

Evidences on the effectiveness of text messages in the adherence to antiretroviral therapy in adults

Evidências sobre eficácia de mensagens de texto na adesão à terapia antirretroviral em adultos

Evidencias sobre la eficacia de los mensajes de texto en la adherencia a la terapia antretroviral en adultos

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How to cite this article:

Soares YKC, Araújo TME. Evidences on the effectiveness of text messages in the adherence to antiretroviral therapy in adults. Rev Gaúcha Enferm. 2020;41:e20190242. doi: <https://doi.org/10.1590/1983-1447.2020.20190242>

ABSTRACT

Objective: To analyze the evidence available in the literature on the effectiveness of text messages in the adherence to antiretroviral therapy in adults.

Method: Integrative review. The search for primary studies was carried out in MEDLINE/PubMed, Web of Science, CINAHL, LILACS, and SCOPUS and the sample consisted of 18 studies, in April 2019, with no time delimitation.

Results: The synthesis of the evidences indicated that, of the 18 analyzed articles, 11 showed an increase in the adherence rates to antiretroviral therapy and an increase in CD4, after using text messages.

Conclusion: Text messages are an important tool for health education and the synthesis of knowledge can help nurses to obtain increasingly substantive adherence rates in relation to antiretroviral therapy.

Keywords: HIV. Text messaging. Antiretroviral therapy, highly active. Adult. Cell phone. Medication adherence.

RESUMO

Objetivo: Analisar as evidências disponíveis na literatura sobre a eficácia de mensagens de texto na adesão à terapia antirretroviral em adultos.

Método: Revisão integrativa. A busca dos estudos primários foi realizada no MEDLINE/ PubMed, Web of Science, CINAHL, LILACS e SCOPUS sendo a amostra composta por 18 estudos, em abril de 2019, sem delimitação temporal.

Resultados: A síntese das evidências indicou que dos 18 artigos analisados, 11 evidenciaram aumento das taxas de adesão à terapia antirretroviral e aumento de CD4, após uso de mensagens de texto.

Conclusão: As mensagens de texto constituem uma ferramenta importante para a educação em saúde e a síntese do conhecimento pode ajudar os enfermeiros na obtenção de taxas de adesão cada vez mais substantivas em relação à terapia antirretroviral.

Palavras-chave: HIV. Mensagem de texto. Terapia antirretroviral de alta atividade. Adulto. Telefone celular. Adesão à medicação.

RESUMEN

Objetivo: Analizar la evidencia disponible en la literatura sobre la efectividad de los mensajes de texto en el cumplimiento de la terapia antirretroviral en adultos.

Método: Revisión integradora. La búsqueda de estudios primarios se realizó en MEDLINE / PubMed, Web of Science, CINAHL, LILACS y SCOPUS; y la muestra consistió en 18 estudios, en abril de 2019, sin delimitación temporal.

Resultados: La síntesis de la evidencia indicó que, de los 18 artículos analizados, 11 mostraron un aumento tanto en las tasas de adherencia a la terapia antirretroviral como en CD4, después de usar mensajes de texto.

Conclusión: Los mensajes de texto son una herramienta importante para la educación sanitaria y la síntesis del conocimiento puede ayudar a los enfermeros a obtener tasas de adherencia cada vez más altas en relación con la terapia antirretroviral.

Palabras clave: VIH. Envío de mensajes de texto. Terapia antirretroviral altamente activa. Adulto. Teléfono celular. Cumplimiento de la medicación.

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INTRODUCTION

The epidemics of the Acquired immunodeficiency syndrome (AIDS) caused by the Human Immunodeficiency Virus (HIV) has a negative impact on families, communities and countries, making this infection one of the greatest challenges for public health, especially due to its prevalence and magnitude. There is an estimated 36.7 million people living with HIV in the world. In its turn, in Brazil, from the beginning of the epidemic in 1980 until June 2018, 926,742 AIDS cases were recorded, with a mean of 40 thousand cases annually in the last five years⁽¹⁻²⁾.

In order to face the epidemic, Brazil has developed strategies based on the combined prevention of HIV, which consists of the combined use of biomedical, behavioral and structural interventions aimed not only at the individual, but also in their relationships and the social groups in which they are inserted, respecting their specificities⁽³⁾.

In this perspective, among the biomedical interventions, the prevention strategy known as "Treatment for All People" (*Tratamento para todas as Pessoas*, TTP) is configured as the main example of facing HIV transmission through the correct use of antiretroviral therapy by people living with HIV/AIDS (PLHIV), since it has the capacity to reduce transmission of the virus, by people infected using regular highly potent antiretroviral therapy (ART). This measure, in addition to preventing illness and increasing life expectancy, dramatically reduces the risk for HIV transmission⁽³⁾.

However, ART is a complex treatment that lasts for the life of the individual and generally causes side effects resulting in poor adherence and inconsistent use, and that tends to decrease over time⁽⁴⁻⁵⁾. The simple lack of a few doses of antiretrovirals (ARVs) per week can be related to viral resistance and with a consequent treatment failure, which can become worse in the long term compared to the individual who does not use therapy⁽⁶⁾.

Given such facts, adherence to ART is considered fundamental to control the epidemic. Conceptually, adherence refers to the correct use of antiretroviral drugs, according to the dose, times and guidelines prescribed by the health team for the treatment of people infected with HIV. The Ministry of Health considers that taking medication with a frequency of at least 80% as sufficient adherence to achieve viral suppression and maintenance⁽²⁻³⁾.

In this context, it is imperative to develop strategies that promote adherence to ART, in order to contribute more effectively to infection control. Thus, technological strategies such as the use of mobile phones have been encouraged, due to the wide range of these devices among the individuals. In Brazil, in 2017, 93.2% of the households in the country

had a mobile phone and nearly 74.9% access the Internet through such devices⁽⁷⁾.

Mobile health implies the use of the mobile phone technology to provide health care, being an emerging area for disease management, which has shown the potential to help patients adhere to long-term chronic treatments and care monitoring⁽⁸⁻⁹⁾. In this context, the use of the mobile phone through calls and text messages has shown relevant results in relation to the adherence to antiretroviral therapy and viral suppression, especially in the first months of treatment⁽¹⁰⁾.

Thus, health information technologies have been stimulated in the context of HIV/AIDS in order to favor the expansion of health care, reducing geographical barriers and the costs involved in preventing and treating the infection. It is a tool that can strengthen the health services in combination with regular care, improving care for people with HIV⁽¹¹⁾.

The national literature is still incipient in relation to the effectiveness of using text messages to promote adherence to antiretroviral therapy. Therefore, the synthesis of knowledge about the use of text messages in antiretroviral therapy in adults becomes important to identify the benefits and implications for coping with HIV/AIDS, in order to guide the health professionals in their practices.

Thus, the aim of this study was to analyze the evidence available in the literature on the effectiveness of text messages in the adherence to antiretroviral therapy in adults.

METHOD

An integrative review study that involves extensive research analysis, resulting in the analysis and synthesis of knowledge on a given topic. To do so, the following stages were followed: identifying the problem and elaborating the guiding question; searching for studies in the literature of primary studies; evaluation of primary studies; data analysis with synthesis, and presentation of the review⁽¹²⁾.

Therefore, this study had the following guiding question: What evidences are available in the literature about the effectiveness of text messages in the adherence to antiretroviral therapy in adults? It is highlighted that a research protocol was built in order to direct the study. To build the guiding question, the PICO⁽¹³⁾ strategy was used, (P for population: Adults; I for intervention or area of interest: Using text messaging applications; Co: was not employed; O for outcome: Evidences on the effectiveness of using text messaging applications in the adherence to antiretroviral therapy).

The search for primary studies was carried out in April 2019 through the Capes Journal Portal with access by

means of the Federated Academic Community (*Comunidade Acadêmica Federada, CAFE*) to which the researchers are linked. The chosen databases were the following: Medical Literature Analysis and Retrieval System Online (MEDLINE), via the US National Library of Medicine (PubMed), Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, and Latin American and Caribbean Literature in Health Sciences (*Literatura Latino-Americana e do Caribe em Ciências da Saúde, LILACS*), via the Virtual Health Library (*Biblioteca Virtual de Saúde, BVS*).

In this way, controlled descriptors identified in the Medical Subject Headings (MeSH), Descriptors in Health Sciences (*Descritores em Ciências da Saúde, DeCS*), and Emtree (CINAHL Terminology) were used, combined with the Boolean operators OR e AND. It is highlighted that keywords were used in order to expand the search and to achieve a greater number of studies on the subject. Chart 1 shows the controlled and uncontrolled descriptors, as well as the search strategies.

The inclusion criteria used were the primary studies in full and available electronically; English, Portuguese or Spanish language; without time delimitation. Literature review articles, editorials, abstracts, case studies, theoretical reflections, monographs, dissertations and theses were excluded, as well as duplicate articles (only the first identified version was maintained). Studies with other age groups and multiple adherence interventions that could not be analyzed separately were also excluded.

The search and selection of articles were carried out by two independent researchers and, in cases of distinction between eligible articles, they were included. In short, 743 articles were identified, 97 of which were duplicated, resulting in 646 articles for reading titles and abstracts. Then, after reading the titles and abstracts, 79 articles were selected to be analyzed in full in order to select those relevant to the study. Of these, 18 studies met the pre-established inclusion and exclusion criteria, constituting the final sample of the integrative review (Figure 1).

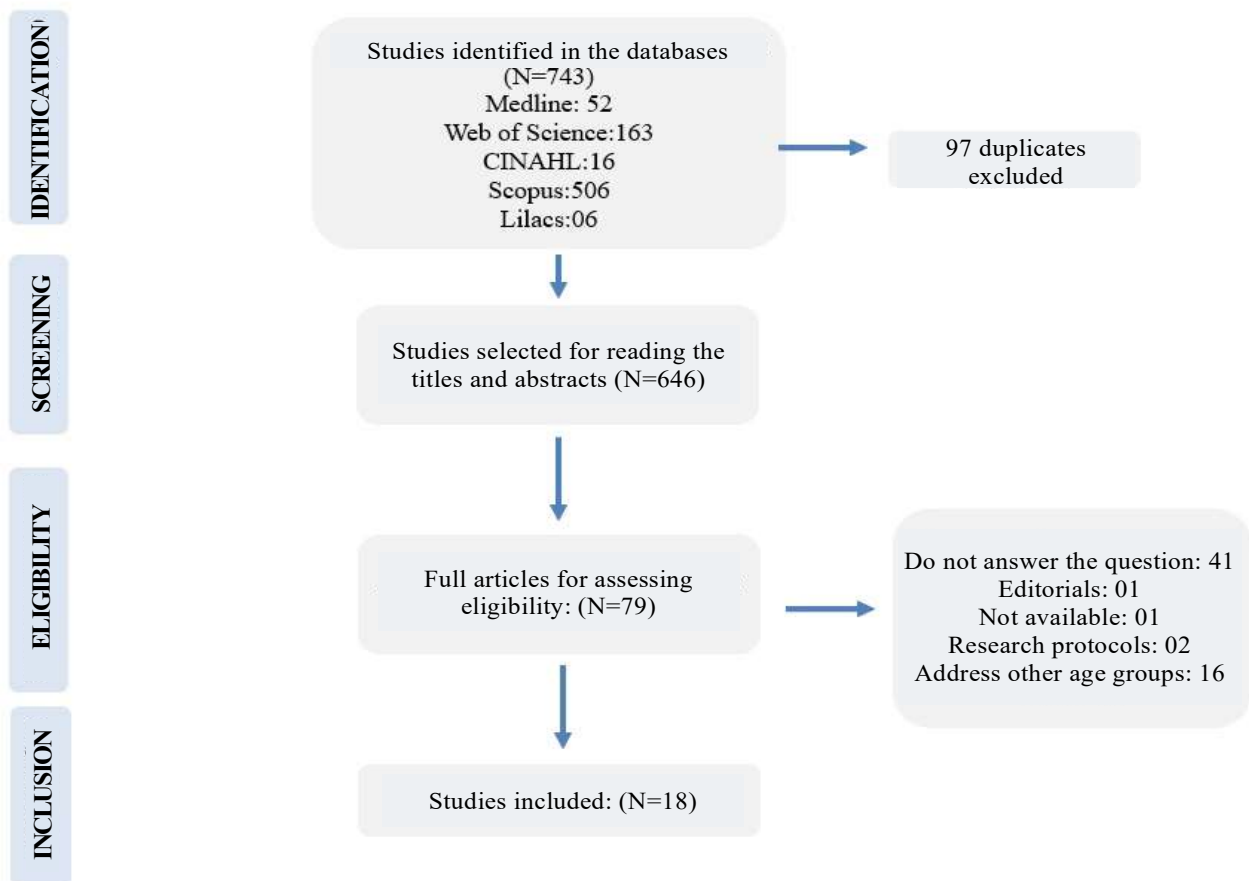


Figure 1 – Flow diagram of the identification, screening, eligibility, and inclusion process for the articles in the integrative review. Teresina, PI, Brazil, 2019

Database	Descriptors
Medline via PubMed	Controlled/MeSH: Adult; Text Messaging; Smartphone; Mobile Applications; Cell Phone; Computers, handheld; Telephone; HIV; Antiretroviral Therapy, Highly Active
	Not controlled: SMS; Mobile Phone; Phone; Device Application
	Search terms
	("adult"[MeSH Terms] AND (((((((("Text Messaging"[MeSH Terms] OR "smartphone"[MeSH Terms]) OR "Mobile Applications"[MeSH Terms]) OR "Cell Phone"[MeSH Terms]) OR "Computers, handheld"[MeSH Terms]) OR "telephone"[MeSH Terms]) OR SMS[Text Word]) OR "Mobile Phone"[Text Word]) OR Phone[Text Word]) OR "Device Application"[Text Word])) AND ("hiv"[MeSH Terms] OR "Antiretroviral Therapy, Highly Active"[MeSH Terms])
Web of Science	Controlled/ MeSH: Adult; Text Messaging; Smartphone; Mobile Applications; Cell Phone; Reminder Systems; HIV; Antiretroviral Therapy, Highly Active
	Not controlled: Mobile Phone; SMS
	Search terms
	TOPIC: (Adult) AND TOPIC: ("Text Messaging") OR TOPIC: (Smartphone) OR TOPIC: ("Mobile Applications") OR TOPIC: ("Cell Phone") OR TOPIC: ("Mobile Phone") OR TOPIC: (SMS) OR TOPIC: ("Reminder Systems") AND TOPIC: (hiv) OR TOPIC: ("Antiretroviral Therapy, Highly Active")
CINAHL	Controlled/Emtree: Adult; Text Messaging; Smartphone; Mobile Applications; Cellular Phone; Human Immunodeficiency Virus; Antiretroviral Therapy, Highly Active
	Not controlled: SMS; Short Message Service; Mobile Phone; Reminder Systems
	Search terms
	(MH "Adult") AND ((MH "Text Messaging") OR (MH "Smartphone") OR (MH "Mobile Applications") OR (MH "Cellular Phone") OR (MH "Reminder Systems") OR "Short Message Service" OR "SMS" OR "Mobile Phone") AND ((MH "Human Immunodeficiency Virus") OR (MH "Antiretroviral Therapy, Highly Active"))
Scopus	Controlled/MeSH: Adult; Text Messaging; Cell Phone; Smartphone; Mobile Applications; HIV; Antiretroviral Therapy Highly Active; Treatment Adherence and Compliance
	Not controlled: Short Message Service
	Search terms
	(TITLE-ABS-KEY (adult)) AND ((TITLE-ABS-KEY ("Text Messaging") OR TITLE-ABS-KEY ("Cell Phone") OR TITLE-ABS-KEY (smartphone) OR TITLE-ABS-KEY ("Mobile Applications") OR TITLE-ABS-KEY ("Short Message Service"))) AND ((TITLE-ABS-KEY (hiv) OR TITLE-ABS-KEY ("Antiretroviral Therapy,Highly Active") OR TITLE-ABS-KEY ("Treatment Adherence and Compliance")))
Lilacs, via the BVS	Controlled/DeCS: Adulto; Mensagem de texto; Smartphone; Aplicativos móveis; Telefone Celular; Telefone Móvel; HIV; Terapia Antirretroviral de Alta Atividade
	Not controlled: Telefone Móvel; SMS; Apps Móveis; Terapia Antirretroviral
	Search terms
	(mh:(Adulto)) AND (mh:(“Mensagem de texto”) OR (mh:(Smartphone)) OR (mh:(“Aplicativos Móveis”)) OR (mh:(“Telefone Celular”)) OR (tw:(“Telefone Móvel”)) OR (tw:(SMS)) OR (tw:(Apps Móveis)) AND (mh:(hiv)) OR (tw:(“Terapia Antirretroviral”)) OR (mh:(“Terapia Antirretroviral de Alta Atividade”))

Chart 1 – Search strategies according to bibliographic databases. Teresina, Piauí, Brazil, 2019.
Source: Research data, 2019.

For data extraction, an instrument was built by the authors themselves containing the following: names of the authors; study title; objective; periodical; year of publication; main results; instrument for assessing adherence of the study; study design; level of evidence.

Regarding the classification of the level of evidence of the selected articles, the following proposal was used: level I - evidence from systematic review or meta-analysis of all relevant randomized controlled clinical trials or from clinical guidelines based on systematic reviews of randomized controlled clinical trials; level II - evidence of at least one well-designed randomized controlled clinical trial; level III - evidence from well-designed clinical trials without randomization; level IV - evidence from well-designed cohort and case-control studies; non-randomized clinical trial, case-control or cohort; level V - evidence from systematic review of descriptive and qualitative studies; level VI - evidence from a single descriptive or qualitative study; level VII - evidence from opinion by authorities and/or report by expert committees⁽¹⁴⁾.

Finally, data analysis and synthesis were performed in a descriptive manner. A synthesis chart was prepared containing the following: title and author, main objective, adherence assessment instrument and main results.

■ RESULTS

Of the 18 articles analyzed, 5 (27.8%) were indexed in the Medline database via PubMed, 6 (33.3%) in Web of Science, and 7 (38.9%) in Scopus. There were no studies selected in the Lilacs database via the BVS and CINAHL.

Regarding the country of origin of the studies, 4 (22.2%) were from the United States of America, and 2 (11.1%) from China, Kenya and Cameroon, respectively. In their turn, Brazil, Mozambique, Australia, Botswana, Uganda, South Africa, Nigeria, and Malaysia contributed only 1 (5.5%) each. A greater concentration was found in the African continent, representing 50% of the production of studies included in this review.

The articles were published from 2010 to 2018. There is an increase in the production of text messages in antiretroviral therapy in adults, especially in the years 2016 and 2017, each with four studies. All the studies were published in the English language and in international journals. There were 3 (16.7%) publications in the Journal of Acquired Immune Deficiency Syndromes and 2 (11.1%) in the PLoS One, Patient Prefer Adherence, and AIDS, respectively.

Regarding the level of evidence, there was a predominance of 14 (77.8%) studies with level of evidence II, 3 (16.7%) with level IV, and 1 (5.5%) with level VI. Chart 2 displays the synthesis of the studies according to title,

author, objective, adherence assessment instrument and main results.

■ DISCUSSION

The results of this integrative review showed that the use of mobile technology through text messaging applications is recent, since the oldest article is from the year 2010; at the same time, the presence of studies such as randomized clinical trial and growing interest of the researchers on the subject is observed, especially in African countries, possibly due to the high prevalence of the disease in these regions.

A number of studies have shown the feasibility of using text messages to promote antiretroviral therapy, especially due to their ease of use, acceptance and satisfaction of the participants^(20,26,28). In this perspective, a study with 37 participants using ART to measure the ease of using a text message program showed relatively high satisfaction in the use of the intervention and a significant association with age. However, the older participants reported greater difficulty in using the intervention⁽²⁶⁾.

It is highlighted that participants in three intervention studies reported at the end of the study that they would like to continue receiving text messages in support of ART adherence, that is, that the text messaging program persists^(16,27-28).

Regarding the periodicity of sending messages, it occurred in a heterogeneous manner between studies, varying from one to seven times in the week^(17,22). The number of messages to be sent is an important variable, since it can interfere with the effectiveness of the intervention. In this perspective, a Brazilian study highlights that sending daily text messages can lead participants to trivialize messages⁽¹⁹⁾. In turn, it was observed that repeated messages can make the participants lose interest in the intervention⁽²⁶⁾.

It is important to highlight that the content of the text messages employed by the scholars covered everything from reminders of medication doses to motivational messages and relevant information about HIV/AIDS. This diversification of content may have influenced the results of the studies, since more solid content may be linked to better outcomes.

A randomized clinical trial incorporated not only reminders and treatment information into the content of text messages, but also diverse topics such as news, sports, weather information, mood, Bible verses, and the participants could choose which category they would like to receive, in addition to be able to change the theme during the study. In addition, they implemented a medication administration confirmation tool and, if there were no responses, the devices would emit audible alarms every 15 minutes until the individual confirmed the use of the medication⁽²³⁾.

Main author Year	Title	Objective	Adherence assessment tool	Main results
Maduka O ⁽¹⁵⁾ 2013	Adherence counseling and reminder text messages improve uptake of antiretroviral therapy in a tertiary hospital in Nigeria.	To demonstrate the effect of adherence counseling and text message reminders to improve adherence to ART.	Self-report and CD4+ cell count.	Increased adherence (statistically significant) and increased number of CD4+ cells.
Lester RT ⁽¹⁶⁾ 2010	Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): a randomised trial.	To assess whether cell phone communication between health care professionals and patients initiating antiretroviral therapy in Kenya improves drug adherence and suppression of viral load.	HIV self-report and viral load.	Increased adherence (statistically significant) and a greater number of suppressed viral loads.
Georgette N ⁽¹⁷⁾ 2017	Impact of a clinical program using weekly Short Message Service (SMS) on antiretroviral therapy adherence support in South Africa: a retrospective cohort study.	To evaluate a weekly SMS reminder clinical program at an HIV clinic to determine prescription coverage.	Prescription coverage.	Greater prescription coverage (statistically significant) .
Abdulrahman SA ⁽¹⁸⁾ 2017	Mobile phone reminders and peer counseling improve adherence and treatment outcomes of patients on ART in Malaysia: A randomized clinical trial.	To determine the effectiveness of cell phone reminders and peer counseling to improve adherence and treatment outcomes among HIV positive patients on ART in Malaysia.	Modified membership questionnaires from the Adult Clinical Trial Group (ACTG).	The mean adherence was higher in the intervention group (statistically significant). Other benefits observed: lower frequency of missed appointments, lower viral load and increased CD4+ cell count (all statistically significant).

Chart 2 - Synthesis of the studies according to title, author, main objective, instrument for assessing adherence and main results. Teresina, Piauí, Brazil, 2019

Source: Research data, 2019.

Main author Year	Title	Objective	Adherence assessment tool	Main results
Da Costa TM ⁽¹⁹⁾ 2012	Results of a randomized controlled trial to assess the effects of a mobile SMS-based intervention on treatment adherence in HIV/AIDS-infected Brazilian women and impressions and satisfaction with respect to incoming messages.	To assess whether an alert system based on mobile SMS messages increases the adherence of HIV-infected Brazilian women.	Self-report, pill count, microelectronic monitors (MEMS) and interview.	It was observed that all the participants in the intervention group remained in compliance.
Mao LM ⁽²⁰⁾ 2018	Beyond mere pill taking: SMS reminders for HIV treatment adherence delivered to mobile phones of clients in a community support network in Australia.	To evaluate the usefulness of ART adherence reminders offered by SMS messages in real life.	Not described.	Although without statistically significant differences, there was an improvement in the participants' adherence.
Reid M ⁽²¹⁾ 2017	Evaluation of the effect of cellular SMS reminders on consistency of antiretroviral therapy pharmacy pickups in HIV-infected adults in Botswana: a randomized controlled trial.	To assess the effect of SMS reminders on receiving ARVs for HIV patients undergoing treatment.	Number of visits to the pharmacy, HIV viral load, CD4 counts and number of consultations.	Better adherence rates in the intervention group. There were no significant changes in CD4 counts and viral loads.
Pop-Eleches C ⁽²²⁾ 2011	Mobile phone technologies improve adherence to antiretroviral treatment in a resource-limited setting: a randomized controlled trial of text message reminders.	To test the effectiveness of the Short Message Service (SMS) reminders about adherence to ART among patients seen at a rural clinic in Kenya.	Monitoring system for medication events.	Increased adherence rate (statistically significant). Other benefits: the participants were significantly less likely to interrupt treatment for more than 48 hours.
Hardy H ⁽²³⁾ 2011	Randomized controlled trial of a personalized cellular phone reminder system to enhance adherence to antiretroviral therapy.	To compare the effectiveness of a cell phone reminder system in increasing adherence to ART versus a whistle.	Self-report, pill count and MEMS.	The adherence increased and remained significantly higher in the discussion group using multiple measures of adherence.

Chart 2 - Cont.

Main author Year	Title	Objective	Adherence assessment tool	Main results
Mbuagbaw L ⁽²⁴⁾ 2012	The Cameroon Mobile Phone SMS (CAMPS) Trial: A Randomized Trial of Text Messaging versus Usual Care for Adherence to Antiretroviral Therapy.	To investigate the use of motivational SMS as a way to improve adherence to ART.	Visual Analog Scale (VAS), number of missed doses and pharmacy refill data.	No significant increase was found on the adherence to ART among the participants.
Ware NC ⁽²⁵⁾ 2016	The Meanings in the messages: how SMS reminders and real-time adherence monitoring improve antiretroviral therapy adherence in rural Uganda.	To investigate the effects of various types of SMS reminders combined with real-time adherence monitoring on adherence to ART.	Not described.	There was an effect on the mood and motivation of the participants.
Cook PF ⁽²⁶⁾ 2015	A counselor in your pocket: feasibility of mobile health tailored messages to support HIV medication adherence.	To test the viability of messages as a way to improve adherence to ART.	MEMS and electronic devices that record the actual bottle openings in real time.	Acceptance was high based on 76% enrollment and 85% satisfaction. Adherence improved from 10% to 15%.
Nsagha DS ⁽²⁷⁾ 2016	A randomized controlled trial on the usefulness of mobile text phone messages to improve the quality of care of HIV and AIDS patients in Cameroon.	To assess the effectiveness of SMS in the adherence of people living with HIV and AIDS to its treatment and care in Cameroon.	Not described.	Adherence to ART was statistically significantly higher in the intervention group.
Ruan Y ⁽²⁸⁾ 2017	Acceptability and efficacy of interactive short message service intervention in improving HIV medication adherence in Chinese antiretroviral treatment-naïve individuals.	To examine the acceptability and effectiveness of SMS in adhering to ART.	Knowledge about HIV and drugs, self-report, VAS, community AIDS Clinical Research programs and CD4 count.	It was verified that the participants significantly improved knowledge about HIV and medications. The intervention group had better adherence rates (statistically significant). There was no effect on CD4 cell count.

Chart 2 - Cont.

Main author Year	Title	Objective	Adherence assessment tool	Main results
Sabin LL ⁽²⁹⁾ 2015	Improving Adherence to Antiretroviral Therapy with Triggered Real-time Text Message Reminders: The China Adherence Through Technology Study.	To assess the effect of triggered cell phone reminders and advice on adherence to ART.	Electronic monitoring in real time.	Greater adherence was observed in the intervention group, corresponding to 87.3% vs. 51.8% of the control group.
Kalichman SC ⁽³⁰⁾ 2016	Randomized Factorial Trial of Phone-Delivered Support Counseling and Daily Text Message Reminders for HIV Treatment Adherence.	To test the independent and interactive effects of SMS medication counseling and reminders on adherence to ART.	Monthly pill counts and HIV viral load.	There were verified significant improvements in obtaining 90% of adherence to ART in relation to the control group in the first 6 monitoring months.
Joseph Davey D ⁽³¹⁾ 2016	SMSaúde: Evaluating mobile phone text reminders to improve retention in HIV care for patients on antiretroviral therapy in Mozambique.	To assess whether regular cell phone text reminders improve retention of patients on ART.	Not described.	The text messages improve retention in attention to HIV in urban patients.
Lewis MA ⁽³²⁾ 2013	Tailored text messaging intervention for HIV adherence: A proof-of-concept study.	To determine the acceptability and effect of medication messages on ART adherence.	Self-report, CD4 count and viral load.	Significant increase in adherence among participants who started the study as non-adherents. There was still a significant decrease in viral load and increase in CD4+ cells.

Chart 2 - Cont.

Source: Research data, 2019.

Some studies chose not to use the words HIV/AIDS in order to protect the participants, which pleased them, as privacy and confidentiality are important factors for adhering to the text message program^(19,22,29,31). A study carried out in Australia showed that the participants had little concern about violation of privacy because they considered the messages non-invasive, which resulted in good acceptance from the participants⁽²⁰⁾.

Regarding ART adherence rates through the intervention of using text messages, there was an increase in adherence rates after the intervention in eleven studies (61.1%), showing a positive statistical association^(15–18,22,24,27–29,31–32). A study carried out in Malaysia verified a significant increase in the mean adherence to ART after six months of follow-up, where adherence increased from 80.1% to 95.7% in the intervention group with text messages compared with 85.1% to 87.5% in the control group⁽¹⁸⁾.

In line with these findings, another study conducted with 431 individuals who had started ART less than three months ago, showed an increase in the percentage of participants who reached 90% adherence by approximately 13 to 16% compared to the group that did not get the intervention⁽²²⁾. A Randomized Clinical Trial conducted in Kenya signaled in its findings that a greater number of patients in the intervention group that got the Short Message Service (SMS) had self-reported adherence of more than 95%, as well as showing better clinical outcomes, in the case of reduced viral loads below the detection level (<400 copies per mL) at 12 months in the intervention group⁽¹⁶⁾.

Text messages can contribute to improving knowledge about the ARVs, such as the dose, according to an experimental study carried out in Nigeria. This same study had as a significant result the attainment of 76.9% adherence to therapy among those who were in the intervention group, in contrast to only 55.8% in the control group. In addition, there was an increase in CD4+ cell count after the intervention, representing an increase to 578.0 cells/ml compared to 361.5 cells/ml recorded in the control group⁽¹⁵⁾.

In South Africa, the patients in the intervention group using SMS had a higher chance of daily coverage during the SMS program compared to those in the control group⁽¹⁷⁾. These findings are consistent with a study carried out in Cameroon which, in the sensitivity analysis, identified that more participants in the intervention group attained more than 90% adherence at six months⁽²⁴⁾. Another study in Cameroon also identified greater adherence to antiretroviral therapy in the group that received SMS compared to standard treatment⁽²⁷⁾.

Heterogeneity in relation to the ideal adherence rate to ART stands out among the studies, as some considered an

ideal adherence rate when it is higher than 85%, others 90% and 95%, which may have affected the interpretations of the study findings. To measure adherence to ART, the participants' self-report, CD4+ count and viral load in the pre- and post-intervention were predominant. The following formula is used to calculate self-reported adherence: number of doses taken/number of prescribed doses × 100%⁽¹⁵⁾.

Other techniques have also been observed to identify the adherence rate, such as prescription coverage, specialized follow-up questionnaires, pill counts, MEMS, visual analog scale, number of pharmacy visits, number of missed doses, and visits to the physician during the study period^(17–19,21,24).

It is highlighted that some studies have shown no statistical association after using text messages to promote adherence to ART^(19–21,24–25). However, they described in their findings that this intervention can be recommended, since they are an information tool and can assist users in taking the medication, in addition to showing an apparent increase in the adherence levels. A Brazilian study conducted in São Paulo concluded that SMS messages can contribute to adherence to ART for a period of at least four months. In addition, text messages were seen as a way of motivating participants to achieve adherence⁽¹⁹⁾.

In that sense, the text messages sent can turn good adherence into a habit. Sending regular and frequent text messages at the beginning of the treatment has the potential to help the participants get used to taking pills at the recommended daily times⁽²⁵⁾. Findings from a study carried out in Botswana verified, although without statistical association, that 85% of the participants who received SMS reminders demonstrated 100% uptake in pharmacies for the six-month period, compared with 70% of collection in ART timely manner in the control group⁽²¹⁾.

In contrast to the aforementioned results, some studies have shown no efficacy, or other benefits, in relation to the use of text messages in increasing adherence to ART. A study carried out in Atlanta in the United States of America in 2016, with 600 participants and lasting 12 months, did not identify any additional benefit of daily text message reminders and observed a statistical association in relation to the receipt of text messages and impairment in self-efficacy of adherence, possibly due to the fact that participants get used to daily adherence reminders⁽³⁰⁾.

In synthesis, it can be observed that the vast majority of studies reported benefits from using text messages to support ART; however, the instruments for assessing adherence to the therapy varied between the studies, including from self-reporting to more complex technologies for monitoring the correct use of the ARVs. In this perspective, this integrative review shows as limitations aspects related

to the heterogeneity of the study methods, which makes it difficult to replicate the intervention.

■ CONCLUSION

The diverse evidence found signals the effectiveness of using text messages to improve adherence to antiretroviral therapy in adults, considering the increase in the adherence rates after the intervention. It was also verified that the use of this technology is linked to satisfactory results, which can contribute to coping with the HIV/AIDS epidemic through messages containing relevant information about the infection, in addition to motivational messages and, above all, reminders and aspects related to ARV doses.

As a contribution of this study to the area of Nursing and Health, the synthesis of evidence on the use of text messages via mobile phone stands out in support of promoting adherence to antiretroviral therapy in adults. In this sense, text messages are an important tool for health education, which is why we aim to arouse the interest of the health team, especially nurses, in the use of mobile technology to improve adherence to antiretroviral therapy, which enables even greater approximation between professional-user.

Finally, the development is suggested of new studies to more precisely determine the frequency of sending text messages, content and methods for assessing adherence.

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Received: 07.08.2019
Approved: 04.28.2020

Associate editor:

Graziella Badin Aliti

Editor-in-chief:

Maria da Graça Oliveira Crossetti