mortality * Likelihood of requiring ventilation * Transfer to ICU * Development of sepsis or septic shock | *“I think it would be helpful to see like ICU transfer outcomes. I would be so curious to see that because when a patient is first septic—showing signs of sepsis where like we don’t know if we’re going to be on the floor managing them or whether they would go [to the ICU]. … I’d be interested to see the mortality, also.” (Bedside 3)*    *“I could see that if an algorithm told me like a certain threshold of morbidity or mortality I might be more inclined to play it safe and just give them antibiotics for the first 48 hours than to watch and wait. I don’t know what that threshold would be, but presumably—I don’t know. If someone told me this patient, based—as a likelihood of, I don’t know, greater than 30 percent in-hospital mortality I might be more likely to pull the trigger on antibiotics. … Other criteria –I guess you could say chance of discharge to home versus a rehab facility. In my mind, that shows whether we caught the infection quick enough so that their level of debilitation was*  *less and they can go home or if they were so debilitated because we waited so long that they now need to go to a physical therapy skilled nursing facility for a couple of weeks. Other things, I think percent chance that they have to go to the ICU, for example, because maybe right now when I recognize the infection and sepsis you don’t need to go to the ICU, but if someone told me this patient has a 33 percent chance of going to the ICU, I might be inclined to act quicker.” (Ordering 5) OR*    *“So a computer algorithm telling you, this patient has a likelihood of developing sepsis that's whatever number greater than 10 percent in the next 24 hours would pique my interest enough to go to see him. But that's where I think it would be helpful.” (Ordering 8)* |
| Utility  Themes re: the impact of a potential alert | | | |
| Audience | This refers to discussion of the best recipients to target for receiving a potential alert to render it useful/used rather than dismissed. | * More useful for novice practitioners * Less useful for bedside nurses who do not put in orders * Clinicians changing services, infrequently rotating on a service | *“…so, what I’m saying is it would be more helpful for providers who are not with the patient at bedside, and who sometimes never actually even see the patient with their own eyes. So, especially on night shift. On night shift, the provider does not come see the patients unless there’s some clinical indication that the nurse has brought to their attention.” ““From a nursing point of view, it depends what level of nurse you get and how that would be helpful.” (Bedside 5)*    *“For those of us who see –as internal medicine people who treat infections all the time, I don’t think it’s like that helpful unless you’re pretty novice. Where I think this is most helpful is to the person who does not usually take care of these types of patients, so like to some degree surgery or folks who are in ultra-subspecialties that would always defer this to someone.” (Ordering 6)* |
| Clinical Impact | This refers to the potential impact(s) of an alert on the course of clinical care. | * Being more or less inclined to initiate broad spectrum antibiotics * How might clinical are change based on an alert? | *“So, seeing a warning like that will trigger me to go do my own assessment. And I’ll tell –I’ll Cureatr the provide like, hey, the MAR just gave me this warning, I’m gonna do my own assessment, I’ll tell you what I find. But I will never just take that at face value and treat based off it ever. I don’t care how good the algorithm is. It’s never gonna be as good as my nursing judgment [laughter].” (Bedside 5)*    *“a big thing is, of course, appropriate use of antibiotics to make sure that we’re not overtreating patients. And so, maybe something that reminds you to reevaluate your antibiotic use at the 24-hour mark is something that could be helpful. Because a lot of times when we’re not sure what’s going on, we do add a lot on initially, and then we get a lot more information and then we –it is appropriate to start peeling things back. Other times it’s not, and someone –and we don’t find out what’s going on, and so we continue to treat someone empirically. But something like that could be helpful to prompt you to really think about the antibiotic decisions that you’re making and to think about antimicrobial stewardship.” (Ordering 6)* |