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THE USE OF INFORMATION TECHNOLOGIES IN SUICIDE PREVENTION

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Abstract

Mental health has become a widely discussed topic. The demystification of this theme has grown exponentially. Also due to the pandemic situation that the world is currently facing, we have been observing a rise in deaths caused by suicide and the numbers do not show signs of a possible reduction. Thus, there is an urgent need to understand the existing methods of suicide prevention, in an accessible and quick way to everyone through information technologies, especially online applications. In this case, we aim to ease the search for these technologies – and systematize them, highlighting their use in suicide prevention –, but also to understand what else can be done to promote them to help possible victims and their families. It sums up what previous authors investigated about suicide prevention through information technologies. Focused on our research question – In what way and with what means may information technologies contribute to suicide prevention? –, a deep analysis of the literature was conducted, in a study covering 50 indexed papers – published from 2007 to 2021 – approaching the use of technologies in suicide prevention, using Leximancer platform, to determine and shape the main themes and concepts proposed in the prevention of suicide – through information technologies papers – and determine how to go further. Our findings give an important contribution to health education, particularly in the prevention of self-destructive behaviours.

Keywords: Suicide prevention, mhealth, information technologies, suicide, app, technologies.

1 INTRODUCTION

Every year 800 000 people die from suicide. Which means, one mortal victim every 40 seconds [1]. Some of the most developed nations have implemented national suicide prevention plans. Although these plans serve multiple interventions, their effectiveness is rarely evaluated. A study by Mann [2] indicates that the main causes of suicide are psychiatric illnesses (90%), but this list also includes causes such as: mood disorders, especially depressive and bipolar disorders. Other factors were also considered important to mention, such as excessive use of alcohol and drugs, access to psychiatric treatment, mental illness, age and gender.

To deal with these causes and factors, there's a multifaceted approach with special attention to mental health issues. Also, it is revealed that the main suicide prevention techniques are: Awareness and Education Programs – reducing the stigma around mental illness and suicide and improving the recognition of suicide risk and aiding in the search for a better understanding of the causes and risk factors for suicidal behaviour (Primary Care Doctors, Gatekeepers and Screening); Treatments (Pharmacotherapy and Psychotherapy); Follow-up care after suicide attempts; Restriction of Means and Media - can help or hinder suicide prevention efforts, being a conduit for public education or aggravating the risk of suicide by praising suicide or promoting it as a solution to life's problems.

In general, the strategies used globally to prevent suicide are: the use of antidepressants; curriculum-based programs; screening of depressions in primary cases; detection and treatment of depression in primary cases; psychotherapy; clozapine (antipsychotic medication); lithium; follow-up care (postal contact program); follow-up care (phone contact program); follow-up care (green card); primary care physician (quality improvement); primary care medical education; gatekeeper programs; blackout media; firearms restriction; public education campaigns; service chain; pesticide restrictions; domestic gas detoxification; barbiturate restrictions (type of drug); changes in analgesic packaging; catalytic converters; barriers to prevent suicide by jumping (from bridges, train lines, etc.); SSRIs (antidepressants); restrictions on alcohol consumption; introduction to antidepressants with less toxicity.

There are several suicide prevention technologies. According to Franco-Martín [3] in September 2017, most of them were web technologies (51.61%), mobile solutions (22.58%), social networks (12.90%), machine learning (3.23%) and other technologies (9.68%). According to the results obtained, although there are technological solutions that help prevent suicide, there is still a lot to be done in this field. Collaboration between technologists, psychiatrists, patients and family members are the key to developing new technology-based solutions that can help save lives.

Apps are low-cost, convenient and discreet. These can be specialized in order to provide suicide prevention interventions with their ability to provide support in any type of risky situation. As the idealization of suicide and the risk of happening it quickly changes, access to high quality mobile resources can save lives. [4]

Over the last decade, we've seen an increase in the use of tools on mobile devices that are crucial for both patients and healthcare professionals. The growth and popularity of mHealth apps (applications with health-related software) has been quite significant. It was estimated that, in 2018, 50% of the more than 3.4 billion mobile device users had downloaded mHealth applications. [5]

The main objective of these types of applications is to provide access to resources related to self-care, clinical assessment, clinical decision-making and treatment response. This type of mobile technologies also provides a platform for interventions via contact (example by sms). More directly related to suicide prevention, it is also possible to create safety plans and provide supportive information for patients and family members.

A study by Lai [6] presents preliminary evidence that suggests the likely economic benefit of Internet suicide prevention strategies. In particular, *iCBT* (Internet-based cognitive behaviour therapy) that may contribute to reduce the suicide idealization. This type of approach appears to be advantageous, as mentioned by other authors, as it can reach populations at risk of suicidal behaviour to which conventional methods have limited access due to stigma, physical/psychological limitations or, also, due to its own geographic location.

Despite being recent, social networks also play an important role in suicide prevention. Proactively using social media to raise public awareness and education about mental health issues is a logical approach to modern public health that can potentially save lives, according to Luxton et al. (2012). This article exemplified some social networks such as Facebook that joined organizations with the Kingdom Child Exploitation and Online Protection Center (CEOP) in order to provide a "panic-button application" that allowed users to report cyberbullying in an easier way. Also, Lopez-Castroman [7] mentions some more projects created through social networks.

Social networks can reach a large number of individuals, who would not normally be so easily captured, allowing them to intervene through anonymous, accessible and non-judgmental online forums to share experiences. There are, however, some challenges such as tracking user behaviour and accurately evaluating it, privacy issues and the possibility of negatively influencing others. Overall, there is significant potential in social media for the prevention of suicide, however, research and informed assessment of their safety and effectiveness is needed. [8]

Traditional approaches to suicide prevention include the use of letters, brochures, billboards, radio, television and telephones. The advancement of technologies, such as the Internet and smartphones, and the exponential increase in their use by the general population, provide new opportunities for effective suicide prevention and dissemination. [9]

There have been several studies on the use of technologies in suicide prevention. This article is included in a master's thesis with the purpose of analysing the most relevant studies that were carried out in the last 15 years (and published in scientific indexed journals). The analysis of these papers will be based on data mining and text mining techniques, using different types of software, particularly, Leximancer. We will focus, especially, on some sections of these papers, namely those referring to the Introduction.

2 METHODOLOGY

To understand which information technologies already exist in the field of suicide prevention in the last fifteen years, analyses will be carried out using text and data mining. We used Leximancer to perform content and textual analysis of forty-seven suicide prevention papers, obtained from Google Scholar website, to analyse and illustrate how authors conduct suicide prevention research and, especially, how

key concepts are presented and discussed. We focused our attention particularly in the Introduction, aiming to identify, analyse and map the main concepts in suicide prevention technologies-centred research, to answer our research question: What guidelines for future research and applications can be deduced from the main concepts found in applications and scientific articles published on the role of technologies in preventing suicidal behaviour?

Table 1. Data collection and papers characteristics.

Year of publication	N.	%
2007	1	2,128%
2011	3	6,383%
2012	1	2,128%
2013	3	6,383%
2014	4	8,511%
2015	6	12,766%
2016	13	27,66%
2017	3	6,383%
2018	6	12,766%
2019	5	10,638%
2020	2	4,255%
Total	47	≈ 100%

3 RESULTS

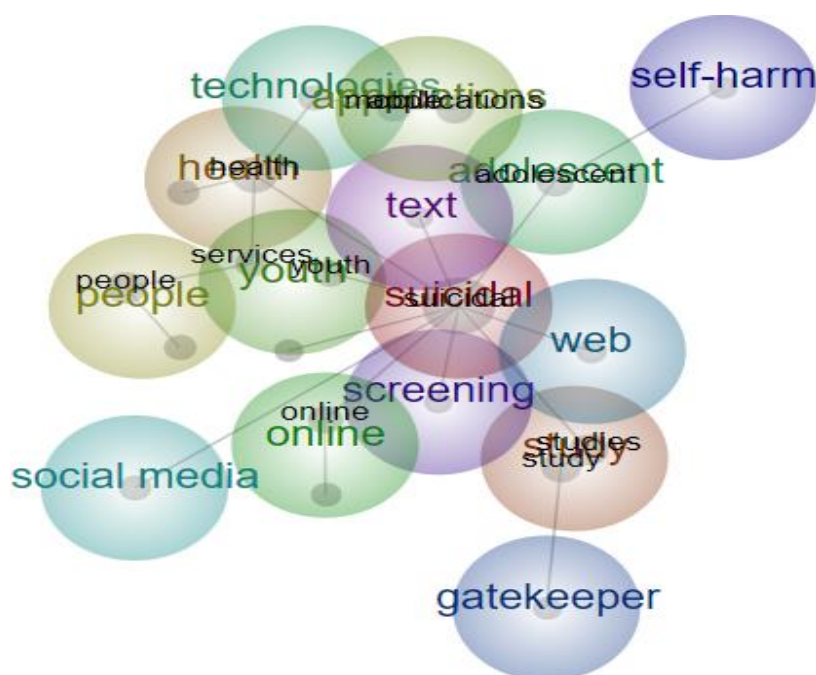


Figure 1. Leximancer's Map of Concepts.

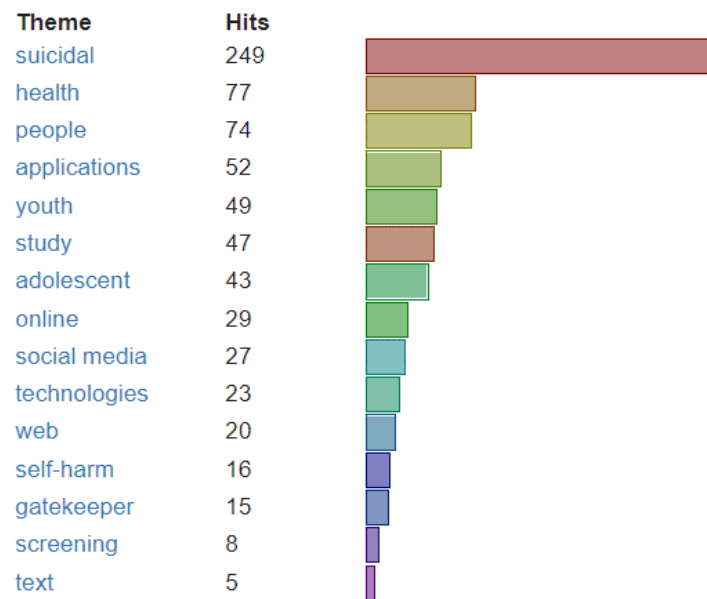


Figure 2. Leximancer's Analyst Synopsis.

With the help of Leximancer software we were able to determinate the most relevant content of the studies mentioned before. Leximancer processes the text and find all the possible concepts, and themes. Then, we analyze and remove the ones that are not significant for this analysis.

People are starting to realize that suicide it's an health issue, this study can show that with the two more mentioned concepts being "suicidal" and "health".

It's clear that online information systems are the most focused suicide prevention technologies and mainly represented by Apps with fifty-two mentions, next we have social media, with twenty-seven mentions, web-based technologies represented by twenty hits and, representing the non-online technologies, text messages with only five mentions.

Gatekeeping is the activity that most of these information systems are implementing on their strategies (fifteen hits), but it's also highlighted screening with eight hits.

It's also very clear that the majority of these studies are focusing their target on younger people, especially adolescents.

4 CONCLUSIONS

With the results that we've obtained it's becoming evident that people are starting to realize that maybe there's really something more that we can do to prevent suicide using information systems.

From 2007 to 2020, there has been a growth on these studies, which means that people are realizing that this is a real issue especially with the pandemic crisis that the world is facing. Suicide is likely to become a more pressing concern as the pandemic spreads. [10]

There's a need to give more importance to mental health, be aware of the signs and become more aware of those who self-harmed before or had others self-destructive behaviours. There's where information's systems can enter and help. Implementing strategies as gatekeeping and screening, for example in apps, websites and using social media to spread some awareness and creating safe places where people can express their feelings and seek for help without being judged.

There's still a lot that can be made. I think it's important to involve mental health specialists in this topic so they can have thoughts on what we can do to make the disadvantages become advantages and realize some inconveniences that we're not considering it.

Suicide is something that affects not only individuals, but entire communities, so every effort must be made to prevent it, and this article is a contribution for that vital goal.

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