Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

The evaluation of a large-scale guideline implementation study for suicide prevention in mental healthcare

Nikki van Eijk
n.l.van.eijk@fsw.leidenuniv.nl

Leiden University

Wouter van Ballegooijen
Vrije Universiteit Amsterdam

Marjolein Veerbeek
113 Suicide Prevention

Renske Gilissen
113 Suicide Prevention

Teun Soederhuizen
EhdK

Remco de Winter
GGZ Rivierduinen

Daan Creemers
GGZ Oost Brabant

Nicole Luijs
Arkin

Anke van Schooten
GGZ Oost Brabant

Tessa van der Linden
GGZ Rivierduinen

Lizanne Schweren
113 Suicide Prevention

Research Article

Keywords: implementation, clinical guidelines, mental healthcare, healthcare professionals, suicide prevention

Posted Date: October 27th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10676417/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Introduction

In a multiple case study design, five mental healthcare (MH) organisations in the Netherlands optimised guideline-based care over a period of two years. Improvements focused on five pillars: detection of suicidality, the diagnostic process, treatment and safety planning, involving next-of-kin, and adequate reporting. We evaluate the project along the Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) model on two aims: implementing the guideline and improving knowledge and self-efficacy among MH professionals.

Methods

Client data was collected from electronic patient files (EPF) across five timepoints (total N = 288,965). Data from MH professionals was collected from surveys pre- and post-implementation (N1 = 1,872, N2 = 874). Multilevel modelling was used for all outcomes of interest to account for organisational differences. We also collected qualitative data as part of evaluating the implementation success.

Results

We present the results in line with the RE-AIM framework. While potentially reaching many clinicians and patients, we found differences in guideline adherence relating to various client and staff characteristics. We observed only slight improvements in guideline adherence, and MH professional knowledge. At the second assessment, clinicians reported that they used the suicide prevention guideline moderately as part of their routine work. Mental health care clinics varied in their level of guideline adherence and preferred different implementation strategies, but all used training programmes and clinic-wide communication.

Conclusions

A first but important step has been taken in improving suicide prevention practices in mental healthcare on a national level by our large-scale implementation strategy, and long-term vision and support would be beneficial.

Introduction

Suicide remains a significant public health problem worldwide, with an estimated 720,000 people dying by suicide each year (World Health Organization, 2025). Apart from suicide deaths, the number of people with suicidal thoughts or who attempt suicide is significantly higher, especially among people with mental disorders (Alqueza et al., 2023; Teismann et al., 2024). While internationally the number of people who were in mental health care at the time of their death is around one in four, in the Netherlands, this number is much higher at around 40% (Ministerie van Volksgezondheid, 2022; Walby et al., 2018). Mental healthcare services are thus essential in preventing suicide deaths and suicide attempts. While suicide is a complex and multifaceted phenomenon, the group of people who die by suicide while receiving mental health services appears to be more homogenous than those who die without receiving mental health services on several demographic and psychological characteristics (Tang et al., 2022). Moreover, they are easier to identify and target within the population, which allows for more preventative opportunities. This has led to the development of many suicide prevention programmes for mental healthcare organisations, focussing on a multitude of relevant elements such as efficient screening, evaluation, and treatment (Brodsky et al., 2018; Mokkenstorm et al., 2018; While et al., 2012). These elements are often guided by clinical practice guidelines, which combine the best available evidence to offer theoretical and practical guidance on how to screen, diagnose and treat suicidality (NVvP, 2025; Van Hemert et al., 2012).

Despite these programmes and guidelines mental healthcare (MH) professionals often face significant difficulties in treating people with suicidality, due to among others lack of sufficient training, negative attitudes, and low self-efficacy (Huang et al., 2023; Mitchell et al., 2020; Silva et al., 2016). As a result, the effect of the implementation of suicide prevention programmes on client outcomes is often lower than expected. For instance, a suicide-related training programme increased confidence, knowledge and guideline adherence among MH professionals, but failed to find significant improvements in clinical practice affecting clients, with the exception of a small subgroup of clients with depression (De Beurs et al., 2016; de Groot et al., 2015).

Another guideline implementation programme also found improvements in only four out of ten targets, suggesting that many elements were not adequately adopted by organisations (Mokkenstorm et al., 2018). However, when clinical guidelines are implemented well, this is associated with lower suicide rates in those organisations (While et al., 2012). A follow-up of this study revealed that guideline adherence alone is not the holy grail of suicide prevention, but that organisational factors also contribute to suicide rates (Kapur et al., 2016). In the Netherlands, a similar guideline implementation programme was launched (SUPRANET), providing organisations with biannual feedback reports, improvement modules for teams, and exchange meetings to promote an interorganisational community of practice (Setkowski et al., 2018). Some improvements in guideline adherence and registration of suicide attempts were found, but the level of implementation differed significantly between organisations, limiting the potential effect of the intervention, and the power to detect client outcomes (Setkowski et al., 2024).

A plethora of determinants for the success of implementation can be found in the literature, ranging from limited knowledge of the guidelines to a lack of time and resources, to consistent leadership promoting the use of evidence-based practices and local champions (Correa et al., 2020; Fischer et al., 2016). Furthermore, studies show that effective implementation programmes contain multiple strategies at various levels (Tilson et al., 2025), but that interventions are not often tailored to these processes (Peters et al., 2022). Even guideline developers report a lack of attention to disseminating and implementing their guidelines in practice (Thoonsen et al., 2024). Therefore, learning from implementation models and frameworks is crucial to improve the uptake of these suicide prevention programmes. Previous studies have shown that using implementation science theories can lead to relevant practices for mental healthcare services, which in turn contribute to lower suicide attempt rates (Ahmedani et al., 2025; Larkin et al., 2023; Richards et al., 2021).

For this study, we built on existing quality improvement initiatives for suicide prevention, focussing on five pillars: detection of suicidality, the diagnostic process, treatment and safety planning, involving next-of-kin, and adequate reporting. While not directly part of the suicide prevention programme, we also collected information on continuity of care, as this was flagged by previous studies to be relevant to reduce suicides (Kapur et al., 2016). We based the programme on three common implementation frameworks: the Knowledge-To-Action framework to guide the process from beginning to end, the Consolidated Framework for Implementation Science to study barriers and facilitators, and the Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM) model to study the effects of the intervention (Damschroder et al., 2022; Glasgow et al., 2019; Graham & Tetroe, 2010). Using a multiple case study design, we evaluated the impact of the suicide prevention programme within five mental healthcare organisations who are partaking in the SUPRANET initiative (van Eijk et al., 2025). The programme had several overarching aims. In this manuscript, we focus on two closely related objectives: (1) implementing the clinical guideline through various implementation strategies and (2) improving the knowledge and self-efficacy of mental health professionals. Specifically, we evaluate the implementation process and its impact on both the quality of care and professionals' knowledge and self-efficacy. Findings related to context-specific barriers and facilitators will be reported separately. We hypothesised that guideline adherence would be higher at the end of the study period (two years) compared to baseline. For the second aim, we also hypothesised that knowledge and self-efficacy would be higher after the programme compared to baseline. In general, the results are described along the domains of the RE-AIM framework, covering the questions that were set in the protocol (van Eijk et al., 2025).

Methods

The study protocol has been described in detail in a previous publication (van Eijk et al., 2025). Here, we summarise the methods used for the evaluation of the two primary objectives.

Design and procedure

The implementation project focussed on improving the uptake of the suicide prevention guideline in large Dutch mental healthcare organisations (MHO) over a period of two years. Together, these MHOs treat over 60,000 clients yearly and account for approximately 15% of suicides within mental healthcare. For each participating MHO, we conducted a baseline assessment assessing the quality of care in the electronic patient files (EPF, see ‘outcomes’ below). Next, EPF indicators were collected biyearly, resulting in five separate time points of data collection. Due to legislative hurdles, we were only able to collect EPF data from four of the five participating MHOs within the study period. In addition, for each MHO, we sent out a survey to the MH

professionals assessing various individual and organisational factors related to suicide prevention. The survey was repeated at the end of the project to estimate changes in knowledge, self-efficacy, and adherence after participation. Local implementation efforts were supported by the project team and included personalised implementation plans and monthly meetings with all MHOs to foster interorganisational collaboration and knowledge exchange. Project leads within participating MHOs self-reported implementation progress at two time points (one year and two years) and discussed this with the project team.

Setting and participants

In total, five MHOs geographically distributed across urban and rural regions of the Netherlands took part in the study. All MHOs offer a multitude of care services, from outpatient to long-term residential care and everything in between. The total number of clients for which EPF data was available varied slightly between time points (T0 = 55,404, T1 = 53,027, T2 = 58,410, T3 = 60,120, T4 = 62,004). N = 1,872 MHO professionals with direct patient contact took part in the survey pre-implementation (T1), representing an estimated 10% of all eligible professionals. N = 874 took part in the survey at the end (T2). The surveys were conducted cross-sectionally.

Outcomes

Quality of care

At the client level, we operationalised quality of care into a set of client-level binary (yes/no) parameters: does the EPF reflect that the patient received screening for suicidality, and following a positive screen, whether they received a diagnostic interview, a structural diagnosis, suicide-specific treatment, a safety planning intervention, and any involvement of next-of-kin. We also assessed client characteristics such as age, gender, and primary diagnosis. Across the five points of data collection, a total of 288,965 cases were included with 129,299 unique clients. Two additional quality indicators measured continuity of care: the number of days between transfer/discharge and the first follow-up appointment, and the presence of a transfer meeting (yes/no). As clients may transfer multiple times within or between MHOs or not at all, continuity of care was assessed per transfer rather than client.

Implementation outcomes

Implementation success was measured in two ways. First, a record of activities for each MHO was made based on their implementation plans. This was monitored halfway through the project, and potential new activities were added to the list. At the end of the project, we assessed for each planned activity whether this was completed, as well as any relevant notes or new activities. We then mapped each of these activities onto the Expert Recommendation for Implementing Change (ERIC) domains, a common implementation model (Powell et al., 2015).

Second, we assessed implementation and sustainment among MH professionals using the NoMAD (Normalisation Measure Development) survey instrument (Finch et al., 2018; May & Finch, 2009) at T2. We shortened the validated Dutch translation of the NoMAD (Vis et al., 2019), selecting only the 13 items that best suited our context (see Appendix A). The resulting instrument showed good internal consistency in our sample (Cronbach's alpha = 0.886).

Knowledge, self-efficacy, and adherence

To measure knowledge, self-efficacy and adherence at T1 and T2, we used items similar to those used in previous studies (de Beurs et al., 2015; Setkowski et al., 2020; Terpstra et al., 2018). For knowledge of suicidality, we used a sum score of three items, which had good internal consistency (Cronbach's alpha = 0.812). Knowledge of the guideline was assessed using a single question, asking MH professionals about their familiarity with the guideline. Self-efficacy was also measured as a single measure, asking MH professionals about their confidence in dealing with clients with suicidality. Here, we deviated from the protocol as the three items we intended to use for a sum score showed low internal consistency (Cronbach's alpha = 0.375). The remaining item was closest to our definition of self-efficacy. Guideline adherence was assessed using a series of 13 guideline-

based actions, for which MH professionals marked the probability of them performing this action on a 5-point Likert scale. The sum score of these items had good internal consistency (Cronbach's alpha = 0.867).

Other outcomes

We assessed organisational factors that were proven to be relevant in previous studies, including staff turnover and the percentage of self-employed MH professionals within the MHOs (Kapur et al., 2016). We also assessed suicides and suicide attempts at the organisational level. These outcomes are reported in Appendix D as they did not strongly relate to any RE-AIM questions previously formulated, and were collected only as tertiary outcomes.

Data analyses

EPF data

For the investigation of the diagnostic process, we calculated a binary variable that scores positively if at least one of the following guideline-based actions was marked (diagnostic interview, structural diagnosis, diagnostic outcome recorded). Other indicators were assessed separately. None of the organisations were able to record all guideline-based actions at every timepoint, leading to sample size differences for different indicators. To estimate the Reach, we regressed client characteristics (sex, age group, care setting, primary diagnosis) on the various guideline-based indicators, while controlling for organisational differences and clients appearing at multiple timepoints in a multilevel model. The baseline data was excluded for this analysis, as none of the clients had been exposed to the programme. For the assessment of Effectiveness, we analysed differences between timepoints for each of the indicators, while controlling for organisational differences. As we had data for the entire population of clients within the participating MHOs, inference-based statistical testing was not necessary. Therefore, we only report effect sizes.

Survey data

For the assessment of the survey data on knowledge, self-efficacy, and guideline adherence, we used multilevel linear models with cases nested within organisations to account for organisational differences. To answer the question of Reach, we combined the data from the T1 and T2 survey. We estimated models with random intercepts and fixed slopes. When looking at differences in staff characteristics, we used the largest group as reference group in the analyses. For analyses regarding Effectiveness, we conducted one-sided tests based on the hypotheses that scores at T2 would be higher than those at T1. All analyses were conducted in RStudio with R version 4.3.1 or in Jamovi (R Core Team, 2023; The Jamovi Project, 2023). The R code used to analyse the EPF and survey data can be found in Appendix F.

Deviations from the protocol

We were unable to use a second order latent growth model on the EPF data due to poor data quality. Therefore, we analysed the indicators separately using multilevel regression models. Secondly, we introduced the NoMAD measure at the T2 survey to learn more about the implementation and sustainment of the project. Lastly, we intended to use a sum score for self-efficacy, but due to low internal consistency, we changed this to a single-item measure.

Human ethics and consent to participate

All data was collected in accordance with Dutch law and regulations. This study involved the retrospective secondary analysis of organization-wide electronic patient files. In accordance with Article 9(2)(j) of the General Data Protection Regulation (AVG/GDPR) and national research exemptions, explicit individual informed consent was not sought. Patients were previously informed about the potential secondary use of their data via the organization's general privacy notice, which includes a mechanism to object/opt out; data from patients who exercised their right to object were strictly excluded from the dataset. This study received ethical approval from the Amsterdam University Medical Centre (2023.0821). For the survey data, MH professionals gave electronic informed consent before each survey.

Results

We followed five large MHOs for a period of 2 years in which they undertook various activities aimed at improving suicide prevention practices within their organisation. Below, we outline the results in line with the RE-AIM framework, answering our two research questions: how does the implementation rate of the clinical guideline and the associated quality of care change over time, and does knowledge and self-efficacy among MH professionals improve over time?

Reach

The concept of Reach refers to both the number and the representativeness of the individuals who participate in a programme or intervention. In our case, this refers both to clients and to MH professionals. The first question we posed regarding Reach was whether client characteristics explain differences between those who did and did not receive all elements of guideline-based care to investigate the representativeness of the implementation. Firstly, we looked at screening for suicidality, as positive screening then requires further action to be taken. In total, screening for suicidality was conducted for 50.4% of the sample, of which 65.9% screened positively for suicidality. For those screening positively, we found that gender, age, setting, and diagnosis all influenced the level of guideline adherence. For the diagnostic process, we found age (positive), setting (lower in youth care and unknown settings), and primary diagnosis (lower in almost all disorders) as significant predictors. For safety planning, gender (higher in females), age (negative), setting (lower in long-term care), and diagnosis (higher in eating disorders and personality disorders, lower in most others) were significant predictors. For next-of-kin involvement, we found gender (higher in men and non-binary people), age (negative), setting (higher in youth care and 'other' settings), and diagnosis (higher in substance abuse, neurocognitive disorders, neurodevelopmental disorders and psychotic disorders, lower in behavioural disorders and trauma-related disorders) as significant predictors. For suicide-specific treatment, we found age (negative) and diagnosis (lower if diagnosis was unknown) as significant predictors. However, for all these characteristics, the conditional effect was much larger than the marginal effect (e.g. $R^2_m = .005,\ R^2_c = 0.99$). The very low marginal R^2 and high conditional R^2 suggest that differences in guideline adherence are primarily explained by organisational differences and only to a limited extent by client characteristics. For transparency, the full results can be found in Appendix B.

The second question was to which extent staff characteristics explain differences in perceived guideline adherence. Firstly, years of experience working in mental health had a small but positive effect on adherence, suggesting that those who had more experience scored somewhat higher on adherence $(b = 0.05,\ p = .010)$. We also found that MH professionals who have a higher caseload of suicidal clients report higher adherence than those who report seeing little suicidality, $b = 0.09, p < .001$, as well as those who have care coordination tasks, $b = 4.97, p < .001$. We then investigated the impact of professional role and type of unit, for which the results can be found in Table 1. Here, we did not only look at the sum score of adherence, but also at each guideline-based action individually, as not all professionals are required to perform the same tasks. We see significant differences between professional roles and types of care units for all 13 guideline-based actions. Overall, we found that doctors and medical specialists score highest on adherence for most actions, as do professionals from crisis or intensive home treatment (IHT) teams. A sensitivity analysis, in which T1 and T2 were analysed separately, showed comparable estimates and significance levels for most variables.

Table 1
The role of staff characteristics on guideline adherence across both timepoints.

Characteristic	N (%)	Guideline adherence, M (SD)						
		Overall	**Asking about suicide**	**Conducting a diagnostic interview**	**Formulating a structural diagnosis**	**Contacting next-of-kin**	**Involving next-of-kin**	**Making use of lived experience**
		Range 13–65	*Range 1–5*					
Overall		45.49 (9.00)	4.30 (0.79)	2.95 (1.30)	2.73 (1.28)	3.49 (1.14)	3.65 (1.10)	2.41 (1.16)
Professional role								
Nursing roles – reference group	760 (31.3)	47.0 (8.29)	4.35 (0.72)	3.07 (1.28)	2.76 (1.23)	3.66 (1.07)	3.74 (1.03)	2.61 (1.18)
Psychologists and psychotherapists	653 (26.9)	47.5 (6.37)	**4.46 (0.62)****	**3.16 (1.23)***	**2.99 (1.14)*****	**3.53 (0.99)***	3.79 (0.94)	**2.03 (1.00)*****
Social work and related roles	460 (18.9)	**40.3 (9.78)*****	**3.91 (0.93)*****	**2.34 (1.17)*****	**1.92 (1.01)*****	**3.08 (1.22)*****	**3.21 (1.20)*****	2.62 (1.23)
Doctors and medical specialists	272 (11.2)	**48.6 (7.34)***	**4.65 (0.54)*****	**3.26 (1.31)*****	**3.66 (1.20)*****	**3.99 (0.92)*****	**4.17 (0.83)*****	**2.22 (0.97)*****
Other	285 (11.7)	**38.9 (11.72)*****	**3.85 (1.02)*****	**2.35 (1.24)****	**1.99 (1.10)*****	**2.85 (1.36)*****	**2.96 (1.34)*****	2.96 (1.34)
Type of care unit								
Outpatient – reference group	781 (32.8)	46.5 (7.79)	4.40 (0.71)	3.04 (1.27)	2.91 (1.21)	3.56 (1.03)	3.81 (0.97)	2.07 (1.03)
Inpatient	709 (29.8)	**42.2 (9.41)*****	**4.11 (0.83)*****	**2.63 (1.31)*****	**2.37 (1.24)*****	**3.13 (1.20)*****	**3.17 (1.17)*****	**2.55 (1.21)*****
Community/ Outreaching	545 (22.9)	47.2 (7.63)	4.35 (0.72)	3.12 (1.23)	**2.86 (1.23)***	3.67 (1.04)	3.86 (0.94)	**2.61 (1.15)****
Crisis/ IHT	133 (5.6)	**52.0 (7.41)*****	**4.75 (0.48)*****	**3.53 (1.38)*****	**3.44 (1.44)*****	**4.32 (0.91)*****	**4.41 (0.88)*****	**2.39 (1.22)*****
Other	210 (8.8)	**41.3 (11.49)*****	**3.94 (1.04)*****	**2.40 (1.26)*****	**2.19 (1.27)*****	**3.13 (1.26)*****	**3.32 (1.32)*****	**2.71 (1.24)*****

Note. * p < .05, ** p <. 01, *** p < .001

Estimates based on Restricted Maximum Likelihood model with organisation as random effect.

Table 1
continued

Characteristic	Guideline adherence, M (SD)						
	Making a safety plan	**Involving next-of-kin in safety planning**	**Recording safety plan in EPF**	**Using suicide-specific treatment**	**Ensuring a warm transfer**	**Contacting the crisis team**	**Discussing cases with colleagues**
	Range 1–5						
Overall	3.83 (1.19)	3.14 (1.18)	3.77 (1.25)	2.80 (1.20)	4.45 (0.84)	3.39 (1.20)	4.60 (0.66)
Professional role							
Nursing roles – reference group	3.94 (1.01)	3.28 (1.13)	3.91 (1.10)	2.97 (1.17)	4.52 (0.76)	3.55 (1.24)	4.66 (0.59)
Psychologists and psychotherapists	**4.35 (0.76)*** **	3.42 (1.04)	**4.25 (0.88)*** **	2.94 (1.15)	4.51 (0.63)	**3.41 (0.99)** **	4.61 (0.59)
Social work and related roles	**3.23 (1.40)*** **	**2.65 (1.20)*** **	**3.16 (1.44)*** **	**2.30 (1.16)*** **	**4.28 (1.07)*** **	**3.10 (1.32)*** **	**4.56 (0.80)***
Doctors and medical specialists	**3.76 (1.13)***	3.24 (1.10)	3.82 (1.15)	3.06 (1.20)	4.60 (0.61)	3.59 (1.15)	**4.55 (0.61)***
Other	**2.87 (1.48)*** **	**2.48 (1.35)*** **	**2.84 (1.54)*** **	**2.26 (1.21)*** **	**4.16 (1.21)*** **	**3.05 (1.37)*** **	**4.52 (0.89)** **
Type of care unit							
Outpatient – reference group	4.13 (1.05)	3.35 (1.13)	4.00 (1.13)	2.87 (1.16)	4.44 (0.77)	3.41 (1.02)	4.54 (0.68)
Inpatient	**3.54 (1.29)*** **	**2.74 (1.17)*** **	**3.55 (1.36)*** **	**2.52 (1.18)** **	4.41 (0.94)	**2.87 (1.36)*** **	**4.64 (0.62)***
Community/ Outreaching	**3.89 (0.99)*** **	3.30 (1.03)	3.87 (1.10)	2.90 (1.17)	4.48 (0.75)	**3.63 (1.01)*** **	**4.64 (0.64)***
Crisis/ IHT	4.24 (0.97)	**3.66 (1.12)***	4.06 (1.03)	**3.44 (1.15)*** **	**4.75 (0.51)*** **	**4.32 (1.18)*** **	**4.68 (0.57)***
Other	**3.12 (1.49)*** **	**2.70 (1.37)*** **	**3.11 (1.57)*** **	**2.42 (1.28)*** **	**4.24 (1.12)** **	3.56 (1.20)	4.52 (0.84)

Note. * p < .05, ** p <. 01, *** p < .001

Estimates based on Restricted Maximum Likelihood model with organisation as random effect.

Effectiveness

Effectiveness assesses the impact of the intervention on individual outcomes. Due to the observational nature of our study, we cannot make any causal inferences, but report associations with time. We have split this into two groups: the associations with client outcomes, and the associations with staff outcomes. For clients, we wanted to know if the proportion of eligible clients receiving guideline-based care increased over time. Firstly, we assessed objective guideline adherence as measured in the EPF. Overall, screening for suicidality was known in the records for 50.4% of the sample. Of this group, over 65% screened positively on suicidality. Across all timepoints, of all clients screening positively for suicidality, the diagnostic process was recorded for 21.5%, 27.2% had a safety plan in the EPF, next-of-kin was involved in 17.9%, and suicide-specific treatment was offered in less than 1%. Continuity of care was only assessed in two organisations, in which the average number of days to follow-up was between 6 and 10, with 60–80% of patients receiving follow-up care within 7 days. A transfer meeting was reported in roughly a third of cases. Investigating improvements over time, we regressed the various indicators against time, with data nested within the organisations. We found a positive link between time and the diagnostic process, $\beta = 0.01$, next-of-kin involvement, $\beta = 0.06$,

and suicide-specific treatment, β = 0.008. However, we found a negative association with time for safety plans, β = -0.01. Again, we found large levels of practice variation between organisations. We were unable to statistically investigate changes in continuity of care. The timeframe was also too short to investigate changes in suicides or suicide attempts, but these results can be found in Appendix D. To illustrate changes within organisations, in Fig. 1, we highlight an organisation who was able to report most guideline-based actions to showcase the patient journey and their changes over time.

Secondly, we assessed whether there was an increase in self-reported guideline adherence among MH professionals. These results can be found in Table 2. Overall, guideline adherence increased from a mean value of 45.1 at T1 to 46.2 at T2, which was statistically significant (p = .036). We also investigated the differences in adherence for each individual guideline-based action across timepoints. We found increases in scores on 11 out of 13 guideline-based actions, of which three were statistically significant. These were conducting a diagnostic interview (p < .001), recording the safety plan in the EPF (p = .004), and using a suicide-specific treatment (p < .001). For two actions – contacting the crisis team and discussing cases with colleagues – we found small decreases from T1 to T2, though these were not statistically significant.

Table 2
MH professional outcomes across timepoints.

Variable	T1 M (SD)	T2 M (SD)	Estimate	marginal R^2	conditional R^2
Knowledge of suicidality (range 4–15)	11.48 (1.64)	11.89 (1.58)	**0.39*** **	.012	.024
Knowledge of the guideline (range 1–4)	2.63 (0.80)	2.71 (0.77)	**0.06***	.001	.029
Self-efficacy (range 1–4)	3.09 (0.57)	3.10 (0.55)	0.02	0	.015
Guideline adherence (range 1–5 per item)					
Overall (range 13–65)	45.14 (9.15)	46.24 (8.62)	**0.77***	.002	.031
Asking about suicide	4.28 (0.80)	4.34 (0.77)	0.06	.001	.003
Conducting a diagnostic interview	2.87 (1.30)	3.10 (1.30)	**0.20*** **	.005	.072
Formulating a structural diagnosis	2.70 (1.28)	2.80 (1.27)	0.07	0	.033
Contacting next-of-kin	3.48 (1.14)	3.53 (1.13)	0.02	0	.015
Involving next-of-kin	3.64 (1.11)	3.67 (1.08)	0	0	.022
Making use of lived experience	2.40 (1.18)	2.42 (1.13)	0	0	.010
Making a safety plan	3.80 (1.22)	3.88 (1.13)	0.06	0	.008
Involving next-of-kin in safety planning	3.11 (1.19)	3.21 (1.14)	0.07	0	.017
Recording safety plan in EPF	3.72 (1.27)	3.89 (1.20)	**0.16** **	.004	.008
Using suicide-specific treatment	2.71 (1.19)	2.98 (1.22)	**0.17*** **	.004	.133
Ensuring a warm transfer	4.44 (0.85)	4.49 (0.79)	0.04	0	.006
Contacting the crisis team	3.40 (1.22)	3.36 (1.17)	-0.08	.001	.030
Discussing cases with colleagues	4.61 (0.67)	4.59 (0.65)	-0.01	0	.002
Note. * p < .05, ** p <. 01, *** p < .001 Estimates based on Restricted Maximum Likelihood model with organisation as random effect.					

For the impact on MH professionals, we posed several questions investigating whether their knowledge and self-efficacy increased over time. These results can also be found in Table 2. Knowledge of suicidality increased the most over time, from 11.48 to 11.89 (p < .001). Knowledge or familiarity with the guideline itself increased a little, from 2.63 to 2.71, which was also statistically significant (p = .038). Self-efficacy did not increase over time, with a mean difference in scores of only 0.01.

Adoption

Adoption represents the number and representativeness of the organisations willing to take part in a programme or intervention. We were interested in two questions relating to adoption, of which the first was how representative the participating MHOs are compared to all MHOs in the Netherlands. This was not measured using formal analyses, but we made some estimations based on national data sources. The data used for these comparisons is available in Appendix C. Starting with the national coverage of the participating MHOs, they offer care in 99 out of 342 municipalities. The distribution of urban and rural regions is similar in those 99 municipalities compared to all municipalities, with a slightly higher rural coverage. We were also able to compare national client data to the client data we collected from the EPFs on several characteristics. Overall, clients were similar in terms of sex, age groups, and most diagnoses. There appeared to be a slight overrepresentation of complex disorders compared to the national average, though classifications in our research data and the national statistics were not directly comparable.

Secondly, adoption is often nested, with professionals within a team within a unit within an MHO. Therefore, we also investigated to what extent organisations supported their employees in participation in the programme, reflecting a certain level of resources and commitment to the programme. For this, we used an adaptation of the NoMAD questionnaire at the T2 survey. This survey measures to what extent MH professionals feel that working with the guideline is embedded in their organisation and whether their organisation supports them in working with the guideline. These results are presented in Table 3. Overall, when asked whether working with the suicide prevention guideline is currently a routine part of their work, the scores are moderate (M = 6.33, SD = 2.13, range 1–10). We also calculated an overall score for the 13 domain questions and found moderate scores (M = 3.67, SD = 0.52, range 1–5). Looking at the subdomains, we see that internalisation and legitimation receive the highest scores. These reflect the potential value of working with the guideline and whether working with the guideline is a legitimate part of their role. The lowest scoring domain is skill set workability, which assesses whether MH professionals believe sufficient training is provided to enable professionals to implement the guideline. Looking at organisational differences using an analysis of variance, we found a significant effect of organisation, $F(4,\ 612) = 5.77,\ p < .001$. Therefore, normalisation of working with the guideline based on the overall score was higher in some organisations than in others.

Table 3
Results from the NoMAD questionnaire.

Domain	Subdomain	M (SD)
Overall		3.67 (0.52)
Coherence		3.78 (0.58)
	Communal specification	3.54 (0.71)
	Internalisation	4.01 (0.72)
Cognitive participation		3.80 (0.62)
	Initiation	3.63 (0.83)
	Legitimation	3.97 (0.73)
Collective action		3.59 (0.61)
	Interactional workability	3.63 (0.77)
	Relational integration	3.76 (0.77)
	Skill set workability	3.25 (0.98)
	Contextual integration	3.64 (0.68)
Reflexive monitoring		3.66 (0.59)
	Communal appraisal	3.62 (0.94)
	Individual appraisal	3.58 (0.73)
	Reconfiguration	3.77 (0.74)

Implementation

Implementation refers to the fidelity to the elements of an intervention, including whether the intervention was delivered as intended, the time of the intervention, and any adaptations made. With regard to this, we posed two questions. Firstly, we were interested in the variation in adoption across an organisation. This proved more difficult to answer than anticipated, as all MHOs took different routes to implementation. Some MHOs decided to implement using top-down strategies, enacting changes for the entire organisation. Other MHOs adopted a team-based approach, in which they went through the action cycle with a small number of selected teams. Some MHOs combined these two approaches, with some changes at the organisational level and others in specific teams or departments. However, due to small sample sizes in teams, we were unable to investigate a dose-response relationship.

The second question pertains to whether the implementation strategies outlined in the implementation plans were delivered as intended. For this, we analysed the individual implementation plan of each MHO and their evaluations. We then summarised the implementation strategies and categorised them according to the Expert Recommendations for Implementing Change (ERIC). Across all five MHOs, we recorded 54 activities that were planned and/or executed. From these, we identified 29 distinct strategies across all nine ERIC domains. A full overview of all used strategies can be found in Appendix E. In Table 4, we highlight some strategies and give examples of how this was executed by organisations. Most of the activities in the implementation plans were delivered as intended. All MHOs focused on improving suicide-related training, with several also focussing on training for treatment of suicidality. Additionally, they all set up communication plans to connect with professionals and inform them about changes, progress and relevant information such as upcoming events. Activities that were delivered as intended were often linked to multi-year policy plans, which were in place in several MHOs. Some activities were only partially implemented. This could mean that the activity was delivered, though later than originally intended, that the activity reached fewer people than originally intended, or that several steps towards implementation were taken but not all. For example, a psychoeducation course for next-of-kin was developed and piloted, but there was a lack of trainers to scale up the implementation. A small portion of the strategies was not delivered as intended. For example, across all MHOs, difficulties with the electronic patient files limited the

implementation of the guideline dissemination tool that was developed for MH professionals. Additionally, some MHOs also managed to implement changes that were not originally part of their implementation plan but were added later during the project. These changes often arose because of urgent needs, or due to new insights that suggested these activities might improve implementation. For instance, in an MHO where they used a team-based approach, they later decided to host an exchange meeting where participating teams shared their lessons and challenges with other teams in the organisation.

Table 4.

Examples of implementation strategies.

ERIC domain	Strategy	Example	#
Train and educate stakeholders	Use train-the-trainer strategies	To make training efforts more sustainable, clinicians took part in train-the-trainer programmes when being trained in suicide-specific treatments	5
Support clinicians	Remind clinicians	Organisations regularly shared communication about suicide prevention online, including research findings from the project, relevant new materials, and available courses	5
Change infrastructure	Change record systems	To facilitate better recording of suicide prevention activities, organisations implemented changes in their electronic patient file	5
Develop stakeholder inter-relationships	Involve executive boards	To increase engagement, a shared vision was developed with executives, and progress was discussed with the board during the project	4
Adapt and tailor to context	Tailor strategies	A needs assessment was conducted in the local context to find specific goals to work on	3
Use of evaluative and iterative strategies	Develop and implement tools for quality monitoring	A dashboard was developed to monitor quality of care on several indicators, which was used in quarterly reports at the management level	2

Discussion

In this study, we evaluated the impact of a large-scale implementation study over a period of 2 years in five mental healthcare organisations in the Netherlands. Specifically, we focussed on evaluating the implementation of the Dutch suicide prevention guideline (and its 2025 update) and the subsequent impact on the quality of care, and the impact of the programme on knowledge and competence among MH professionals. While potentially reaching a large number of clinicians and patients, we found differences in guideline adherence relating to various client and staff characteristics. We observed only slight improvements in guideline adherence, MH professional knowledge, and reported adherence. At the second assessment, clinicians reported that they used the suicide prevention guideline moderately as part of their routine work. Mental health care clinics varied in their level of guideline adherence and preferred different implementation strategies, but all used training programmes and clinic-wide communication.

Starting with the first aim, we investigated to what extent success was achieved in implementing the guideline, and whether this improved over time. The reach of this programme was extensive, with a potential reach of thousands of professionals and tens of thousands of patients. Moreover, this group was reflective of the general population of mental healthcare patients and organisations in the Netherlands. At the end of the project, MH professionals reported that working with the guideline was relatively normalised in their organisation, with most seeing the added value of a systematic approach to suicide prevention. The level of implementation itself was hard to measure; various measures of guideline adherence served as proxy for this success. Here, we found small increases in some but not all indicators. Looking at the EPF data, only a small percentage of patients seemed to receive elements of guideline-based care. Whether this is a lack of consistent reporting or a genuine lack of action cannot be determined from this data, but it does show that more progress needs to be made to show improvement on a wider scale. This is especially true when we take into consideration how many different implementation strategies were implemented across the five organisations, of which most were implemented as intended. While we were unable to investigate a dose-response type of relationship between implementation efforts and implementation success, previous studies show that more

intensive implementation is associated with better outcomes (Kapur et al., 2016; Setkowski et al., 2024). When looking at improvement over time, another study shows that barriers tend to dissipate over time with continued implementation support, moving a programme to the sustainment phase (O'Connell et al., 2024). Our study shows that organisations are at various phases of implementation regarding different aspects of suicide prevention, with most reporting clear multi-year policy plans and consistent communication, but only just beginning to explore suicide-specific treatment or the use of lived experience experts. In short, these results show that strategies on multiple levels are needed to achieve sustainable change beyond the current project, such as visible leadership, train-the-trainer strategies, and dashboarding.

Secondly, we investigated the impact of this programme on knowledge and self-efficacy among professionals. Previous studies show that these factors play a significant role in how MH professionals handle suicidality in practice (Boukouvalas et al., 2020; Huang et al., 2023; Lee et al., 2016). Moreover, use of implementation strategies to improve evidence-based care increases knowledge and self-efficacy, and reduces the risk of suicide in patients (Layman et al., 2021; Pisani & Boudreaux, 2023; Wakai et al., 2020). In the current sample, we found small increases in knowledge of suicidality and knowledge of the guideline. However, we found no increases in self-efficacy. In a separate study using the same data, we recently reported that the role of knowledge on guideline adherence was significantly larger than the role of self-efficacy (van Eijk et al., 2026). A possible explanation for this discrepancy could lie in unmeasured factors acting as confounders, such as attitudes and stigma, which have also been found to play a role (Erbuto et al., 2021), or in the operationalization of self-efficacy, for which we encountered methodological difficulties leading to a small scale that may be unable to capture specific nuances. Overall, MH professionals rated their knowledge as relatively high, which is likely related to strong increases in the proportion of professionals which received training over the past decade, from around 10% to over 80% (Mokkenstorm et al., 2018; Setkowski et al., 2020). However, socially desirable answers and overestimation may confound some of these high scores.

Clinical implications

Overall, our results show that during two years of intensive implementation of a suicide prevention programme, both the quality of care and knowledge among professionals increased. While we cannot assume a causal relationship between the project and the results, it is hopeful that change can occur in such a short period of time, regardless of the cause. These were selected mental healthcare organisations that were already participating in the larger SUPRANET initiative and were highly motivated to investigate how suicide prevention could be improved within their organisations. This made it difficult to pinpoint the exact mechanisms of change, though all MHOs reported a need for the attention and support offered by the programme, suggesting that without the programme, change might have been slower or more limited. Our results show that in a period of just two years, improvements can be made regarding suicide prevention, reaching a significant number of people, regardless of whether these improvements were specifically due to the programme or not. This is a hopeful testament that should encourage other MHOs to actively implement improvements in their suicide prevention policies. Especially the role of the community of practice, in which MHOs collaborate and exchange best practices has been highlighted by previous research as making a significant contribution to improvements (Barwick et al., 2009).

On the other hand, our results show significant levels of practice variation, and relatively low guideline adherence rates overall. For instance, a safety plan was only recorded in the EPF for 1 in 4 suicidal patients across the entire population of people with suicidality, with some organisations reporting safety plans for only 2%, while we know that safety plans have a significant effect on suicide attempt rates (Nuij et al., 2021). Looking at the progression of suicide prevention in Dutch mental healthcare organisations since the publication of the first guidelines, we see significant improvements on many levels. However, there is still a long way to go before every patient receives the quality of care that they deserve. This is also reflected in the role client-, staff- and organisational differences play in guideline adherence, suggesting that who you are, where you receive care, and from whom, all impact whether or not you receive the best available evidence-based care for suicide prevention. Strengthening the community of practice, sharing best practices, and mandates from national organisations may standardise processes between organisations, thereby reducing unwanted practice variation.

Strengths and limitations

A strength of this study lies in the large sample size from the participating MHOs, as well as their representativeness of the general mental healthcare landscape. During the programme, hundreds of MH professionals have been trained, thousands of people have attended webinars and educational modules, and a vast number of clients have been in contact with professionals who were exposed to the programme. Another strength is the context-specific analytic approach. By tackling this as a multiple case study design, we were able to take the local context into account for investigating the implementation of the guideline. At the same time, the similarities between organisations allowed us to make general observations that led to recommendations for the mental healthcare sector as a whole.

Initially, we planned an extensive statistical procedure to assess improvements in quality of care. However, similar to other studies, we faced many challenges that limited the execution and the evaluation of our programme (Boudreaux et al., 2022). Specifically, limitations in the EPF not only negatively impact the quality of our data, but also how MH professionals are able to record and handle client suicidality. This was reflected in an earlier finding, stating less than half of MH professionals find their EPF facilitating in recording suicidality (van Eijk et al., 2026). Moreover, external pressures such as changing legislation and staff shortages put significant strain on the MHOs, which may have delayed or decreased the intensity of the implementation at some level. However, these challenges reflect implementation in real-world settings, which has yielded valuable insights.

Secondly, we were limited by the timeframe of the programme. The time was too short to reach all possible organisational units and focus on all elements of the guideline at the same time. Therefore, MHOs had to make careful decisions which elements to prioritise, which may not be reflected as accurately in overall scores. We also lacked a long-term follow-up, resulting in Maintenance not being systematically assessed during the evaluation. However, we believe our research aligns well with real-world roll-out of implementation projects, and therefore has a lot of practical utility for other mental healthcare organisations. Our research on implementation strategies shows that significant resources are needed to implement improved guideline adherence at a large scale. As such resources may not be available to everyone, a more modular approach may be taken to build up to a systematic embedding of suicide prevention practices, following a similar pattern of prioritising only a few elements of the guideline at once.

Lastly, only 50.4% of the total sample was screened for suicidality. This may suggest that screening was not performed routinely but was instead targeted at clients in whom suicidality was already suspected. As a result, the relatively high proportion of positive screening results may, at least in part, reflect selective screening rather than the true prevalence of suicidality within the study population. However, when screening positively, we still found low rates of guideline-based care for diagnostics and treatment, suggesting that this initial selective screening does not automatically improve the delivery of subsequent care.

Conclusions

We evaluated a systematic approach to suicide prevention based on clinical guidelines, that has the potential for improvement at both the staff and the client level. This study provides evidence that large-scale implementation efforts in complex settings are possible. Implementation of suicide prevention is a multifaceted concept, with all aspects needing adequate attention to achieve improvement. Moreover, it is an iterative and developing process, with new interventions and appropriate techniques reaching the field, with some recommendations being phased out in favour of new and better recommendations (NVvP, 2025; Van Hemert et al., 2012). This puts extra burden on implementation efforts, which are already considerable, given that it takes an average of 17 years for evidence to change practice (Rubin, 2023). A first but important step has been taken in improving suicide prevention practices in mental healthcare on a national level by our large-scale implementation strategy, and long-term vision and support would be beneficial. Because of the precarious nature of suicidality and the large burdens associated with a suicide (attempt), even small improvements can have significant effects on people's lives, warranting continuous quality improvement programmes.

Declarations

Declaration of interests

None of the authors declare a conflict of interest.

Consent to Publish declaration

not applicable

Funding declaration

This study was funded by the Dutch Ministry of Health, Welfare and Sports as part of the third National Agenda for Suicide Prevention. The funder had no role in the design of the study.

Author Contribution

CRediT: Conceptualization: NVE, MV, TS, LS; Data curation: NVE, WVB, RDW, DC, NL, AVS, TVL; Formal Analysis: NVE; Funding acquisition: MV, RG, LS; Investigation: NVE, LS; Methodology: WVB, LS; Project administration: MV, TS, NL, AVS, TVL, LS; Resources: RG; Software: RG; Supervision: WVB, RG, DC, LS; Validation: WVB; Visualization: NVE; Writing – original draft: NVE, WVB, LS; Writing – review & editing: NVE, WVB, MV, RG, TS, RDW, DC, NL, AVS, TVL, LS

Acknowledgement

We want to thank all the participating mental healthcare organisations and their staff for participating in the study and collecting data. We want to thank the members of our project group, Stichting Aurora, Suïcidepreventiecentrum, MIND, and the NL GGZ. We want to thank EhdK, and specifically Pit Spee and Jenneke Aartsen for their implementation expertise and work during the project.

Data Availability

No informed consent was obtained for the publication of patient data, and therefore individual level data cannot be shared. Anonymised survey data may be available upon reasonable request. All software used to analyse the data is available freely and open source, with the code used being available in the Appendix.

References

1. Ahmedani BK, Penfold RB, Frank C, Richards JE, Stewart C, Boggs JM, Coleman KJ, Sterling S, Yarborough BJH, Clarke G, Schoenbaum M, Aguirre-Miyamoto EM, Barton LJ, Yeh H-H, Westphal J, McDonald S, Beck A, Beidas RS, Richardson L, Simon GE. Zero Suicide Model Implementation and Suicide Attempt Rates in Outpatient Mental Health Care. JAMA Netw Open. 2025;8(4):e253721. https://doi.org/10.1001/jamanetworkopen.2025.3721.
2. Alqueza KL, Pagliaccio D, Durham K, Srinivasan A, Stewart JG, Auerbach RP. Suicidal Thoughts and Behaviors Among Adolescent Psychiatric Inpatients. Archives Suicide Res. 2023;27(2):353–66. https://doi.org/10.1080/13811118.2021.1999874.
3. Barwick MA, Peters J, Boydell K. Getting to Uptake: Do Communities of Practice Support the Implementation of Evidence-Based Practice? J Can Acad Child Adolesc Psychiatry. 2009;18(1):16–29. https://pmc.ncbi.nlm.nih.gov/articles/PMC2651208/.
4. Boudreaux ED, Larkin C, Sefair AV, Mick E, Clements K, Pelletier L, Yang C, Kiefe C. Studying the implementation of Zero Suicide in a large health system: Challenges, adaptations, and lessons learned. Contemp Clin Trials Commun. 2022;30:100999. https://doi.org/10.1016/j.conctc.2022.100999.

5. Boukouvalas E, El-Den S, Murphy AL, Salvador-Carulla L, O'Reilly CL. Exploring Health Care Professionals' Knowledge of, Attitudes Towards, and Confidence in Caring for People at Risk of Suicide: A Systematic Review. Archives Suicide Res. 2020;24(sup2):S1–31. https://doi.org/10.1080/13811118.2019.1586608.
6. Brodsky BS, Spruch-Feiner A, Stanley B. (2018). The Zero Suicide Model: Applying Evidence-Based Suicide Prevention Practices to Clinical Care. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00033
7. Correa VC, Lugo-Agudelo LH, Aguirre-Acevedo DC, Contreras JAP, Borrero AMP, Patiño-Lugo DF, Valencia DAC. Individual, health system, and contextual barriers and facilitators for the implementation of clinical practice guidelines: A systematic metareview. Health Res Policy Syst. 2020;18(1):74. https://doi.org/10.1186/s12961-020-00588-8.
8. Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. Implement Sci. 2022;17(1):75. https://doi.org/10.1186/s13012-022-01245-0.
9. de Beurs DP, Bosmans JE, de Groot MH, de Keijser J, van Duijn E, de Winter RFP, Kerkhof AJF, M.. Training mental health professionals in suicide practice guideline adherence: Cost-effectiveness analysis alongside a randomized controlled trial. J Affect Disord. 2015;186:203–10. https://doi.org/10.1016/j.jad.2015.07.028.
10. De Beurs DP, De Groot MH, De Keijser J, Van Duijn E, De Winter RFP, Kerkhof AJFM. Evaluation of benefit to patients of training mental health professionals in suicide guidelines: Cluster randomised trial. Br J Psychiatry. 2016;208(5):477–83. https://doi.org/10.1192/bjp.bp.114.156208.
11. de Groot M, de Beurs DP, de Keijser J, Kerkhof AFJM. An e-learning supported Train-the-Trainer program to implement a suicide practice guideline. Rationale, content and dissemination in Dutch mental health care. Internet Interventions. 2015;2(3):323–9. https://doi.org/10.1016/j.invent.2015.04.004.
12. Erbuto D, Berardelli I, Sarubbi S, Rogante E, Sparagna A, Nigrelli G, Lester D, Innamorati M, Pompili M. Suicide-Related Knowledge and Attitudes among a Sample of Mental Health Professionals. Int J Environ Res Public Health. 2021;18(16):8296. https://doi.org/10.3390/ijerph18168296.
13. Finch TL, Girling M, May CR, Mair FS, Murray E, Treweek S, McColl E, Steen IN, Cook C, Vernazza CR, Mackintosh N, Sharma S, Barbery G, Steele J, Rapley T. Improving the normalization of complex interventions: Part 2 - validation of the NoMAD instrument for assessing implementation work based on normalization process theory (NPT). BMC Med Res Methodol. 2018;18(1):135. https://doi.org/10.1186/s12874-018-0591-x.
14. Fischer F, Lange K, Klose K, Greiner W, Kraemer A. Barriers and Strategies in Guideline Implementation—A. Scoping Rev Healthcare. 2016;4(3). Article 3. https://doi.org/10.3390/healthcare4030036.
15. Glasgow RE, Harden SM, Gaglio B, Rabin B, Smith ML, Porter GC, Ory MG, Estabrooks PA. (2019). RE-AIM Planning and Evaluation Framework: Adapting to New Science and Practice With a 20-Year Review. *Frontiers in Public Health*, *7*. https://www.frontiersin.org/articles/10.3389/fpubh.2019.00064
16. Graham ID, Tetroe JM. The knowledge to action framework. Models and frameworks for implementing evidence-based practice: Linking evidence to action. Volume 207. New York: Wiley-Blackwell; 2010. p. 222.
17. Huang KC, Jeang S-R, Hsieh H-L, Chen J-W, Yi C-H, Chiang Y-C, Wu H-P. Survey of knowledge, self-efficacy, and attitudes toward suicide prevention among nursing staff. BMC Med Educ. 2023;23(1):692. https://doi.org/10.1186/s12909-023-04685-4.
18. Kapur N, Ibrahim S, While D, Baird A, Rodway C, Hunt IM, Windfuhr K, Moreton A, Shaw J, Appleby L. Mental health service changes, organisational factors, and patient suicide in England in 1997–2012: A before-and-after study. Lancet Psychiatry. 2016;3(6):526–34. https://doi.org/10.1016/S2215-0366(16)00063-8.
19. Larkin C, Arensman E, Boudreaux ED. Preventing Suicide in Health Systems: How Can Implementation Science Help? Archives Suicide Res. 2023;27(4):1147–62. https://doi.org/10.1080/13811118.2022.2131490.
20. Layman DM, Kammer J, Leckman-Westin E, Hogan M, Grumet JG, Labouliere CD, Stanley B, Carruthers J, Finnerty M. (2021). The Relationship Between Suicidal Behaviors and Zero Suicide Organizational Best Practices in Outpatient Mental Health Clinics. *Psychiatric Services*. (Washington, DC). https://doi.org/10.1176/appi.ps.202000525
21. Lee SJ, Osteen PJ, Frey JJ. Predicting Changes in Behavioral Health Professionals' Clinical Practice Skills for Recognizing and Responding to Suicide Risk. J Soc Social Work Res. 2016;7(1):23–41. https://doi.org/10.1086/685037.

22. May C, Finch T. Implementing, Embedding, and Integrating Practices: An Outline of Normalization Process Theory. Sociology. 2009;43(3):535–54. https://doi.org/10.1177/0038038509103208.
23. van Ministerie W. en S. (2022, July 8). *Suïcides en suïcidepogingen binnen de ggz—Geestelijke gezondheidszorg—Inspectie Gezondheidszorg en Jeugd* [Webpagina]. Ministerie van Volksgezondheid, Welzijn en Sport. https://www.igj.nl/zorgsectoren/geestelijke-gezondheidszorg/suicidemeldingen-en-suicidepreventie
24. Mitchell SM, Taylor NJ, Jahn DR, Roush JF, Brown SL, Ries R, Quinnett P. Suicide-Related Training, Self-Efficacy, and Mental Health Care Providers' Reactions Toward Suicidal Individuals. Crisis. 2020;41(5):359–66. https://doi.org/10.1027/0227-5910/a000647.
25. Mokkenstorm J, Franx G, Gilissen R, Kerkhof A, Smit JH. Suicide Prevention Guideline Implementation in Specialist Mental Healthcare Institutions in The Netherlands. Int J Environ Res Public Health. 2018;15(5). Article 5. https://doi.org/10.3390/ijerph15050910.
26. Nuij C, van Ballegooijen W, de Beurs D, Juniar D, Erlangsen A, Portzky G, O'Connor RC, Smit JH, Kerkhof A, Riper H. Safety planning-type interventions for suicide prevention: Meta-analysis. Br J Psychiatry. 2021;219(2):419–26. https://doi.org/10.1192/bjp.2021.50.
27. NVvP. (2025, April 9). *Richtlijn Suïcidaliteit*. https://richtlijnendatabase.nl/richtlijn/su_cidaliteit/startpagina_-_su_cidaliteit.html
28. O'Connell S, Cully G, McHugh S, Maxwell M, Jeffers A, Kavalidou K, Lovejoy S, Jennings R, Russell V, Arensman E, Griffin E. Factors affecting implementation of a National Clinical Programme for self-harm in hospital emergency departments: A qualitative study. BMJ Qual. 2024. https://doi.org/10.1136/bmjqs-2024-017415. bmjqs-2024-017415. Safety.
29. Peters S, Sukumar K, Blanchard S, Ramasamy A, Malinowski J, Ginex P, Senerth E, Corremans M, Munn Z, Kredo T, Remon LP, Ngeh E, Kalman L, Alhabib S, Amer YS, Gagliardi A. Trends in guideline implementation: An updated scoping review. Implement Sci. 2022;17(1):50. https://doi.org/10.1186/s13012-022-01223-6.
30. Pisani AR, Boudreaux ED. Systems Approach to Suicide Prevention: Strengthening Culture. Pract Educ Focus. 2023;21(2):152–9. https://doi.org/10.1176/appi.focus.20220081.
31. Powell BJ, Waltz TJ, Chinman MJ, Damschroder LJ, Smith JL, Matthieu MM, Proctor EK, Kirchner JE. A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. Implement Sci. 2015;10(1):21. https://doi.org/10.1186/s13012-015-0209-1.
32. R Core Team. (2023). *R: A Language and Environment for Statistical Computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/
33. Richards JE, Simon GE, Boggs JM, Beidas R, Yarborough BJH, Coleman KJ, Sterling SA, Beck A, Flores JP, Bruschke C, Goldstein Grumet J, Stewart CC, Schoenbaum M, Westphal J, Ahmedani BK. An implementation evaluation of Zero Suicide using normalization process theory to support high-quality care for patients at risk of suicide. Implement Res Pract. 2021;2:26334895211011769. https://doi.org/10.1177/26334895211011769.
34. Rubin R. It Takes an Average of 17 Years for Evidence to Change Practice-the Burgeoning Field of Implementation Science Seeks to Speed Things Up. JAMA. 2023;329(16):1333–6. https://doi.org/10.1001/jama.2023.4387.
35. Setkowski K, Gilissen R, Franx G, Mokkenstorm JK. Praktijkvariatie op het gebied van suïcidepreventie in de Nederlandse ggz. TIJDSCHRIFT VOOR PSYCHIATRIE; 2020.
36. Setkowski K, Mokkenstorm J, van Balkom AJ, Franx G, Noord IV, Dongelmans DA, Eikelenboom M, Gilissen R. Feasibility and impact of data-driven learning within the suicide prevention action network of thirteen specialist mental healthcare institutions (SUPRANET Care) in the Netherlands: A study protocol. BMJ Open. 2018;8(8):e024398. https://doi.org/10.1136/bmjopen-2018-024398.
37. Setkowski K, van Balkom AJLM, Hoogendoorn AW, Franx G, Veerbeek M, de Winter RFP, Gilissen R. (2024). Reducing suicides in mental healthcare: Results from a 4-year follow-up implementation study in the Netherlands (SUPRANET). *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1080235
38. Silva C, Smith AR, Dodd DR, Covington DW, Joiner TE. Suicide-Related Knowledge and Confidence Among Behavioral Health Care Staff in Seven States. Psychiatric Serv. 2016;67(11):1240–5. https://doi.org/10.1176/appi.ps.201500271.

39. Tang S, Reily NM, Arena AF, Batterham PJ, Calear AL, Carter GL, Mackinnon AJ, Christensen H. (2022). People Who Die by Suicide Without Receiving Mental Health Services: A Systematic Review. *Frontiers in Public Health*, *9*. https://doi.org/10.3389/fpubh.2021.736948
40. Teismann T, Forkmann T, Glaesmer H, Alpers GW, Brakemeier EL, Brockmeyer T, Christiansen H, Fehm L, Glombiewski J, Heider J, Hermann A, Hoyer J, Kaiser T, Klucken T, Lincoln TM, Lutz W, Margraf J, Pedersen A, Renneberg B. … In-Albon, T. (2024). Prevalence of suicidal ideation in German psychotherapy outpatients: A large multicenter assessment. *Journal of Affective Disorders*, *351*, 971–976. https://doi.org/10.1016/j.jad.2024.02.019
41. Terpstra S, Beekman A, Abbing J, Jaken S, Steendam M, Gilissen R. Suicide prevention gatekeeper training in the Netherlands improves gatekeepers' knowledge of suicide prevention and their confidence to discuss suicidality, an observational study. BMC Public Health. 2018;18(1):637. https://doi.org/10.1186/s12889-018-5512-8.
42. The Jamovi Project. (2023). *Jamovi (version 2.3)* [Computer software]. https://www.jamovi.org
43. Thoonsen AC, Merten H, Broeders TT, Gans A, van Beusekom I, Delnoij DMJ, de Bruijne MC. The role of guideline organizations in nationwide guideline implementation: A qualitative study. Health Res Policy Syst. 2024;22(1):174. https://doi.org/10.1186/s12961-024-01253-0.
44. Tilson JK, Martinez C, Mickan S, D'Silva LJ, Howard R, MacDowell S, Roth HR, Skop KM, Dannenbaum E, Farrell L. Understanding Behavior Change in Clinical Practice Guideline Implementation: A Qualitative Study. J Neurol Phys Ther. 2025;49(1):13. https://doi.org/10.1097/NPT.0000000000000498.
45. van Eijk NL, Schweren LJS, Veerbeek M, Creemers DHM, van Ballegooijen W, de Winter RFP, Luijs N, Janssen K, Lucassen I, Schoorl M, Kapur N, Gilissen R. Improving Guideline-Based Care for Suicide Prevention in Mental Healthcare: An Empirical Implementation Protocol. Global Implement Res Appl. 2025. https://doi.org/10.1007/s43477-025-00202-5.
46. Van Hemert A, Kerkhof AJFM, De Keijser B, Verwey C, Van Boven J, Hummelen J, De Groot MH, Lucassen P, Meerdinkveldboom JSM, Steendam M. (2012). *Multidisciplinaire richtlijn Diagnostiek en Behandeling van Suicidaal Gedrag [Multidisciplinary guideline Diagnostics and Treatment of Suicidal Behavior]*. De Tijdstroom. https://psychiatrieweb.nl/pw.spoed/files/docs/suicidaal%20gedrag/richtlijn/120801_MDR_DBSG.pdf
47. Vis C, Ruwaard J, Finch T, Rapley T, de Beurs D, van Stel H, van Lettow B, Mol M, Kleiboer A, Riper H, Smit J. Toward an Objective Assessment of Implementation Processes for Innovations in Health Care: Psychometric Evaluation of the Normalization Measure Development (NoMAD) Questionnaire Among Mental Health Care Professionals. J Med Internet Res. 2019;21(2):e12376. https://doi.org/10.2196/12376.
48. Wakai S, Schilling EA, Aseltine RH, Blair EW, Bourbeau J, Duarte A, Durst LS, Graham P, Hubbard N, Hughey K, Weidner D, Welsh A. Suicide prevention skills, confidence and training: Results from the Zero Suicide Workforce Survey of behavioral health care professionals. SAGE Open Med. 2020;8:2050312120933152. https://doi.org/10.1177/2050312120933152.
49. Walby FA, Myhre MØ, Kildahl AT. Contact With Mental Health Services Prior to Suicide: A Systematic Review and Meta-Analysis. Psychiatric Serv. 2018;69(7):751–9. https://doi.org/10.1176/appi.ps.201700475.
50. While D, Bickley H, Roscoe A, Windfuhr K, Rahman S, Shaw J, Appleby L, Kapur N. Implementation of mental health service recommendations in England and Wales and suicide rates, 1997–2006: A cross-sectional and before-and-after observational study. Lancet. 2012;379(9820):1005–12. https://doi.org/10.1016/S0140-6736(11)61712-1.
51. World Health Organization. (2025). *Suicide*. https://www.who.int/news-room/fact-sheets/detail/suicide

Footnotes

1. In the Netherlands, each client typically has one clinician who is responsible for the monitoring and execution of the treatment process, called a *regiebehandelaar*. This is sometimes also referred to as a lead practitioner.

Figures

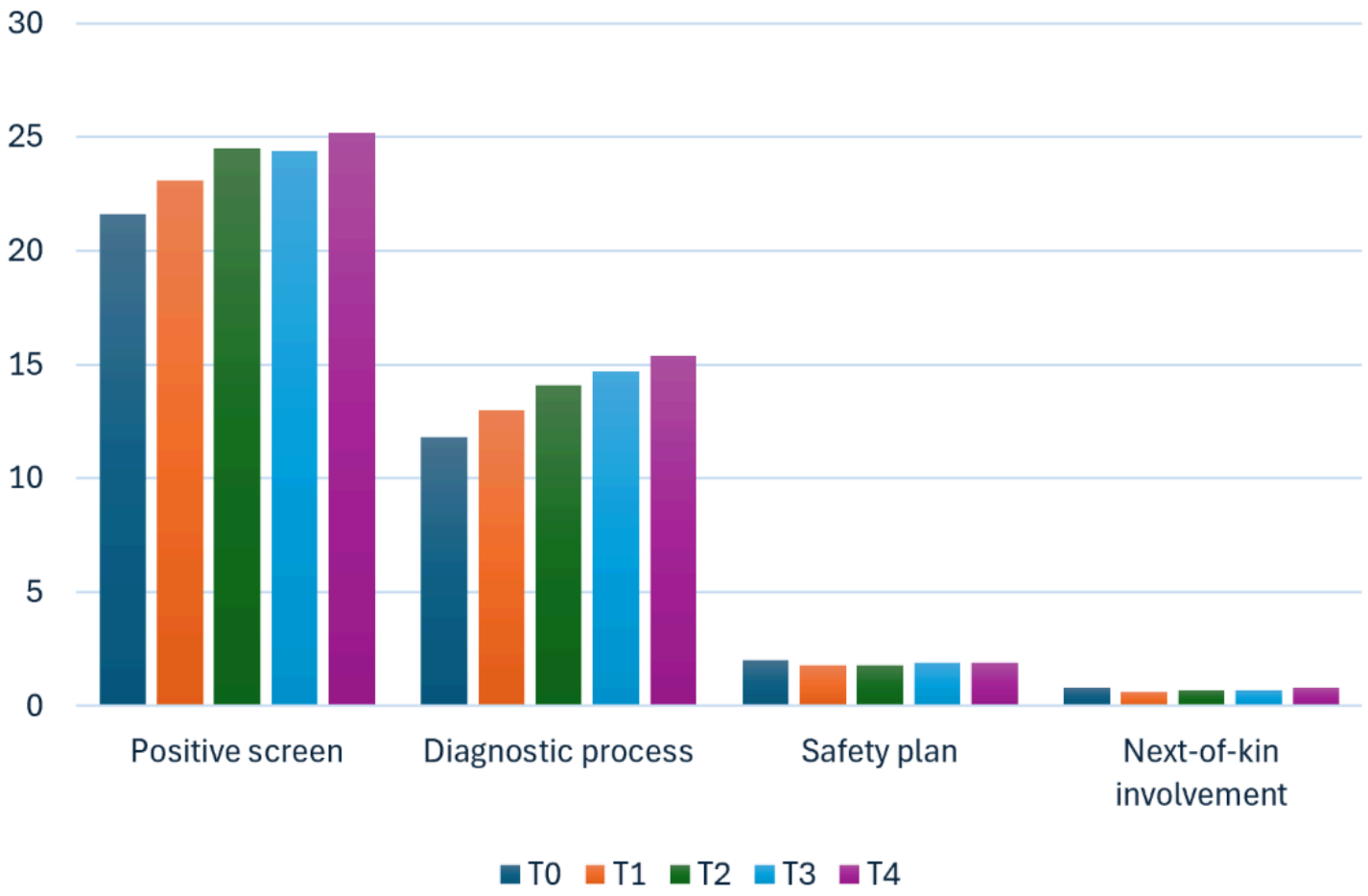


Figure 1

Patient journey scores within a single organisation across time. Positive screen is defined as percentage of total clients; all other indicators are defined as percentage of clients screened positively.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Appendix.docx