MEMOTEXT Literature Review

Amos Adler, MSc, Mareena Mallory, BCMPH
May 1st, 2018
# Table of Contents

**MEMOTEXT LITERATURE REVIEW** .................................................................................................................. 1

**PURPOSE:** .................................................................................................................................................. 3

**INTRODUCTION:** ........................................................................................................................................ 3

**METHODOLOGY OF REVIEW** ................................................................................................................... 4

**FINDINGS OF THE REVIEW** ...................................................................................................................... 4

1. **0.0 Education Programs** ......................................................................................................................... 4

2. **0.0 Adherence Programs** ........................................................................................................................ 4

3. **0.0 Support Programs** ........................................................................................................................... 10

4. **0.0 SMS Aggregation** ............................................................................................................................. 11

5. **0.0 Research** .......................................................................................................................................... 11

6. **0.0 Mobile Application Intervention** ..................................................................................................... 13

6. **0.0 Quality Improvement Initiatives** ..................................................................................................... 15

**CONCLUSION** ............................................................................................................................................ 16

**REFERENCES** ............................................................................................................................................. 16
Purpose:

The purpose of this document is to provide a literature review of projects and research that have utilized MEMOTEXT Corp’s technology or development methodology since 2011.

Introduction

MEMOTEXT is a data-driven, evidence-based, personalized digital engagement engine that empowers patients to achieve their healthcare goals while improving the bottom line for healthcare stakeholders. Commercialized in 2011, MEMOTEXT began as an SMS medication reminder service but has since grown into a complex content personalization engine. Using a proprietary development methodology, MEMOTEXT designs digital evidence-based patient engagement interventions to change or maintain a target health behavior. MEMOTEXT’s approach is that everyone is different and an individual’s needs change over time. Every condition, population, and patient have a different journey that requires a nuanced set of content and interventions to effectively engage.

Segmentation is a large part of the MEMOTEXT methodology. Users and content are often segmented, or categorized, into different user groups or personas that share certain characteristics. This allows organization and targeting of messages, content, and interventions to produce more personalized results. Segmentation and tailoring is achieved by MEMOTEXT’s ability to consume objective and subjective sources of health data (Figure 1).

The MEMOTEXT vision as has evolved to use machine learning algorithms (http://mtxt.io/) to find value within the increasing availability and connectedness of health data from multiple sources, using insights to improve both patient outcomes and the bottom line.

![Figure 1. MEMOTEXT Sentinel](image-url)
Methodology of Review

The documents chosen for this literature review focus on research and programs completed by or with MEMOTEXT. For this search, posters, documents, presentations, and publications were reviewed both internally and externally by various commercial and academic entities.

Findings of the Review

1.0 Education Programs

One program was identified as being solely an educational program. This program was in collaboration with the Canadian Pulmonary Fibrosis Foundation.

Canadian Pulmonary Fibrosis Foundation: Inspiration Patient Assistance Program

The educational program titled “Inspiration Patient Assistance Program” was a 2014 partnership with the Canadian Pulmonary Fibrosis Foundation. This initiative was an educational program for patients undergoing Esbriet (pirfenidone) treatment for idiopathic pulmonary fibrosis (IPF). Eligible participants were newly or previously diagnosed with IPF and prescribed Esbriet for treatment. Enrollment was open to anyone on the medication, however, the disease is typically found in males over the age of 50. In this program, participants were given the choice of receiving up to three messages per day. Message content varied from education, motivation, and healthy lifestyle and was offered via IVR, SMS and Email in both English and French.

Outcomes: The outcomes of this program are confidential.


2.0 Adherence Programs

Adherence programs involving education, support, and reminder components were divided into those that were adaptive and those that were static. Adaptive programs used segmentation based on survey responses to deliver customized and personalized content to users. Programs that were static delivered a pre-set array of content to all of its users.

2.1 Adaptive Adherence Programs

Through literature review, eight adaptive adherence programs were identified leveraging partnerships with Johns Hopkins University, Boots UK, Allergan, Massachusetts General Hospital, Green Shield Canada, Genentech, Accountable Health Solutions, and PerformRX.
**Johns Hopkins University (JHU): ADRS**

In collaboration with Johns Hopkins University, a medication reminder program was created in 2014 for post-operative glaucoma patients in the JHU Hospital system. The program was titled “Impact of Automated Dosing Reminders on Medication Adherence Using Microsoft HealthVault” (ADRS). Recruitment and enrollment were led by the clinicians, and enrollment was completed online. For this intervention, participants received two segmented reminder messages per day via SMS or IVR (Boland et al., 2014).

*Outcomes:* From this intervention, a 31% increase was seen in adherence to post-op glaucoma therapy versus a match control group. Results are published in JAMA Ophthalmology (Boland et al., 2014).

*Link:* https://jamanetwork.com/journals/jamaophthalmology/fullarticle/1871612

**Boots UK: Medication Reminder Program**

A medication reminder program with an education component was created in 2012 with Boots drugstores in the United Kingdom for patients with Diabetes. Recruitment was led by Boots UK pharmacists who would complete a paper form at the pharmacy. This form was sent to call centre (MessagePad) who then filled out an online application. Participants could choose their own frequency of messages to be either daily, weekly or bi-weekly. Messages included reminders, education, and motivational material related to medication, disease, lifestyle, or diet. This program was offered via SMS or IVR. The program segmented patients and content based on health attitudes, beliefs, and subsequent self-management and adherence behaviours. Re-segmentation occurred after six months to improve content targeting. Greatest improvements in medication adherence were seen in those with the lowest adherence at program start.

*Outcomes:* Results showed that 80-85% of patients demonstrated improved knowledge of diabetes management, 83% showed improved knowledge of diabetes medication, and a decrease from 50% to 25% of clients that missed a dose one or more times a week was seen. Additionally, patients filled their prescriptions for Metformin an average of 2.3 days earlier than historical results.

**Allergan: Treatment Support Program**

A Treatment Support Program with Allergan was created for Chronic Dry Eye Disease patients prescribed Restasis in 2016. Allergan led the recruitment process by administering brochures to doctors prescribing the target medication. Doctors then provided their patients with the brochure and a copay for enrollment card. Patients could enroll via text2enroll or through an external web portal created by MEMOTEXT. This medication reminder and education program recorded self-reported adherence in participants who received two messages per day either via IVR, SMS, or Email. The first message was education or refill focused while the second message was a medication reminder automatically scheduled 12 hours after the first message to accommodate medication requirements. Content delivered was segmented based on participant responses to survey questions. The pilot was initially limited to residents of Ontario but was later expanded to all of Canada.
**Outcomes:** Outcomes of this intervention include a significant reduction in the typical adherence drop off rate after the first 6 months. Specific KPIs are confidential.

**Massachusetts General Hospital (MGH): SOFIA**

In collaboration with MGH, a reminder program with educational and supportive components was created in 2017 called SOFIA. SOFIA, short for Simple Online Family Intervention for ADHD, is designed for the parents of children ages 6-12 who are prescribed stimulant medication to treat ADHD. Parents were recruited through a Patient Gateway portal to perform prescription searches for a list of newly prescribed ADHD medications. MGH administrators contacted patient families and invited them to participate. Accepting the invitation was followed by enrolment through a web portal designed by MEMOTEXT. Participants received a set number of messages per week and educational content was segmented and delivered to participants based on their responses to trigger questions asked periodically. Reminders for prescription renewals were sent based on the 30-day medication cycle and were based on a refill validation process. Content included reminders, tips, facts, and 2-way (responsive) SMS messages in the form of myth debunking questions.

**Outcomes:** Preliminary findings showed >50% improvement in adherence using this technology compared to a control. This program is currently in development and formal validation is currently underway in multiple clinical settings.


**Green Shield Canada (GSC): Stick2it**

GSC partnered with MEMOTEXT in 2014 for the Stick2It intervention. This intervention was targeted at adult members who have new or 6-month historical claims for specific Cholesterol and Hypertension medications. Recruitment was led by GSC and involved two recruitment campaigns. First, members were mailed postcards and second, enrollment was completed via IVR and a web portal. This intervention was an adaptive education support program which involved self-reported adherence and participants receiving up to three messages per day based on personal preference. The message content included reminders, education, motivation and healthy lifestyle which includes heart-healthy recipes. Content delivered in both English and French was segmented at intake and subsequent weekly intervals based on participant survey responses through IVR, SMS and Email.

**Outcomes:** The Stick2It program had a retention rate of 91.1% (n=434) of participants and over a period of ten months. The program increased persistence by 37.3% based on claims data compared to a control group. A decreased medication dropout rate also proved significant.

Genentech: MyCFCoach

Genentech partnered with MEMOTEXT to create MyCFCoach in 2015 for adults with Cystic Fibrosis and who were prescribed Pulmozyme as a supplement to their existing therapies. Genentech led the recruitment by providing clients with resources and advertising on social media. Enrollment for this reminder program was completed through a web portal. Participants self-reported adherence and received two messages per day. Messages included reminders, education, support, motivation and healthy lifestyle content which was segmented based on participant responses to survey questions. The content was delivered via SMS and email.

Outcomes: This intervention showed a high degree of patient satisfaction with the support program and above 90% retention rates.

Accountable Health Solutions (AHS): Blood Glucose Monitor (BGM) Adherence

In partnership with AHS, MEMOTEXT initiated a pilot program to in 2014 to assess and address patient adherence to prescribed BGM regimens in members with Type II Diabetes. Eligible participants were members who have claims for Diabetes testing supplies who are over the age of 18. AHS led recruitment by reaching out to eligible members via direct mail and enrollment was completed via a web portal. This reminder program included self-reported adherence and participants received up to 3 messages per day based on their own preferences. Message content included reminders, education, motivation, and healthy lifestyle. In addition, participants received a weekly mood meter. Content delivered via SMS and email was segmented based on participant responses to survey questions focused on diabetes health literacy, improving lifestyle, and increasing motivation.

PerformRX: HealthNHand

Developed by PerformRx, in conjunction with MEMOTEXT, a digital health intervention called HealthNHand launched in 2014 as an asthma medication adherence program (Figure 2). For this intervention, eligible participants were identified based on previous claims filled for a controller medication in the 6 months prior to the launch with no prior claims for medications used to treat COPD only. Recruiting was completed by direct outreach via phone or mail and participants self-enrolled through a web portal or by calling into the PerformRx call centre. The intervention itself was a tailored medication reminder, education, and support program where participants self-reported adherence. Participants received up to four messages per day based on their controller medication requirements. Messages included reminders, education, live air quality index forecasts from airnow.gov, asthma triggers, motivation and support for a healthy lifestyle. Refill calls were determined based on the date their last claim was filled. The content was delivered via IVR, SMS, and email and segmented based on participant survey responses.

Outcomes: Results of this intervention showed a conversion of 40% of non-adherers (participants that take their medications less than half the time) into moderate or optimal adherers. Results were
presented by poster at Stanford Medicine X Conference in Palo Alto California and by presentation at the 2015 Vendor Education Series for the Association for Community Affiliated Plans.

**Link:** https://www.youtube.com/watch?v=tMZ9ZOeV_hc

---

**Using Personalized Digital Health Behavior Change to Manage Asthma**

**BILL SImpson Ph.D.,^1^ Amos Adler M.Sc^1^ and Sheena Cherali PharmD^1^**

(1) MEMOTEXT, Toronto, Canada. (2) PerformRX Philadelphia, PA.

---

**2.2 Static Adherence Programs**

The literature review found six static adherence programs that are partnered with Nova Southeastern University, McKesson Canada, Sanofi Genzyme, Leo Pharmaceuticals, Arizona University, and Biogen.

**Nova Southeastern University (NSU): ReMIND**

In partnership with Dr. Kevin Clauson at NSU, a Diabetes Medication Reminder Program called ReMIND was established in 2012. ReMIND was a parallel group, open-label, randomized, controlled clinical trial study to use SMS messages to improve medication adherence in patients with Type II Diabetes. Recruitment was done by the clinical trial leader and enrollment was completed by the clinician through a web portal created by MEMOTEXT. Participants received one SMS message per day at 9:00 am.

**Links:**

McKesson Canada: INVIVA SMS Appointment Reminder Tool

MEMOTEXT partnered with McKesson Canada in 2017 for an INVIVA SMS Appointment Reminder Tool. This solution was designed to improve the appointment reminder process for patients at INVIVA infusion clinics. As there is a mandate for Patient Care Representatives (PCRs) to provide appointment reminder phone calls within the 4-6 days prior to a scheduled appointment, the objective of this pilot project was to increase the ability of PCRs to send reminders while decreasing the daily call burden on PCRs through appointment reminders and care coordination. Patients of INVIVA were onboarded by PCRs and an e-consent was completed by SMS, IVR, or manually via nurses at the infusion clinics. A web portal was created to manage both users, patients, reminders, and to create reports. For this tool, patients were sent a reminder via their preferred primary communication method 5 days prior to their appointment. If no response was received, a second reminder was sent 3 days prior to their appointment. If there was still no response from the patient, a third reminder was sent via their preferred secondary communication method the day before the appointment. All message content, including emails, SMS messages, and IVR call scripts were created by McKesson.

Outcomes: This project was piloted on 4 clinics and is in the process of being expanded to 66 additional ones.

Sanofi Genzyme: Medication Reminder Program

In partnership with Sanofi Genzyme, a medication reminder and education program was developed in 2010 for adults with lower phosphorus levels as a result of Chronic Kidney Disease. Recruitment was done via online advertising and enrollment was completed by Sanofi Genzyme online or via a faxed form from the patient. In the program, participants received up to one message per day which included content such as recipes that focused on kidney health.

Outcomes: Outcomes of this intervention are confidential.

Leo Pharmaceuticals: Pharma Intervention

A Pharma-based intervention was completed alongside Leo Pharmaceuticals for participants that were newly diagnosed with Actinic Keratosis in 2013. The population was typically over 40 years of age and prescribed Picato as their primary treatment. Recruitment was led by participating HCPs and was integrated with the existing STI/Copay program. Physicians would provide patients with a non-activated card with their prescription to participate in the program each with their own unique identifier. Patients could then complete enrollment and activate their card by inbound IVR or a web portal. In this medication reminder program, messages were scheduled on a predetermined sequence based on rigid dosing and outcomes requirements. Messages included reminders, educational content, and surveys in both English and French via SMS or IVR.

Outcomes: Results of this project were high patient satisfaction with the intervention and a self-reported increase in ease of use of the product.
Arizona University: TEXT2COPE

In a 2013 collaboration with Arizona University, a pilot study titled TEXT2COPE was developed to establish the feasibility, acceptability, and preliminary effects of a mobile technology cognitive behavioural intervention. A study of healthy lifestyle behaviours of parents of overweight and obese preschoolers was delivered in a primary care setting. Recruitment was done by the clinical trial leader and enrollment was completed by the clinician through a web portal designed by MEMOTEXT. This reminder program delivered up to one message a day to participants containing supportive messages. The content was curated by Arizona University and was offered via SMS (Militello, Melnyk, Hekler, Small & Jacobson, 2016).

Outcomes: Self-reported findings indicate that the program is feasible and acceptable in the population. The intervention also showed significant improvements in parental knowledge about nutrition (P=.001), physical activity (P=.012) and in their behaviours towards engaging in healthy lifestyle choices for their children (P=.040) (Militello, Melnyk, Hekler, Small & Jacobson, 2016).

Biogen: AVOTALK

In partnership with Biogen, a free telephone reminder and education services called AVOTALK was created in 2008 for patients with Multiple Sclerosis who take the once-a-week prescription AVONEX. Eligible participants were typically between 18 and 30 years old. Patient recruitment was done via case manager through their call centre and those who opted in received reminders and educational information about self-injections of Avonex. Additionally, support was offered via a live nurse should the patient have any questions or concerns. Each patient was able to personalize the timing of delivery of a medication reminder sent via IVR or SMS and all message content was created in English and French by Biogen.

Outcomes: Outcomes of the intervention show an adherence rate of 100% (n=40) and a retention rate of 96.5%.

Links:

3.0 Support Programs

Broward Regional Health Planning Council (BRHPC): Wellness Support Program

A wellness support program was developed in collaboration with BRHPC. For this program, eligible participants were already enrolled in a wellness program with BRHPC and MEMOTEXT was provided with client contact information. Participants received one SMS message per week focused on living a healthy lifestyle. This program was carried out from April to July of 2017 and concluded successfully.
4.0 SMS Aggregation

**Novartis: Gilenya Program**

For Novartis, MEMOTEXT acts as an SMS aggregator for their Gilenya program targeting multiple sclerosis. For this program, Novartis created the message content and MEMOTEXT handled the SMS communication. Novartis led the recruitment process and completed the enrollment. This program is offered in English and French and is currently ongoing.

5.0 Research

Five MEMOTEXT research projects were found in collaborations with the University of British Columbia (UBC), Vanderbilt University, NSU, FHI360, and St. Michaels Hospital.

**University of British Columbia (UBC): SmartMom**

In a 2017 collaboration with UBC, the effects of a program titled SmartMom was studied in pregnant women in the northern health authority in British Columbia. This program took a specific focus on aboriginal women living in rural residences who were at a socio-economic disadvantage. UBC led the recruitment process for this program and it was promoted through websites, posters, and takeaway marketing material such as magnets. Enrollment for this program was completed by the participant through a web portal or through TEXT2Enroll. For this study, participants received three weekly messages scheduled based on their gestational week. Content included educational and supportive material with links to helpful website resources. In addition, there were six optional supplementary streams with additional educational content that a participant could choose to sign up for. Supplemental messages were delivered five minutes after their regular scheduled messages. The content for this project was created by the UBC and delivered by web portal or SMS. For participants who do not have access to a phone, they are able to view the messages from any computer (Munro et. al,. 2017).

*Outcomes:* Participants perceived SmartMom to be highly acceptable and relevant while text message modality reflected how participants currently sought pregnancy-related information specific to them. This is an ongoing study with discussions for expansion to different health authorities and provinces underway. (Munro et. al,. 2017).


**Nova Southeastern University (NSU): Smoking Cessation Program**

A research study was completed in 2017 with NSU involving adults wishing to receive support to help them quit smoking. Recruitment and enrollment were done onsite by clinicians through a web portal designed by MEMOTEXT. Throughout this program, participants received one SMS message in a predetermined sequence. Messages were focused on goals and motivation to assist with smoking cessation and the content and schedule were provided by NSU (Bronsburg, 2017).
Outcomes: Results of this study were published in the Online Journal of Applied Knowledge Management in 2016 and suggest that motivational intervening focused text messages may have had a positive impact on tobacco quit rates when coupled with evidence-based tobacco cessation programs (Bronsburg, 2017).

St. Michael’s hospital: Flu Shot in Pregnancy

Alongside St. Michaels Hospital a randomized controlled trial was completed in 2017 to evaluate if text message reminders increase the likelihood of receiving the flu shot among pregnant women Eligible participants included pregnant women who saw their OB/Gyn for a prenatal visit during flu season with no restriction on age. Recruitment occurred onsite at the hospital by a clinician via a web portal created by MEMOTE TEXT. During this educational program, participants received one message in a predetermined sequence containing information about pregnancy and flu shot safety. The content and schedule were provided by the St. Michael’s Hospital (Yudin et al., 2017).

Outcomes: Weekly text messages reinforcing the recommendation for and safety of the influenza vaccine in pregnancy did not increase the likelihood of actually receiving the vaccine among pregnant women (Yudin et al., 2017).

Vanderbilt University: REACH

A 2016 study titled REACH was created in partnership with Vanderbilt University. This study targeted individuals with Type II Diabetes on various therapies including oral medications, injectable medications, and insulin. Participants must have been adults who have demonstrated difficult maintaining adherence to prescribed treatments. Recruitment was driven by the REACH research team and the clinical trial leaders. Enrollment was completed by the clinician using their RedCap portal during face-to-face interviews with the participant. The RedCap Portal was integrated with MEMOTE TEXT for easy data exchange. For this study, participants received up to five SMS messages per day including educational material, self-reported adherence, self-reported healthy lifestyle, and feedback based on responses. Message content included reminders, education, support, behavioural skills, and goals. Messages were both one-way and two-way communications and content was segmented based on questionnaire responses. An additional message was sent to notify participants when their A1c lab results were ready for them to view on a HIPAA-compliant hosted web page (Nelson et al., 2016).

Outcomes: Overall, participants were satisfied with REACH and provided favourable ratings for each of its elements and demonstrated a 96% response rate to assessment test messages (Nelson et al., 2016).

Link: https://news.vanderbilt.edu/2016/11/10/study-tracks-diabetes-management-via-text-messaging/
FHI360: HIV Strategy

FHI360 teamed up with MEMOTEXT in 2015 to develop and assess the efficacy of an integrated and scalable strategy to identify, recruit, link to care, retain in care, and maintain viral suppression among HIV-infected men who have sex with men (MSM). Eligible participants were adult patients on antiretroviral drugs or combination therapies. Recruitment was restricted to participants in the study and enrollment was completed by case managers through a MEMOTEXT-designed web portal. Participants in this study received up to three medication reminders, one motivational message, and an unlimited amount of refill or appointment reminders per day. These reminders were set by IVR, SMS or email based on participant preference. Participants had the functionality to reach out to the Case Manager directly from the message in any of the three communication methods offered.

Outcomes: This study is ongoing and there are no outcomes to report.

6.0 Mobile Application Intervention

CAMH: A4i

MEMOTEXT is currently in the beta testing phase of one mobile application intervention. The App for Independence (A4i) is an award-winning mobile health intervention for people with schizophrenia created in collaboration with The Centre for Addiction and Mental Health (CAMH) in 2016 (Figure 3). The target population is adults living in Toronto who have a Schizophrenia spectrum diagnosis and who own or regularly use a smartphone. Participants are being recruited through CAMH and the research assistant walks them through installing the app on their phone and enrolling in the program via a web portal designed by MEMOTEXT. For the beta version of this application, participants receive one daily check-in message, one educational message, and as many reminder messages as they choose. The educational messages include topics such as social activation, living with schizophrenia, stress, anxiety, and motivation. The application consists of three sections a feed, toolkit, and reminders page. The feed page is regularly updated with supportive and peer-generated content that participants can browse and contribute to. The toolkit contains pre-populated resource links to videos and websites as well as a sound checker with an oscillator to determine whether or not the participant is hearing voices. The reminders page is where medication, activity, or appointment reminders can be set and edited.

Outcomes: Users from two testing cohorts were well retained throughout a three-week testing period. Cohort 1 and 2 had an average class retention rate of 44.3%(SD=18.8) and 46.0% (SD=20.1) respectively. 60% of users shared a post on the feed throughout the testing period and 71% of users liked a post at least once. At the conclusion of the testing period, 79.2% of participants said they would download the app if it was free in the App Store. The initiative is currently in the next phase of testing.

Links:
http://www.memotext.com/camh-memotext/#sthash.eMY4gPPy.dpbs
Figure 3. The A4i Poster presentation
6.0 Quality Improvement Initiatives

MEMOTEXT: Balanced Adherence Metric

While the standard Proportion of Days Covered (PDC) metric quantifies adherence in patients with complex regimens, it may not accurately quantify other important dimensions of adherence. MEMOTEXT set out to combine PDC with Compliance Rate (CR), Delay to Refill, and Medication Persistence into a single, simple to interpret, metric which. The Balanced Adherence Metric (BAM) for claims data was created. This study showed that a mathematical combination of currently available adherence metrics may be more beneficial than either metric alone in objectively assessing adherence. Results were presented via poster (Figure 4) at the 2016 Pharmacy Quality Alliance (PQA) Annual Meeting & Innovation Forum in Arlington, Virginia.


Figure 4. BAM 2016 poster presented at the Pharmacy Quality Alliance Annual Meeting & Innovation Forum in Arlington, Virginia.
Conclusion

MEMOTEXT has been clinically and commercially validated since 2012 with solutions that are proven to improve adherence, provide efficiencies in care coordination, and empower the provider decision support in commercial, clinical, and academic settings. Through the 23 education, reminder, support, aggregation, application, and research interventions identified in this review, they have demonstrated expert abilities as a behaviour change engine that collects health data to personalize adherence solutions. Their highly-customizable and evidence-based approach positions them to tackle the many challenges facing healthcare systems today.

References


Bronsburg, S.E. (2016). Text messaging’s impact on an evidence based medicine tobacco cessation program.


