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Rapid intensification of suicide risk preceding suicidal behavior among primary care patients

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Abstract

Background: Approximately half of those who attempt suicide report experiencing suicidal ideation and suicidal planning in advance; others deny these experiences. Some researchers have hypothesized that rapid intensification is due to past suicidal ideation and/or behaviors that are "mentally shelved" but remain available for rapid access later.

Method: To evaluate this hypothesis, we examined (a) temporal sequencing of suicidal ideation, suicidal planning, and suicidal behavior, and (b) speed of emergence of suicidal behavior in a prospective cohort study of 2744 primary care patients.

Results: Of 52 patients reporting suicidal behavior during follow-up, 20 (38.5%) reported suicidal ideation and planning prior to their suicidal behavior, 23 (44.2%) reported suicidal ideation but not planning, and nine (17.3%) denied both suicidal ideation and planning. Over half ($n = 30$, 57.7%) reported the onset of suicidal ideation and/or planning on the same day as or after their suicidal behavior (i.e., rapid intensification). Rapid intensification was not associated with increased likelihood of reporting recent or past suicidal ideation, planning, or behaviors, suggesting rapid intensification does not depend on prior experience with suicidal ideation and/or behaviors.

Conclusion: Detecting primary care patients at risk for this form of suicidal behavior may be limited even with universal suicide risk screening.

KEYWORDS
cusp catastrophe, multiple pathways, planning, rapid intensification, suicidal ideation

Ideation-to-action theories of suicide such as the interpersonal-psychological theory of suicide (Van Orden et al., 2010), the three-step theory (Klonsky & May, 2015), and the integrated motivational-volitional model (O'Connor & Kirtley, 2018) posit that people pass through a series of phases or stages of escalating suicide risk. This sequential trajectory often begins with relatively low risk states characterized by the desire for death.

A subset of this group progresses to more "active" forms of suicidal ideation, which can include suicide planning in some cases, representing an especially high-risk form of suicidal ideation. Finally, a small subset of people in this stage will progress to suicidal behavior. These models stand in contrast to the "multiple pathways" model described by Baca-Garcia et al. (2011), which suggests that the progression to suicidal behavior need not follow any particular sequence of stages. From this perspective, people experiencing a desire for death—traditionally conceptualized as a less severe form of suicidal ideation—could potentially transition directly to suicidal behavior without passing through intermediate levels of risk such as active ideation and planning. An important implication of the multiple pathways model is that suicidal behavior could sometimes emerge directly from a very low risk or even nonsuicidal state, effectively bypassing suicidal ideation and planning altogether.

Previous research suggests that a significant percentage of people who attempt suicide—potentially around half—deny experiencing suicidal ideation and/or planning in advance (Borges et al., 2000; Chaudhury et al., 2016; Conner, 2004; Conner et al., 2007; Jeon et al., 2010; Jiang et al., 2010; Kessler et al., 1999; Nock et al., 2014; Ursano et al., 2015; Wastler et al., 2021; Wyder & De Leo, 2007). Such attempts are traditionally referred to as "unplanned" or "impulsive" suicidal behavior (Conner, 2004). Some researchers have argued that suicidal behaviors without advance ideation and planning may be explained by episodic suicidal ideation (Jobes & Joiner, 2019). According to this perspective, individuals who experience suicidal ideation episodically may have had one or more prior suicidal episodes during which they developed a plan for suicidal behavior but then mentally "shelved" the plan without action. During a subsequent suicidal episode, the plan is rapidly retrieved and acted upon, giving the false appearance of suicidal behavior without prior suicidal ideation or planning (Jobes & Joiner, 2019).

The occurrence of episodic suicidal ideation has been empirically documented (Bryan et al., 2019; Bryan & Rudd, 2018; Glenn et al., 2020; Kleiman et al., 2017), and this type of ideation is associated with increased risk for suicidal behaviors (Bryan et al., 2019; Wang et al., 2021). Further, previous research provides some support for the association between engaging in planning during a previous suicide episode and later "impulsive" suicide attempts. In a recent study of adults who reported a suicide attempt within the preceding month, 22% denied experiencing any suicidal thoughts or desire to die at all within the same month (Wastler et al., 2021). Consistent with the mental shelving perspective, 48% of this subgroup reported they had previously thought about suicide at some earlier point in their lives; however, contrary to this perspective, 52% (approximately 12% of all participants who had recently attempted suicide) said they had never experienced suicidal thoughts at any point in their lives. An important limitation of that study was its cross-sectional design and reliance on retrospective reports of thoughts and experiences that may have occurred many years prior. Longitudinal studies that repeatedly assess the occurrence of suicidal ideation and suicidal behaviors are needed to better understand the pathways that lead to suicidal behavior. Such research could reveal information with important implications for improving suicide risk screening, assessment, and intervention.

Recent conceptual work provides a framework for understanding the multiple pathways perspective, to include cases where suicidal behaviors rapidly emerge from very low risk states, seemingly "skipping over" intermediate levels of risk like active suicidal ideation and suicidal planning (Bryan et al., 2020). In contrast to traditional perspectives that conceptualize suicide risk as a unidimensional spectrum (see Figure 1a), the three-dimensional model depicted in Figure 1b provides a foundation for understanding how suicide can result from multiple, qualitatively distinct pathways. Whereas some pathways involve gradual linear change through incrementally severe risk states, other pathways involve sudden, discontinuous change from lower to higher risk states. In Figure 1b, for instance, Pathway A represents a gradual or incremental progression toward suicidal behavior through multiple sequential phases of suicide risk that are associated with gradual increases in the probability of suicidal behavior. Pathway B, by contrast, represents a progression toward suicidal behavior that is initially gradual but then suddenly "jumps" from a lower risk state to a higher risk state, effectively "skipping over" the suicidal planning phase. Pathway C represents a more extreme version of this phenomenon, effectively "skipping over" all intermediate risk stages, including suicidal ideation and suicidal planning. These two pathways provide alternative pathways to suicidal behavior, consistent with the multiple pathways model.

The jump in suicide risk observed in Pathways B and C occurs because the intermediate phases of suicide risk (e.g., active suicidal ideation, suicidal planning) are improbable, meaning people will spend little (possibly no) time in these states. These improbable states are depicted by the folded region of Figure 1b. When entering these improbable regions of suicide risk, people are likely to quickly shift to one of two more probable states: either high risk (the upper surface) or low risk (the lower surface). For people who shift to the lower risk state, the probability of suicidal behavior will drop, but for people who shift to the higher risk state, the probability of suicidal behavior will rapidly increase. If someone attempts suicide soon after this rapid intensification of suicide risk, they are likely to
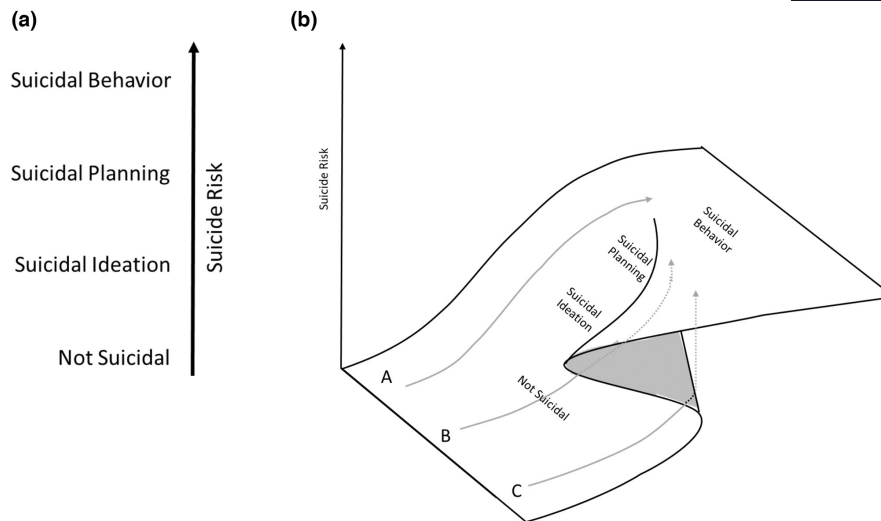
FIGURE 1 The traditional model of suicide risk (a) assumes that all suicidal thoughts and behaviors like on a continuous, unidimensional spectrum with low risk at the bottom of spectrum and high risk at the top. According to this perspective, the pathway to suicide progresses through several incremental stages: from nonsuicidal to suicidal ideation to suicidal planning to suicidal behavior. The three-dimensional cusp catastrophe model of suicide risk (b) provides an alternative framework that allows for multiple pathways. Pathway A progresses through multiple incremental phases of suicide risk, consistent with the unidimensional spectrum model: from nonsuicidal to suicidal ideation to suicidal planning to suicidal behavior. Pathway B progresses from nonsuicidal to suicidal ideation to suicidal behavior, "skipping" over suicidal planning in the process. Pathway C progresses from nonsuicidal to suicidal behavior, "skipping" over suicidal ideation and suicidal planning.

deny experiencing intermediate risk states like suicidal ideation and suicidal planning.

In the present study, we used data from a prospective cohort study of primary care patients that repeatedly assessed suicidal ideation, plans, and behaviors for 1 year after enrollment. Our primary aim was to examine the progression of suicide risk in two ways. First, we sought to describe the temporal sequence of suicidal ideation, suicidal planning, and suicidal behavior among patients who engaged in suicidal behavior during the one-year study period. Second, we sought to assess the relative frequency of rapid intensification of suicide risk, which we defined as suicidal behavior that occurred on the same day as the first onset of suicidal ideation and/or suicidal behavior that occurred prior to the first onset of suicidal ideation.

METHOD

Participants and procedures

Participants for the present study included primary care patients who reported suicidal behavior (i.e., interrupted, aborted, or actual suicide attempts) within 1 year of enrolling in the PRImary care Screening Methods (PRISM) Study, a multisite prospective cohort study of patients recruited from six military primary care clinics located at five military installations across the U.S. between July 2015 and August 2018 (Bryan et al., 2020). Patients were recruited from clinic waiting rooms during routine visits by a trained research associate who provided information about the study. Patients who completed the informed consent process were provided with a computer tablet to complete a baseline self-report survey. Participants were contacted 6 and 12 months later to complete a phone-based interview assessing the incidence of suicidal ideation, planning, and behaviors since baseline. Participants could select a small token of appreciation (e.g., t-shirt, gift card for coffee) for completing the baseline assessment and received a $50 electronic gift card for each completed assessment during follow-up. PRISM's inclusion criteria were being 18 years of age or older, eligible to receive medical services from the Department of Defense, able to understand and read the English language, and able to complete the informed consent process. To maximize generalizability, the only exclusion criterion was the presence of a medical or psychiatric condition that diminished capacity for providing informed consent (e.g., acute intoxication, psychosis). The study was reviewed and approved by the Naval Health Research Center Institutional Review Board.

Instruments

Self-injurious thoughts and behaviors interview (SITBI)

The SITBI (Nock et al., 2007) was used at baseline to assess lifetime history of suicidal ideation, suicidal planning, and

TABLE 1 Self-injurious thoughts and behaviors interview item content to assess suicidal ideation, suicidal planning, and suicidal behaviors at baseline and during follow-up.

Variable	Item content[a]
Suicidal ideation	ever had thoughts of killing yourself?
Suicidal planning	ever actually made a plan to kill yourself?
Actual suicide attempt	ever made an actual attempt to kill yourself in which you had at least some intent to die?
Interrupted suicide attempt	been very close to killing yourself and at the last minute someone or something else stopped you?
Aborted suicide attempt	ever been close to killing yourself and at the last minute decide not to kill yourself?

[a]At baseline, each item was preceded by "Have you..." and during follow-up, each item was preceded by "In the past 6 [or 12] months, have you...".

suicidal behaviors and was used during follow-up to assess the occurrence of suicidal ideation, suicide planning, and suicidal behaviors since baseline. Participants reporting suicidal thoughts and behaviors were asked to report the date of onset of the reported episode or behavior. Each variable was assessed separately for all participants. Item content is displayed in Table 1. To increase the accuracy of recall, interviewers prompted participants to consider contextual factors (e.g., season of the year, physical location) and other meaningful life events (e.g., anniversaries, birthdays, holidays) as temporal anchors. Interrupted, aborted, and actual suicide attempts were combined to represent "suicidal behavior."

Patient health questionnaire-9 (PHQ-9)

The PHQ-9 (Kroenke et al., 2001) is a self-report scale that assesses the frequency of the nine criteria for a major depressive episode within the past 2 weeks. The scale's ninth item asks about "thoughts that you would be better off dead, or thoughts of hurting yourself in some way," and has been validated as an indicator of suicidal ideation and risk for subsequent suicidal behavior (Simon et al., 2013). All of the PHQ-9's items, including the suicide risk item, are rated using the following scale: 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day.

Data analytic plan

Analyses focused on the subset of participants ($n = 52$) reporting an interrupted, aborted, or actual suicide attempt

(i.e., "suicidal behavior") during the 1 year follow-up. For each of these participants, the dates of onset for suicidal ideation, suicidal planning, and suicidal behavior during the study period were sequenced in chronological order. Chi-square tests of association and phi statistics were used examine associations between categorical variables and F tests and eta statistics were used to compare continuous variables across groups. Owing to our small sample size, effect size statistics were used to guide interpretations.

RESULTS

Follow-up data were missing from 952 of 2,744 (34.7%) participants. As previously reported (Bryan et al., 2021), participants with missing data were younger in age (37.0 vs. 42.2 years; t (1946) = 6.7, $p < 0.001$) and less likely to self-identify as White (62.5% vs. 70.2%; χ^2 (2) = 16.4, $p < 0.001$). Fifty-two (1.9%) participants reported at least one suicidal behavior during follow-up. The demographic characteristics of the 52 participants with follow-up suicidal behavior are summarized in Table 2. Of those reporting follow-up suicidal behavior, 38 (73.1%) endorsed prior suicidal ideation, 22 (43.1%) prior suicidal planning, and 14 (26.9%) endorsed prior suicidal behavior at baseline; 13 (25.0%) denied all these experiences at baseline.

Regarding temporal sequencing, 20 (38.5%) participants reported experiencing suicidal ideation before suicidal planning and suicidal planning before suicidal behavior; 23 (44.2%) reported experiencing suicidal ideation before suicidal behavior but denied experiencing suicidal planning; and nine (17.3%) reported experiencing no suicidal ideation or planning before suicidal behavior. Though not statistically significant, participants who denied experiencing suicidal ideation or planning before suicidal behavior were slightly less likely to identify as Latino/Hispanic ($\Phi = 0.3$), slightly less likely to endorse suicidal ideation at baseline ($\Phi = 0.3$), and slightly more likely to be currently serving in the military ($\Phi = 0.4$). Two (25.0%) of participants in this group screened positive for suicide risk on the PHQ-9 at baseline.

Regarding emergence of suicidal behavior, 21 (40.4%) participants reported experiencing suicidal ideation or planning at least one day prior to their suicidal behavior, 21 (40.4%) reported experiencing suicidal ideation or planning on the same day as their suicidal behavior, and nine (17.3%) reported experiencing suicidal ideation or planning after their suicidal behavior (see Table 3). Based on this distribution, we classified the latter two groups—suicidal ideation or planning on the same day as or after suicidal behavior—as *rapid intensification* ($n = 30$) and the first group—suicidal ideation or planning one or more days prior to suicidal behavior—as

TABLE 2 Selected demographic features of the study cohort.

Variable	Full sample (n = 52)
Age, M (SD)	33.8 (19.2)
Gender, n (%)	
Male	23 (44.2)
Female	28 (53.8)
Other	1 (1.9)
Race, n (%)[a]	
White	40 (76.9)
Black	9 (17.3)
Asian	2 (3.8)
Native Amer.	3 (5.8)
Pac. Island	1 (1.9)
Other	7 (13.5)
Latino/Hispanic	
Yes	10 (19.2)
No	40 (76.9)
Other	2 (3.8)
Military Service	
Yes, currently	35 (67.3)
Yes, but not currently	7 (13.5)
No	10 (19.2)
Baseline Suicide Risk	
Recent suicidal ideation (PHQ-9)[b]	32 (61.6)
Lifetime suicidal ideation (SITBI)	38 (73.1)
Lifetime suicidal planning (SITBI)	22 (43.1)
Lifetime suicidal behavior (SITBI)	14 (26.9)

[a]Participants were allowed to select more than one racial identity. Totals within each column therefore may not sum to 100%.

[b]A negative screen was defined as a score of zero (i.e., no thoughts of death or self-harm) and a positive screen was defined as any non-zero score.

sequential progression (*n* = 22). Demographic characteristics and rates of suicidal ideation, planning, or behaviors at baseline were similar across groups (Φ's ≤ 0.2, $\eta = 0.2$; Table 4). Eleven (36.7%) participants in the rapid intensification group screened positive for suicide risk on the PHQ-9 at baseline.

To examine the "mental shelving" perspective, all possible combinations of SITBI and PHQ-9 responses at all timepoints were considered within the rapid intensification group (see Figure 2). When considering the entire life span, 21 (70.0%) participants in the rapid intensification group reported suicidal ideation and/or suicidal behavior at some point prior to their suicidal behavior, seven (23.3%) denied suicidal ideation at any point prior to their suicidal behavior, and two (6.7%) had one or more missing data points. By comparison, 17 (77.3%) participants in the

TABLE 3 Timing of onset of suicidal ideation or suicidal planning prior to follow-up suicidal behavior.

No. of days	n (%)
≥181 days	3 (5.8)
91–180 days	6 (11.5)
31–90 days	7 (13.5)
8–30 days	2 (3.8)
1–7 days	3 (5.8)
Same day	21 (40.4)
After	9 (17.3)
Missing	1 (1.9)

sequential progression group reported suicidal ideation and/or suicidal behavior at some point prior to their suicidal behavior, four (18.2%) participants denied suicidal ideation at any point prior to their suicidal behavior, and one (4.5%) had one or more missing data points.

DISCUSSION

Suicide risk has traditionally been conceptualized as consisting of a series of progressive phases or steps that correspond to increasing levels of risk: the wish to die leads to suicidal ideation, suicidal ideation evolves into suicidal planning, and suicidal planning progresses to suicidal behavior (Baca-Garcia et al., 2011; Bryan et al., 2020). Consistent with this perspective, suicidal ideation and planning are often assumed to be necessary preconditions for suicidal behaviors (Jobes & Joiner, 2019). This perspective underlies common approaches to suicide risk screening and assessment. The Columbia Suicide Severity Rating Scale (CSSRS; Posner et al., 2011), for example, using a hierarchical scoring system wherein suicidal planning is considered a more severe indicator of suicide attempt risk than suicidal ideation. In contrast, some researchers have argued the progression toward suicidal behavior can follow multiple pathways, with some pathways potentially bypassing suicidal ideation and planning altogether (Baca-Garcia et al., 2011; Bryan et al., 2020). The present results lend support for the latter. In this sample of primary care patients who reported suicidal behavior during the one-year study period, only 38.5% described a sequential progression through suicidal ideation and planning prior to their suicidal behavior and another 38.5% reported experiencing suicidal ideation but "skipping" suicidal planning. Within these two groups, around three-quarters reported a history of suicidal thoughts or behaviors prior to baseline, consistent with the "mental shelving" perspective proposed by Jobes and Joiner (2019). The remaining

TABLE 4 Demographic and clinical characteristics, by temporal sequence and speed of onset groupings.

Variable	Pathway					Speed of onset			
	SI > SP > SB (n = 20)	SI > SB (n = 23)	SB (n = 9)	χ^2/F	η/Φ	sequential progression (n = 22)	Rapid intensification (n = 30)	χ^2/F	η/Φ
Age, M (SD)	31.1 (18.7)	38.5 (21.4)	27.4 (10.4)	1.4	0.2	37.2 (21.8)	31.3 (17.0)	1.2	0.2
Gender, n (%)				0.5	0.3			1.5	0.2
Male	7 (33.3)	12 (52.2)	4 (50.0)			10 (45.5)	13 (43.3)		
Female	14 (66.7)	10 (43.5)	4 (50.0)			11 (50.0)	17 (56.7)		
Other	0 (0)	1 (4.3)	0 (0)			1 (4.5)	0 (0)		
Race, n (%)[a]									
White	18 (85.7)	15 (65.2)	7 (87.5)	3.2	0.2	17 (77.3)	23 (76.7)	0.0	0.0
Black	4 (19.0)	5 (21.7)	0 (0)	2.0	0.2	3 (13.6)	6 (20.0)	0.4	0.1
Asian	1 (4.8)	0 (0)	1 (12.5)	2.6	0.2	1 (4.5)	1 (3.3)	0.1	0.0
Native Amer.	2 (9.5)	1 (4.3)	0 (0)	1.1	0.1	1 (4.5)	2 (6.7)	0.1	0.0
Pac. Island	1 (4.8)	0 (0)	0 (0)	1.5	0.2	1 (4.5)	0 (0)	1.4	0.2
Other	4 (19.0)	3 (13.0)	0 (0)	1.8	0.2	4 (18.2)	3 (10.0)	0.7	0.1
Latino/Hispanic				5.7	0.3			2.4	0.2
Yes	6 (28.6)	4 (17.4)	0 (0)			5 (22.7)	5 (16.7)		
No	15 (71.4)	17 (73.9)	8 (100)			16 (72.7)	24 (80.0)		
Other	0 (0)	2 (8.6)	0 (0)			1 (4.5)	1 (3.3)		
Military service				7.2	0.4			0.7	0.1
Yes, currently	14 (66.7)	14 (60.9)	7 (87.5)			14 (63.6)	21 (70.0)		
Yes, but not currently	1 (4.8)	6 (26.1)	0 (0)			4 (18.2)	3 (10.0)		
No	6 (28.6)	3 (13.0)	1 (12.5)			4 (18.2)	6 (20.0)		
Baseline Suicide Risk									
Recent suicidal ideation (PHQ-9)	9 (42.9)	9 (39.1)	2 (25.0)	0.1	0.1	9 (40.9)	11 (36.7)	0.1	0.0
Lifetime suicidal ideation (SITBI)	18 (85.7)	16 (72.7)	4 (50.0)	4.0	0.3	17 (81.0)	21 (70.0)	0.8	0.1
Lifetime suicidal planning (SITBI)	11 (52.4)	9 (40.9)	2 (25.0)	1.8	0.2	11 (52.4)	11 (36.7)	1.2	0.2
Lifetime suicide attempt (SITBI)	5 (23.8)	7 (33.3)	2 (28.6)	0.5	0.1	6 (27.3)	8 (26.7)	0.0	0.0

[a]Participants were allowed to select more than one racial identity. Totals within each column therefore may not sum to 100%.

participants denied any prior history of suicidal ideation, planning, or behaviors, consistent with the multiple pathways perspective (Baca-Garcia et al., 2011).

Finally, a small percentage of participants (15.4%) reported skipping suicidal ideation and suicidal planning altogether, suggesting a sudden shift from a very low risk state to suicidal behavior. Only half of this subgroup reported experiencing suicide risk prior to baseline, suggesting relatively equal support for the mental shelving and multiple pathways perspectives and implicating the existence of a small subset of suicidal behaviors that can emerge without experiencing suicidal ideation or planning, as traditionally defined and conceptualized. This

rate is similar to that reported by Wastler et al. (2021), who found that 11% of adults with a lifetime suicide attempt denied ever experiencing suicidal ideation. Overall, our results suggest that rapid intensification may not require prior experience with suicidal ideation and/or behaviors.

Our results further suggest that rapid intensification of suicide risk—defined in this study as the onset of suicidal ideation on the same day as suicidal behavior or suicidal behavior occurring in the absence of suicidal ideation—is common among primary care patients. In this sample, over half of the patients reporting suicidal behaviors (30 of 52%, 57.7%) during the study period fit this
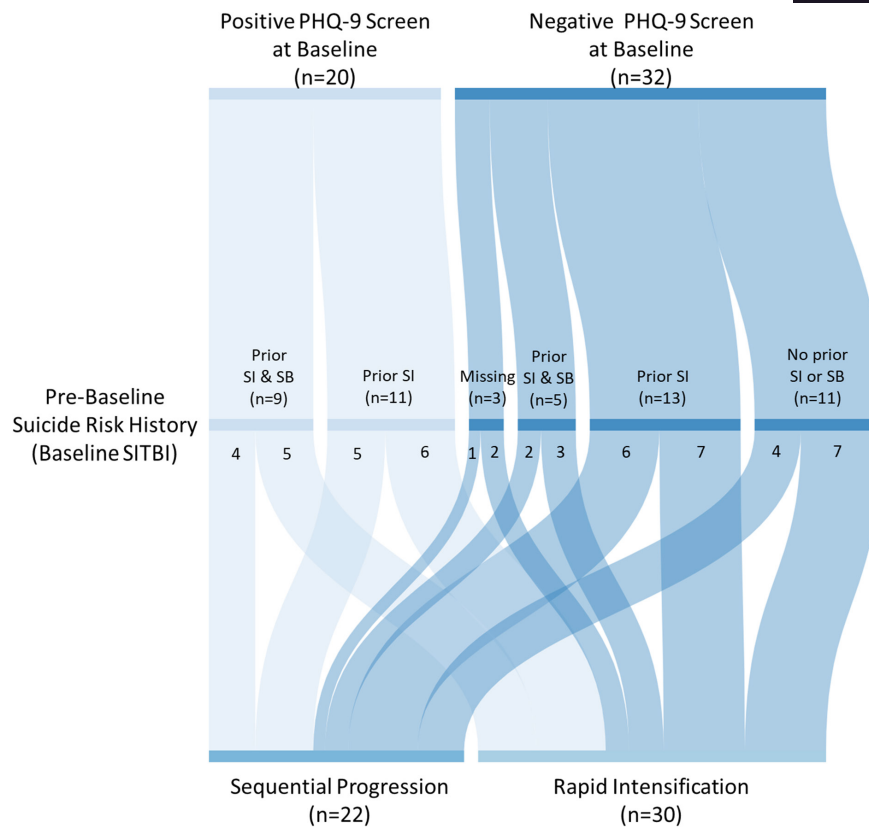
FIGURE 2 Combinations of pre-baseline suicide risk history, suicide risk screening results at baseline, and sequential progression versus rapid intensification of suicide risk prior to suicidal behavior during the one-year follow-up. A positive screen at baseline is defined as a non-zero score on PHQ-9 item 9 ("thoughts that you would be better off dead or of hurting yourself in some way" during the past 2 weeks) and a negative screen is defined as a score of zero on PHQ-9 item 9. Pre-baseline history of suicidal ideation is defined as endorsement of lifetime suicidal ideation or planning on the SITBI at baseline. Rapid intensification is defined as the first onset of suicidal ideation on the same day as suicidal behavior. Sequential progression is defined as the first onset of suicidal ideation one or more days prior to suicidal behavior.

definition. This rate aligns with previously reported rates of "unplanned" or "impulsive" suicide attempts (Borges et al., 2000; Chaudhury et al., 2016; Conner, 2004; Conner et al., 2007; Jeon et al., 2010; Jiang et al., 2010; Kessler et al., 1999; Nock et al., 2014; Ursano et al., 2015; Wastler et al., 2021; Wyder & De Leo, 2007). To our knowledge, this is the first study to describe the occurrence of rapid intensification among primary care patients. Although the present sample was modest in size, the consistency of our findings with previous studies bolsters confidence in the conclusion that rapid intensification of suicide risk is a common feature of suicidal behavior.

The present results hold important implications for suicide prevention. With respect to suicide risk screening, our results provide some context for the modest sensitivity of suicide risk screening even when patients are repeatedly screened, when multiple "levels" or stages of suicide risk are assessed (e.g., the Columbia Suicide Severity Rating Scale; Posner et al., 2011), and/or when complex predictive analytics based on machine learning models are tested (Belsher et al., 2019; Bjureberg

et al., 2021; Brown et al., 2020; Bryan et al., 2021; Carter et al., 2017; Gutierrez et al., 2019; Schafer et al., 2021; Simon et al., 2013; Simpson et al., 2021). Despite the poor performance of suicide risk screening methods, especially in populations with lower incidence rates, some researchers have nonetheless encouraged universal suicide risk screening in primary care (King et al., 2017; Ross et al., 2021). Although increasing the frequency of screening could theoretically improve the identification of patients who will go on to attempt suicide, our results suggest that repeated screening of primary care patients—even as often as once per month—probably would not meaningfully improve the detection of most suicidal behaviors, which are characterized by rapid intensification of suicide risk within a single day. To meaningfully improve suicide risk detection among primary care patients, novel tools and strategies that can detect rapid intensification are therefore needed. Based on the present results, tools and strategies that rely on the self-disclosure of suicidal ideation and behaviors may not be well-suited for this purpose.

With respect to treatment and intervention, the existence of multiple pathways implicates the potential need to develop and employ a range of prevention strategies that are tailored to different pathways, consistent with the "Swiss cheese model" of prevention (Reason, 1990). For example, receipt of empirically supported treatments like crisis response planning, cognitive behavioral therapy for suicide prevention, problem solving therapy, and dialectical behavior therapy have been shown to significantly reduce suicide attempt rates (Fox et al., 2020; Mann et al., 2021). Because the progression of suicide risk in Pathway A (see Figure 1b) is incremental, there may be sufficient time for someone to be referred to one or more of these therapies, thereby interrupting or blocking their progression toward suicidal behavior. By comparison, the progression of suicide risk in Pathway B is less gradual, reducing the window of opportunity to intervene with these treatments, highlighting the need for "just-in-time" interventions that can be rapidly deployed. Finally, the progression of suicide risk in Pathway C may be sufficiently sudden and discontinuous that early identification of risk will be very difficult, if not impossible, thereby limiting the opportunity for referral to mental health treatment. In this group, suicide prevention strategies that can be put into place prior to rapid intensification may be required. Regardless of pathway, the potential for adverse effects associated with deployed interventions should be considered, as highlighted by recent findings showing an increase in self-harming behaviors subsequent to the implementation of a low-intensity intervention intended to reduce these behaviors (Simon et al., 2022).

Our study has limitations, the most salient being that data were collected only in military clinics. Similar research in other populations is warranted to determine if our results and conclusions are broadly generalizable. Recall bias also may have influenced findings. To mitigate this risk, we used a method for categorizing cases that increases reliability at the expense of diminished resolution. Specifically, we are unable to determine how much time progressed between the first onset of suicidal ideation and the suicidal behavior that reportedly occurred on the same day. Such information could provide even greater clarity regarding the nature of rapid intensification and further inform the options available to avert these types of suicidal behaviors; having only a few minutes versus multiple hours to intervene may implicate different strategies. Third, our small sample size also restricts our ability to investigate rapid intensification with greater nuance. Fourth, it is possible that our definition of rapid intensification is overly strict. Progressing to suicidal behavior within 48 h, for example, may also be reasonably described as rapid intensification. Larger sample sizes would allow us to explore differences across different groups (e.g., gender, race, age) and potentially lead to better characterizations of "rapid intensification." Despite these limitations, our results suggest that multiple pathways to suicidal behavior exist and rapid intensification of suicide risk is common. For these reasons, universal screening for suicidal ideation in primary care clinics may not meaningfully improve the detection of primary care patients who will engage in suicidal behaviors.

DISCLAIMER

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