

Contact With Mental Health Services Prior to Suicide: A Systematic Review and Meta-Analysis

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Objective: Access to mental health care is regarded as a central suicide prevention strategy. This is the first systematic review and meta-analysis of the prevalence of contact with mental health services preceding suicide.

Methods: A systematic search for articles reporting prevalence of contact with mental health services before suicide was conducted in MEDLINE and PsycINFO, restricted to studies published from January 1, 2000, to January 12, 2017. A random-effects meta-analysis with double arcsine transformations was conducted, with meta-regression used to explore heterogeneity.

Results: Thirty-five studies were included in the systematic review, and 20 were included in the meta-analysis. Among suicide decedents in the population, 3.7% (95% confidence interval [CI]=2.6%–4.8%) were inpatients at the time of death. In the year before death, 18.3% (CI=14.6%–22.4%) of suicide decedents had contact with inpatient mental health

services, 26.1% (CI=16.5%–37.0%) had contact with outpatient mental health services, and 25.7% (CI=22.7%–28.9%) had contact with inpatient or outpatient mental health services. Meta-regression showed that women had significantly higher levels of contact compared with men and that the prevalence of contact with inpatient or outpatient services increased according to the sample year.

Conclusions: Contact with services prior to suicide was found to be common and contact with inpatient or outpatient mental health services before suicide seems to be increasing. However, the reviewed studies were mainly conducted in Western European and North American countries, and most studies focused on psychiatric hospitalization, which resulted in limited data on contact with outpatient services. Better monitoring and data on suicides that occur during and after treatment seem warranted.

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Despite long-standing efforts to decrease suicide rates, they remain quite stable internationally (1) and have increased considerably in the United States (2,3). The general lack of success in reducing suicide rates internationally is clearly related to the fact that suicide is a complex and multifaceted phenomenon with a low base rate at the individual level (4). Although causes and risk factors are far from completely understood, psychiatric disorders are an essential risk factor for suicidal behavior, and more than 90% of persons who die by suicide have a psychiatric disorder (5). One meta-analysis of data from psychiatric inpatients found a suicide rate of 147 per 100,000 inpatient years, with higher rates in more contemporary samples (6). Another recent meta-analysis found that the suicide rate among discharged psychiatric patients was 484 per 100,000 person-years—or 44 times the global suicide rate in 2012 (7).

These studies illustrate the well-known elevated risk of suicide among psychiatric patients, which has had a significant impact on the recommended approaches to suicide prevention. Several agencies, including the World Health Organization (WHO) (8), the Office of the U.S. Surgeon General, the Institute of Medicine (9), and the Department of Health in England (10), have highlighted increased access to health care and improved quality of care as essential strategies to prevent suicide. To explore the potential

population effect of increased contact with mental health services as a suicide prevention strategy, accurate estimates of the current prevalence of contact with mental health services preceding suicide are needed.

We located only two reviews on the prevalence of contact with mental health care prior to suicide, and both are dated. One concluded that contact with inpatient psychiatric care in the year before suicide may have been as high as 41% (11). However, this estimate was based on a single study, and the authors found much lower rates (4%–11%) of contact with community-based psychiatric services in the year before suicide. The other review found an average contact rate of 32% in the year before death, but it did not weight the included studies (12). These authors also found variation between age groups and genders in rates of contact. A limitation of the two reviews was the lack of a valid quantitative synthesis of the evidence. Furthermore, not only does mental health care vary greatly between countries, it has also undergone dramatic changes over the past several decades, including downsizing of inpatient facilities and expansion of outpatient and community services (13). As a result, much of the old literature regarding contact with services before suicide now seems obsolete.

Our aim was to conduct a systematic review—and to our knowledge the first meta-analysis—of the prevalence and

time of contact with mental health services prior to suicide, restricted to studies published after January 1, 2000. We predicted that differences in contact rates would be observed between treatment settings, genders, sample years, age groups, and regions.

METHODS

Protocol and Registration

The review protocol was based on PRISMA-P guidelines (14) and was registered at PROSPERO (CRD42017057797). Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) (15) and Meta-analyses Of Observational Studies in Epidemiology (MOOSE) (16) quality standards were used.

Search and Information Sources

We searched the databases MEDLINE and PsycINFO through Ovid. The primary search term was “suicide” as a keyword, combined with “mental health services,” “inpatients,” “outpatients,” “hospitalization,” or “patient discharge” in both keywords and truncated free text. The search was limited to articles published from January 1, 2000, to January 12, 2017, when the search was conducted. We included peer-reviewed articles that had been published electronically (including preprints) or in print. In MEDLINE, the “review” filter was applied in order to identify and remove review articles from the search. In PsycINFO, the “all journals” filter was applied to exclude books and book chapters. Reference lists of included articles were screened.

Eligibility Criteria

Studies were included that reported completed suicide (including deaths of undetermined cause or open verdicts) as an outcome combined with a frequency, proportion, or rate of contact with mental health services within one, three, and six months; one year; or lifetime prior to the suicide. Title and abstract had to be available in English. We included only studies that had samples drawn from the general population and excluded review articles, articles that reported on samples selected according to specific subgroups, and clinical follow-up studies.

Study Selection

The search was deduplicated twice. References were handled in EndNote[®]7 throughout the review. One reviewer (MØM) screened titles and abstracts (N=3,742) for eligibility, which resulted in 315 records. Inclusion criteria were pilot-tested and refined until a Cohen's kappa of .68 was reached. After the criteria were revised, records were screened a second time by two independent reviewers (MØM and ATK). When disagreement occurred, records were kept for full-text screening. A total of 181 articles were retrieved in full text and assessed for eligibility by two independent reviewers (MØM and ATK). Disagreements were

resolved through discussion. When the reviewers were uncertain about whether to include a study or if nonresolvable disagreements occurred, a third reviewer (FAW) made the decision.

When several records reported from the same population and time period, the record with the largest sample was kept. This criterion resulted in the exclusion of 20 studies. Records reporting on identical cohorts were collapsed into one record. One record (17) reporting on two different time periods was divided into two different studies. We used consultants to interpret two papers—one in German and one in Italian. One study that fulfilled the inclusion criteria was discovered during preparation of the manuscript and included in the review (18).

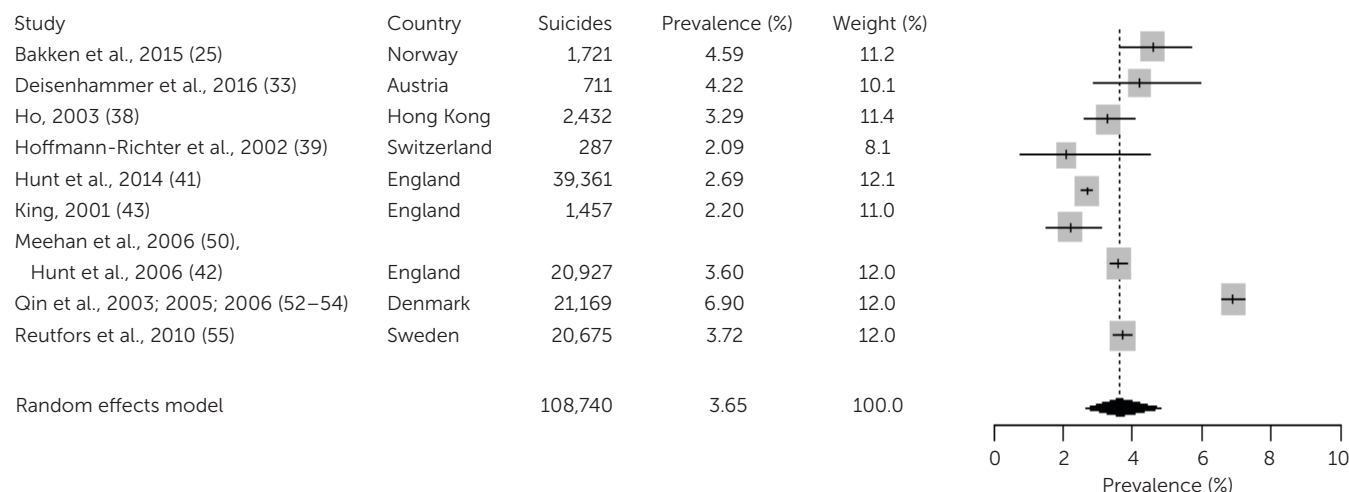
Data Items and Data Extraction

Two independent reviewers (MØM and ATK) extracted data from published reports with a form and coding instructions that had been pilot-tested. Disagreement was resolved through discussion. If no agreement was reached, the authors of the article were contacted. Data were extracted on contact rates or proportions, study design, country, time frame of included suicides, and subgroups (gender and type of services). When the outcome was reported as a proportion, two reviewers independently converted the proportion into number of cases. Measures of contact were grouped by setting: inpatient, defined as a psychiatric hospitalization; outpatient, comprising all psychiatric treatment not based on a hospitalization; and inpatient or outpatient services, a broader category that includes both the mentioned categories. This broader category was used when studies reported the prevalence of contact with mental health services without differentiating between inpatient or outpatient treatment or without specifying the level of care this treatment setting included.

Risk of Bias

Risk of bias was assessed by using an eight-item form based on previously published quality criteria for systematic reviews of studies of prevalence (19,20) and adapted for this review. The items assessed whether the study had a representative national sample, whether it was a true or close representation of the sampling frame, whether random selection or census was used, whether the study had a reliable and valid data collection method, whether there was an acceptable definition of suicide that included established death codes, and whether an appropriate fraction to estimate prevalence was used. The last item was an overall assessment of the study's risk of bias.

Bias was assessed by two independent reviewers (MØM and ATK). Items were rated as low or high, and the overall rating was rated as low, moderate, or high risk of bias. When information was missing, the item was rated as high risk of bias, thus overestimating the risk of bias. Disagreement was resolved through discussion. Pilot-testing was used to train the two independent reviewers.

FIGURE 1. Prevalence of contact with inpatient services at time of death among suicide decedents in the general population^a

^a Lines beside or within the shaded areas indicate 95% confidence intervals. The solid diamond indicates the overall measure. Heterogeneity: $I^2=98.6\%$, $\tau^2=.0018$, $p<.001$

Data Analysis and Synthesis

To reduce heterogeneity, studies of specific age groups were included only in the qualitative review and were not included in the meta-analysis. The meta-analysis was conducted for the following time periods: current and one year. Data were analyzed with the metafor package in R, version 1.9–9 (21). The metaprop function was used to provide the pooled estimates, forest plots, and meta-regression. The double arcsine transformation was used to stabilize confidence intervals (22). A random-effects model stratified by type of setting was used to conduct the meta-analysis, because of a priori assumed heterogeneity. The meta-analysis used inverse variance weighting. Heterogeneity was measured with I^2 statistics, where I^2 above 75% was considered to be high (23). Lines indicating overall prevalence were not printed in the forest plots because of high heterogeneity.

Heterogeneity was explored by meta-regression. Gender was prespecified as a trial-level covariate. In addition, the midyear of the individual studies' sampling period was calculated to assess the recency of the various samples. Analyses with regions and age groups as covariates were initially planned, but low power and unequal distribution of data did not allow the analyses to be conducted. Publication bias was assessed through visual inspection of funnel plots.

RESULTS

Identification and Description of Studies

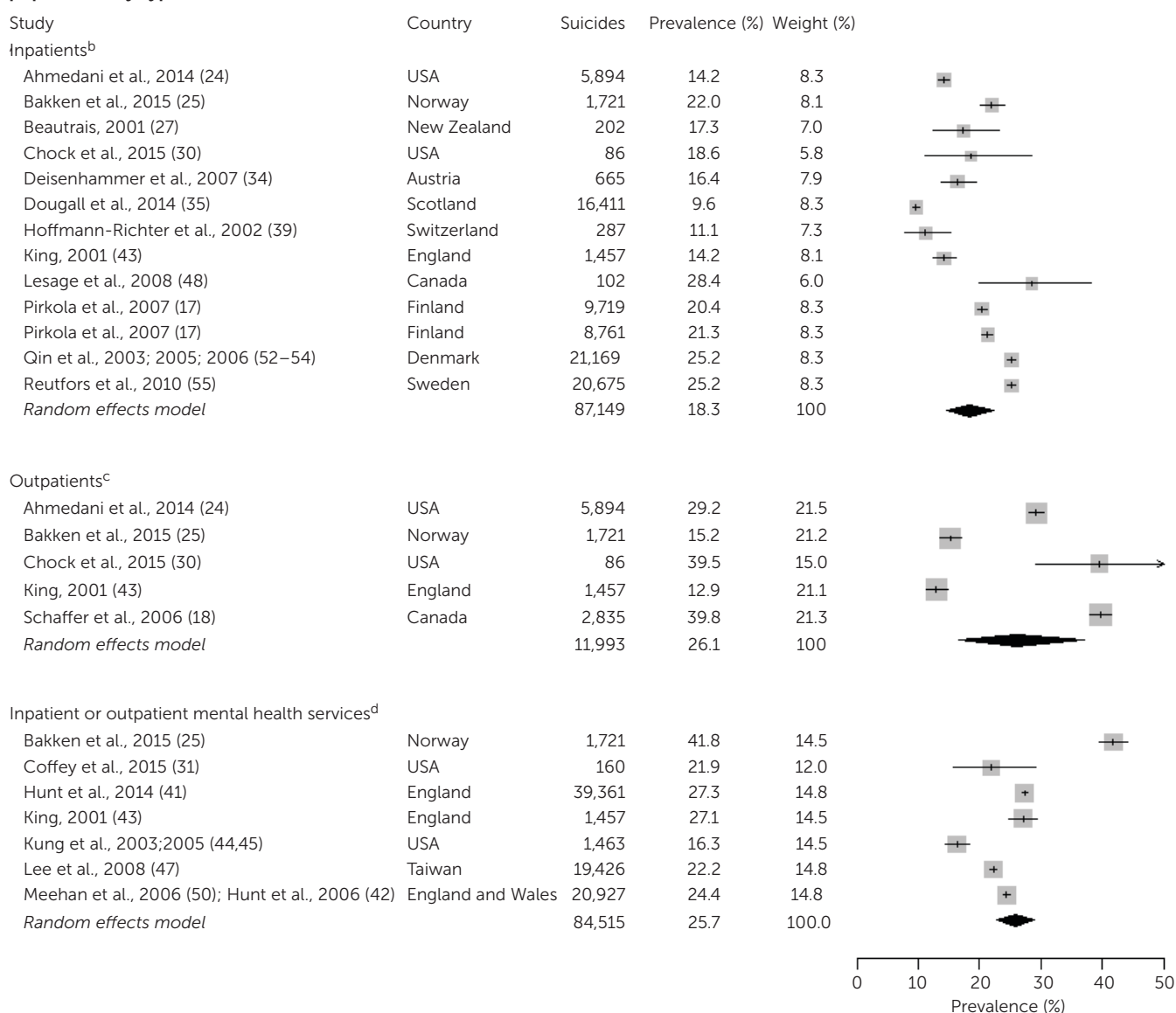
The inclusion criteria were met by 59 studies. [A PRISMA flow diagram of the systematic search is included in an online supplement to this article.] Twenty studies were excluded because of overlap, and four were merged with another study (Figures 1 and 2). As a result, 35 studies were included in the qualitative review (17,18,24–60). Five authors were contacted for additional information.

The included studies were from 19 primarily Western European and Northern American countries [see table in online supplement]. The studies used linkage of national registers ($N=9$), psychological autopsies ($N=10$), national clinical surveys ($N=4$), and record reviews ($N=13$) and included samples from 1980 to 2015 [see supplement]. The median midyear of the samples was 2000. Eleven studies reported the main outcome across genders in all settings, and seven of these reported on contact with inpatient treatment. Eight studies included open verdicts or sudden unexplained deaths in their definition of suicide (35,40,41,43,50,55,56,59).

Of the studies that included all age groups, 18 reported on contact with inpatient services, seven on contact with outpatient treatment, and 13 on contact with inpatient or outpatient mental health services prior to suicide [see table in supplement]. The time points used to report the proportion of contact varied between studies, with most studies reporting on contact within one year. Eleven studies reported on specific age groups: six on contact with mental health services by persons age 25 and under who died by suicide and five on contact by persons over age 50. There were large variations between these studies in the time points and settings used to report the outcome variable. There was a slight tendency of lower contact rates in the studies reporting on suicides of persons under age 25. No clear trend could be observed in the studies of persons over age 50.

Meta-Analysis

Twenty individual studies reporting on 21 samples were included in the meta-analysis. Of these, nine studies reported prevalence of suicides among persons who were in contact with inpatient services at the time of death (Figure 1), giving a pooled prevalence of 3.7% (95% confidence interval [CI]=2.6%–4.8%). Eighteen studies reported on suicides among persons in contact with mental health

FIGURE 2. Prevalence of contact with mental health services in the year before death among suicide decedents in the general population, by type of service^a

^a Lines beside or within the shaded areas indicate 95% confidence intervals. Solid diamonds indicate overall measures.

^b Heterogeneity: $I^2=99.5\%$, $\tau^2=.008$, $p<.001$

^c Heterogeneity: $I^2=99.3\%$, $\tau^2=.0174$, $p<.001$

^d Heterogeneity: $I^2=98.7\%$, $\tau^2=.0021$, $p<.001$

services within the year prior to death, stratified by setting (Figure 2). The pooled prevalence for contact with inpatient services was 18.3% (CI=14.6%–22.4%), for outpatient services it was 26.1% (CI=16.5%–37.0%), and for inpatient or outpatient mental health services it was 25.7% (95% CI=22.7%–28.9%).

Heterogeneity was large and significant in all strata. As noted above, 11 studies reported the prevalence of contact with services by gender. In the seven studies that reported contact rates for inpatient treatment within one year, gender was a significant covariate ($p\leq.001$, $\tau^2=.003$), with contact being more common for women (35.0%, CI=30.1%–40.1%) than for men (19.7%, CI=17.3%–22.1%).

The midyear of the individual studies' sampling period was a significant moderator between studies of contact with inpatient or outpatient mental health services within one year of death ($p=.003$, $\tau^2=.002$), with higher contact estimates in the most recent samples. The results of the meta-regression were not significant for current inpatients or those who had inpatient contact within one year.

Post hoc meta-regressions were conducted for the studies in which deaths of undetermined cause were included in the definition of suicide as a trial-level covariate. The meta-regression was significant for current inpatients ($p=.041$, $\tau^2=.001$) but not significant for contact with inpatient services within one year or for contact with inpatient or outpatient

services within one year. We further examined the borderline significant finding by conducting a subgroup analysis; the results were not significant for all strata and showed that studies that included open verdicts and sudden unexplained deaths in the definition of suicide had a lower contact prevalence than studies that reported only on suicides.

Funnel plots of the studies included in the meta-analysis showed no systematic skewness or asymmetry for contact with mental health services overall or with inpatient services within one year, indicating no publication bias (data not shown).

Risk of Bias

An interobserver agreement of $\kappa=.609$ was reached for the assessment of risk of bias. Of the 35 included studies, 29 had a representative sampling frame, 12 had a representative national sample and 19 studies used census or random sampling. The method for data collection was assessed as low risk of bias in 23 studies. Sixteen studies had an acceptable definition of suicide based on established death codes. Twenty-four of the 35 studies reported numerators and denominators that were directly and clearly defined. Overall risk of bias was rated as high in nine, moderate in 14, and low in 12 studies [see table in supplement].

DISCUSSION

This systematic review and meta-analysis of mental health service contact prior to suicide found that within the prior year, 18.3% of persons who died by suicide had contact with inpatient mental health services, 26.1% had contact with outpatient mental health services, and 25.7% had contact with inpatient or outpatient mental health services. These rates are remarkably lower than those in the previous review by Pirkis and Burgess (11), who reported that up to 41% of persons who died by suicide were in contact with inpatient services in the year before death. The rates are also lower than those in the review by Luoma and colleagues (12), who reported that approximately 32% of persons who died by suicide were in contact with mental health services in the year before death. The lower estimates found in this review are probably due to the use of formal meta-analytic approaches with weighting, which are less influenced by small studies with outlying estimates, as well as by the inclusion of several recent large registry studies. In addition, the overall number of suicides included in this review is much larger than in the previous reviews.

As expected, a great degree of heterogeneity was found in all subgroups. Meta-regression showed that contact with mental health services was significantly more common among females than among males and that the recency of the sample was a significant trial-level covariate for increased contact with inpatient or outpatient mental health services but not for inpatient services exclusively.

The overall prevalence of persons admitted to a psychiatric hospital at the time of their death by suicide death was

3.7%. Despite large heterogeneity, the confidence interval for the overall estimate was narrow. The overall sample was large and represented by several extensive, national clinical surveys or registry studies in Western European countries. All the studies except those by Qin and colleagues (52–54) lay within the confidence interval of the overall effect. The slightly higher prevalence in the studies by Qin and colleagues could be explained by the broad time span of the sample, ranging from 1981 to 1997.

The overall prevalence of contact with inpatient or outpatient mental health services in the year preceding suicide was 25.7%. Even though heterogeneity was high, the confidence interval was quite narrow, and most studies lay within the boundaries of the confidence interval. The exceptions were the study by Bakken and colleagues (25), who found a higher prevalence, and the study by Kung and colleagues (44), who found a lower prevalence. These two studies probably represent two opposite types of health care organization—the comprehensive, publicly financed health care system in Norway and the private insurance-based systems in the United States.

Only five of the included studies reported exclusively on the prevalence of contact with outpatient services in the year before death. An overall estimate of 26.1% of suicide decedents were found to have been in contact with outpatient services in the prior year, which is similar to the estimate for the combined inpatient and outpatient mental health services category. This surprising result is due to great variation in the contact prevalence between the few studies reporting on outpatients. It is also likely that organization of and referral to outpatient services might be subject to greater variation between countries, compared with inpatient services. The sparse data on contact with outpatient services was pointed out 20 years ago by Pirkis and Burgess (11) and is even more striking now given the past decades' increased focus on outpatient treatment and community services worldwide (13).

As expected, we found significant differences in contact rates between genders; admission to a psychiatric hospital in the year before death was more common among females than among males. This finding implies that use of such services is less prevalent among men (61,62). Because of the lack of data, it was not possible to analyze gender differences regarding use of outpatient services or mental health services in general (inpatient or outpatient); this is an area requiring future research.

Sample year was a significant covariable for contact with inpatient or outpatient mental health services in the year before death but not for contact with inpatient services only. This finding indicates that contact with the wider range of mental health services became more common during the study period, and the differences between treatment settings could be a result of the general increased focus on outpatient services. As noted above, there might also be greater variation in the way outpatient services are organized in various countries, compared with inpatient services, which should

also be taken into account. However, the magnitude of increase in the prevalence of contacts with mental health services during the study period was modest, which limits the current potential population effect of increased contact with mental health services as a suicide prevention strategy.

Post hoc analysis of the relation between suicide definitions and contact indicated a lower prevalence of contact in studies that included deaths of undetermined cause in their definition. Contrary to expectations, one of these meta-regressions was borderline significant, but the findings were not replicated in subgroup analyses. Meta-regressions are sensitive to false positives, and one should be especially careful when conducting post hoc analyses (63). When all results were taken together, we found no evidence of higher levels of contact in studies that included deaths of undetermined cause in their suicide definition, and we believe that this lends support to the practice of including undetermined deaths in countries where the use of such verdicts is common in suicide research.

It was not possible to conduct a meta-analysis of studies on specific age groups, because these studies reported the outcome variable in different settings and time points. With one exception (49), studies of suicide decedents under age 25 generally found lower rates of contact with mental health services, compared with the general population. Studies of suicide decedents over age 50 mainly reported on service contact during the individuals' lifetime and consequently found a higher prevalence of contacts than in the younger and general population.

The risk of bias in individual studies was generally rated as being moderate or low. Of the studies included in the meta-analysis, only one small study was rated as having a high risk of bias (39), but this had little weight in the meta-analysis. Our review included several national registry studies, which is likely to have improved the overall quality of our findings, because the samples in these studies were larger and more representative of the general population and because record linkage is effective for identification of cases in this line of research.

The high degree of heterogeneity and the wide distribution of data across settings and time-periods restricted our opportunities to conduct planned subgroup analyses and meta-regressions as specified in the protocol. We did, however, find gender to be a significant predictor of contact with services, and we also found somewhat lower rates of contact among suicide decedents under age 25, as discussed above. Nevertheless, such individual characteristics accounted only for a limited amount of the observed heterogeneity, as expected. Furthermore, although there is some variation in suicide rates between countries and regions (1), it is difficult to see how such differences could explain the large variation in contact with services among suicide decedents. The large variation is thus more likely to stem from differences on a system level, particularly regarding how mental health care is organized in various countries, and issues related to the availability of services in various countries or health care systems.

Previous studies have found large differences between high- and low-income countries in the degree of contact with mental health services among persons with anxiety, mood, and substance use disorders (64). In one study of European countries, the rate of contact with mental health services for mental health reasons varied between 9.7% in Italy and 29.9% in Netherlands—both well-organized, high-income countries (65). Differences in these general contact rates with mental health care might thus be attributable to determining factors related to national political priorities, such as the amount of resources allocated to health care (64), availability of mental health services (65), and other factors related to the dimensionality of mental health services in various geographical areas or nations.

Factors related to the organization of the mental health care system might also be of great importance. For instance, patients with a particular degree of depression might receive treatment in primary care in some regions and in specialized care in other areas. This difference would in turn directly influence contact with services before suicide. Several studies have demonstrated that the ways in which primary and specialized care interact might also be important in accounting for the variability in contact with various services (65,66). Both these issues, along with the issue of capacity, may explain our finding that the variation between single studies was most pronounced for outpatient services, compared with both inpatient services and combined inpatient or outpatient services. Finally, even in Norway, where contact rates with mental health services were found to be above 40% in the year before suicide, a recent study found that most people with mental health conditions do not receive any treatment (67). The pathways to specialized care are thus somewhat coincidental and characterized by large variations, and thus they are difficult to disentangle on the basis of findings from a systematic review.

In general, existing studies lacked clinical information on contact with mental health care before suicide, which precluded any attempt to include such covariates in the meta-analysis. On the basis of our systematic review and meta-analysis, we recommend that in addition to a better formal surveillance of suicide among patients, future studies systematically report on three time points—current, three months, and one year—when possible, provide comprehensive descriptions of the settings included, differentiate between inpatient and outpatient treatment, and report the prevalence of contact for each gender.

The results of our review might inform suicide prevention interventions and research in several ways. First, although prevalence rates of contact were found to vary between countries and health care systems, a substantial proportion of suicide decedents were in contact with mental health care services in every study included. However, even in Norway, the country with the highest contact rates, not more than four in ten suicide decedents had been in contact. This finding means that if the WHO strategy (8) of reducing the number of suicides by improving access to care is to be

more effective, actions must be taken on both a health administrative level and a political level to enable services to reach more individuals. Second, this finding might also imply that other parts of the health care system, in particular primary care services, should be actively involved in recognition and treatment of people with mental disorders.

In addition to the general implications for suicide prevention highlighted above, the findings of this review might also have implications for health care systems individually. A high rate of contact with services is not necessarily evidence of efficient suicide prevention, because it can also indicate poor service quality. In the same way, low rates of contact can result from effective identification of people at risk and effective treatment. Nevertheless, the results of this review can serve as a basis for comparing various service systems or nations. In the development of suicide prevention strategies, policy makers and health authorities should evaluate the specific health care system in order to decide where to best place the effort. In systems with a low prevalence of contact before suicide, increasing access to care would probably be the most appropriate place to start. In systems with a high level of contact, it might be more effective to assess and improve the performance of the system, including the quality of care. Finally, the proportions of persons in contact with services identified in this review once again point to the dramatically increased risk of suicide both during and after contact with mental health services. Although there is some evidence of the effect of suicide prevention interventions at the system level (68,69), our findings clearly highlight the urgent need for development of better measures of suicide prevention both during an episode of inpatient or outpatient treatment and in the first year following treatment for this high-risk group.

CONCLUSIONS

This systematic review and meta-analysis provides the first pooled prevalence rates of contact with mental health services before suicide. Although our overall estimates are lower than reported in two previous reviews, contact with mental health services is still common prior to suicide. We found substantial variation in the prevalence of contact between various samples and settings. Given the large number of suicide decedents in the general population who had been in contact with mental health services in the year before death, the lack of data from many countries and regions is striking, particularly regarding outpatient services. In addition, information about diagnoses and other clinical variables was absent in most of the studies reviewed, which is unfortunate considering how important this type of knowledge can be in the development of suicide prevention strategies. This review, together with other recent meta-analyses that also emphasize the enormous increased risk of suicide among mental health patients (6,7), points to the importance of improved monitoring of suicides in relation to health services. It further shows the need for interventions aimed at reducing barriers to care for suicidal individuals and

the need for development and evaluation of more suicide-specific interventions for the high-risk population already receiving care.

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Submissions Invited for Culture & Mental Health Services Column

A new column in *Psychiatric Services*, Culture & Mental Health Services, edited by Roberto Lewis-Fernández, M.D., aims to clarify the ways that culture shapes the utilization, delivery, and organization of mental health services. Submissions may examine the influence of culture at the level of the individual seeking care (e.g., the impact of a person's cultural views of illness on treatment choice and level of engagement), the provider (e.g., the role of implicit racial-ethnic biases on service recommendations), the program (e.g., how local socioeconomic and organizational factors influence the package of services offered at a clinic), or the mental health system (e.g., how political forces affect reimbursement structures that determine availability of services). Dr. Lewis-Fernández welcomes papers that focus on aspects of culture related to interpretation (meaning making), social group identity (e.g., race-ethnicity, language, and sexual orientation), and social structures and systems. The goal of the column is to make visible the social-contextual frameworks that shape care. Papers, limited to 2,400 words, may be submitted online as columns via ScholarOne Manuscripts at mc.manuscriptcentral.com/appi-ps. The cover letter should specify that the submission is for the Culture & Mental Health Services column.