ORIGINAL RESEARCH

Promoting Access Through Complementary eHealth Technologies: Recommendations for VA's Home Telehealth and Personal Health Record Programs

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BACKGROUND: Many healthcare organizations have embraced eHealth technologies in their efforts to promote patient-centered care, increase access to services, and improve outcomes.

OBJECTIVE: Using the Department of Veterans Affairs (VA) as a case study, this paper presents two specific eHealth technologies, the Care Coordination Home Telehealth (CCHT) Program and the My HealtheVet (MHV) personal health record (PHR) portal with integrated secure messaging, and articulates a vision of how they might be implemented as part of a patient-centric healthcare model and used in a complementary manner to enhance access to care and to support patient-centered care.

METHODS: Based on our experience and ongoing work with both programs, we offer a series of recommendations for pursuing and ultimately achieving this vision.

CONCLUSION: VA's CCHT and MHV programs are examples of an expanding repertoire of eHealth applications available to patients and healthcare teams. VA's new patient-centric healthcare model represents a significant shift in the way that services are delivered and a profound opportunity to incorporate eHealth technologies like the CCHT and MHV programs into clinical practice to increase access to care, and to ensure the responsiveness of such technologies to the preferences and circumstances of patients.

KEY WORDS: eHealth; patient-centered medical home; telehealth; personal health records; veteran.

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INTRODUCTION

eHealth has been described as an emerging, multidisciplinary field focused on the delivery or enhancement of health

information and health services through information and communication technologies (ICTs)¹. Advances in eHealth have simplified the tasks of finding and using health information, led to the creation of tools to help consumers engage and collaborate more fully in the healthcare process^{2,3}, and have supported efforts to connect with consumers, disseminate information, offer new services, improve clinical encounters, and support disease management independent of geographic locations^{4–9}. eHealth also has the potential to enhance access to healthcare services by offering novel channels for communication and information flow that complement existing systems. The capability for patients and providers to exchange secure messages and the automated transmission of patient data from in-home devices exemplify “continuous access” to care as articulated by the Institute of Medicine¹⁰ and help redefine access to care more broadly as “the opportunity and potential ease of having face-to-face and virtual interactions among a care team,” including patients, healthcare providers, informal caregivers, peers, and computer applications^{11,12}. At present, healthcare organizations both within and beyond the United States (U.S.) are moving to design a wide range of eHealth technologies that offer different features and functionalities. Although the meaningful use of these technologies has the potential to improve healthcare processes and outcomes¹³, there are challenges associated with their implementation¹⁴.

In 2010, the U.S. Department of Veterans Affairs (VA) undertook a series of transformational initiatives to “design a veteran-centric healthcare model and infrastructure to help veterans navigate the healthcare delivery system and receive coordinated care”¹⁵. As part of this effort, VA supports the use of technology in conjunction with virtual medicine and is implementing a patient-centered medical home (PCMH) model at all VA primary care locations which is referred to as Patient Aligned Care Teams (PACT)^{16–18}. PACT is managed by primary care providers in collaboration with other clinical and non-clinical VA staff and has tremendous potential to reshape the healthcare experiences of the approximately 8 million veterans currently enrolled in the VA healthcare system; many of whom are described as having a “complex” health status. Complexity may encompass eligibility for care across multiple systems¹⁹,

numerous chronic health conditions²⁰, and residence in rural or highly rural areas²¹ with limited insurance coverage and limited access to healthcare facilities²².

Using VA as a case study, we present two specific eHealth technologies, the Care Coordination Home Telehealth (CCHT) Program and the My HealtheVet (MHV) personal health record (PHR) portal, as vehicles to enhance consumer access to health care and explore how their respective features and functionalities might be used together to provide seamless, patient-centered care. For the full potential of these two technologies to be realized, they must work together synergistically. To that end, we offer a series of recommendations as to how this might be accomplished. Although VA may be somewhat unique from an organizational and policy perspective, the experiences of VA stakeholders with eHealth technologies provides valuable lessons to those in other healthcare systems.

BACKGROUND

VA's Care Coordination Home Telehealth (CCHT) Program

Telehealth involves the use of ICTs to deliver health services in situations where the care recipient is separated by distance from the care provider²³. Supported by the VA Office of Telehealth Services, formerly known as the Office of Care Coordination, the CCHT program provides chronic care management to facilitate veteran access to care in the least restrictive environment possible—the home. As presented in Table 1, videophones and messaging devices, which rely on standard telephone lines, link veterans with care coordinators. Messaging devices in the veteran's home are programmed with a set of questions (called disease management protocols), to which the veteran responds by pressing buttons. The responses prompt the care coordinator to deliver potential interventions and/or education, consult with members of the care team, or telephone the veteran for further assessment or to provide advice. Peripheral devices, such as blood pressure cuffs or blood glucose meters, can also connect to the messaging device for easy data downloading and transmission.

Table 1. Aspects of the Care Coordination Home Telehealth Program

Target Populations
- Patients with one or more chronic care needs
Equipment
- Telephones, personal computers, interactive voice response
- In-home messaging/monitoring devices
- Biometric devices (e.g., blood pressure cuff, glucose meter)
- Videophones, telemonitors
- Digital cameras
Care Management Strategies
- Disease Management Protocols (DMP)—a set of questions that proactively identify symptoms, behaviors and health factors that affect disease management. They also deliver education regarding the disease and its management.
- Routine monitoring of vital status (e.g., weight, blood pressure, blood sugar)

The CCHT program allows for the monitoring of key parameters in large groups of veterans, thus facilitating easier and quicker intervention when needed. Previous studies of veterans with chronic conditions who used CCHT have shown lower mortality²⁴ and healthcare utilization^{25–27}, as well as improved quality of life²⁶ and more timely receipt of care²⁸. Other work has found increased time to readmission among veterans with heart failure²⁹, including a dose-response relationship^{30,31}. Veterans engaged with the program report that it “reassures” them and lets them know that they are “doing the right thing”³².

VA's My HealtheVet (MHV) Personal Health Record (PHR) Portal

Contemporary personal health records (PHRs) have been described as electronic applications “through which individuals can access, manage and share their health information, and that of others for whom they are authorized, in a private, secure, and confidential environment”³³. Designed to address consumer health information needs, PHRs consist of information supplied, organized, and owned by consumers, and may also include content provided by healthcare organizations. My HealtheVet (MHV) (<http://www.myhealth.va.gov>), VA's integrated, Web-based PHR portal brings together information self-entered by veterans, data extracts from VA's electronic health record (EHR), self-management tools, health education materials, and additional services such as Secure Messaging in an effort to engage veterans in their own healthcare and to promote collaboration among healthcare stakeholders^{34–36}.

Table 2 presents the core components of MHV and the three-tiered access model on which it is based, with increased system functionality available at each level³⁷. The VA “Blue Button” launched in the summer of 2010 enables registered users to download an electronic copy of their personal health information available in MHV. As of May 2011, more than 240,000 unique MHV users have used the VA Blue Button. Direct feedback from veterans, gathered through the American Customer Satisfaction Index (ACSI), an industry standard online survey tool, is used to prioritize the development and release of new system additions³⁸. Other planned functionality includes viewing additional EHR data extracts and the delegation of account access to others.

As of April 2011, MHV had been visited over 51 million times, over 1.2 million individuals had registered (85% are veterans), and over 327,000 veterans were authenticated users³⁹. The majority of system adopters are male (91%), between 51 and 70 years old (68%), served during the Vietnam War (60%), access MHV from home (96%), and use the system to order VA prescription refills (75%)⁴⁰. One-third of MHV users live one or more hours away from a VA facility⁴¹. Published studies documenting the effects of MHV use on healthcare processes and outcomes are still limited; however, researchers within VA's health services research and development service (HSR&D) are establishing work in this area.

Chumbler and colleagues⁴² suggest that the integration of eHealth applications may spark further innovation in both the CCHT and MHV programs. They describe how telehealth programs can be used to collect patient information remotely and PHR programs can subsequently function as a kind of interactive repository in which to manage that information. We

concur with this vision; however, we also advocate for a more process-oriented perspective on access to care and disease management, focusing on potential ways that these programs could be integrated in a complementary manner.

SYNERGIES BETWEEN THE CCTH AND MHV PROGRAMS

Table 3 presents a series of healthcare elements—resources, processes, and activities that are an inherent part of managing health—and the various functionalities of the CCTH and MHV programs that map to each element^{27,34,35,43}. Although there is some overlap, we suggest how the respective functions provided by the two programs might be drawn upon in combination to enhance different healthcare elements, including access to care. The concept of “trajectory,” which encompasses the physiological unfolding of disease as well as the corresponding efforts made to manage disease course⁴⁴, is particularly useful in this context as it underscores the changing, dynamic nature of healthcare needs and management activities, and the frequently assumed but less frequently articulated point that different CCTH and MHV functions will be more or less appropriate (and useful) at different points in time. As a

veteran’s circumstances change, the CCTH and MHV functions that they are using may also change for optimal use. The scenarios presented in Textbox 1 highlight the need for healthcare providers to continually reassess a patient’s situation, consider the repertoire of available eHealth tools, and to advocate for their use accordingly in concert with patient needs and preferences.

In the remainder of this paper we discuss several recommendations that we believe, based on existing evidence, should be considered in order to realize this vision.

RECOMMENDATIONS FOR REALIZING THE SYNERGIES BETWEEN THE CCTH AND MHV PROGRAMS

1. At the System Level, Re-envision and Integrate CCTH and MHV into the New Model of Care

Across VA, the implementation of the PACT model represents a profound and transformative shift in the way that healthcare services are accessed by and delivered to veterans. The PACT model provides a platform which we can use to examine how the

Textbox 1. Use Scenarios - CCTH and MHV over the Trajectories of Chronic Heart Failure and Diabetes

John is a 62 year old Vietnam-era Veteran who has chronic heart failure and diabetes.

Scenario 1: John has been able to manage his conditions well with the assistance of his primary care provider (PCP). During his last outpatient clinic visit, John was asked by his PCP to carefully monitor his body weight as even a small increase could lead to an exacerbation of his heart failure. Having heard about some of the self-monitoring features available through MHV, John registered and completed the IPA process before leaving the VA facility that day. Once home, he weighed himself, logged onto MHV, and entered his weight under the Track Health section. He continued this practice daily for the next month and shared his data with his PCP upon his return to the clinic. Using this information, the PCP made a slight adjustment to John’s medication. John continues to monitor his weight and knows to contact his PCP if he experiences more than a two pound increase from his baseline weight. John also started to refill his prescriptions online through the Pharmacy section of MHV.

Scenario 2: John has been monitoring his weight using MHV. However, his diabetes has worsened and he is having trouble maintaining his weight. He recently had a brief hospitalization due to an exacerbation of his heart failure. Because his care has become more complicated, his PCP recommended that he use the CCTH telehealth system. On a daily basis, John uses CCTH to report his weight, blood sugar and blood pressure. The disease management protocols in place for heart failure and diabetes also provide information and education to John regarding how best to manage his conditions. The care coordinator reviews John’s information daily and either contacts him directly with additional counseling and advice or contacts his providers if the data suggest that he may need a change in treatment plan. At that point, the PCP may intervene with a different medication dose or new prescription, or schedule John to come in for an appointment. He and his PCP sometimes work out these details by exchanging secure messages through MHV. John also continues to use MHV to refill his prescriptions and to review the Research Health section of the portal which provides trusted information about diabetes and heart failure.

Table 2. Components of MHV and Their Associated Functionality

Personal Information
- Store and maintain contact/emergency contact information ^{R, I}
- Manage account profile, preferences, and options ^{R, I}
- Print selected personal/medical information on a pre-formatted wallet card ^{R, I}
Pharmacy
- Request refills for VA prescriptions ^{R, I}
- View history of all VA prescriptions ^{R, I}
- Record the name, start/end date, prescription number, and dosage for medications, over-the-counter drugs, herbals and supplements ^{R, I}
- View and print a complete summary of VA and self-entered medications ^{R, I}
Research Health
- Search collections of evidence-based health information ^{A, R, I}
- Access health screening tools, mental health resources, and related articles ^{A, R, I}
- Take online course offerings to promote mental health ^{A, R, I}
Get Care
- Store information pertaining to caregivers and providers ^{R, I}
- Keep records of healthcare facilities visited and their locations ^{R, I}
- Organize health insurance information ^{R, I}
- Maintain a health calendar including events, appointments, reminders, and to-do lists ^{R, I}
- View VA Appointments and set reminder notifications via email ^I
Track Health
- Create and maintain a personal, family, and military health history ^{R, I}
- Track and graph vitals, readings, and other health measures ^{R, I}
- Record allergies by date, severity, reaction, diagnosis ^{R, I}
- Document immunization information, including date, method used, and any reactions ^{R, I}
- Document tests by name, date, location performed, provider's name, and results ^{R, I}
- Track medical events including illnesses and other issues ^{R, I}
- Maintain diaries to monitor food intake and exercise routines ^{R, I}
- View VA Allergies extracted from the VA electronic health record ^I
- Select information to print out as a shareable Blue Button report ^{R, I}
MHV Community
- Access information about benefits and resources, VHA-related news and events ^{A, R, I}
- Explore links to additional online resources ^{A, R, I}
Wellness Reminders
- View customized VA Wellness Reminders for preventative care and screens ^I
Secure Messaging
- Exchange secure electronic messages with healthcare team members for non-urgent needs (currently available at selected sites with further expansion to all VA facilities in 2011) ^I
VA Blue Button: Download My Data
- Generate and download an electronic copy of personal health information available in MHV ^{R, I}

^A Denotes features that are available to anyone who visits the MHV web-portal-PHR

^R Denotes features that are limited to users who have registered with MHV

^I Denotes features that are limited to users who have completed an identity verification process known as in-person authentication

CCHT and MHV programs complement one another, and more importantly, determine how they can be meaningfully integrated into VA's new model of care. Doing so will require interaction among different stakeholder groups that have traditionally operated in separate domains. Strengthening these relationships is an important step towards the elimination of latent organizational silos that are characteristic of large systems. Relevant program offices will need to identify shared strategic priorities, common functional requirements, and opportunities for synergistic use. Creation of an eHealth advisory board representing both CCHT and MHV may be useful in this regard and enable the development of a unified voice with which to convey information to policymakers.

It will also be important to continue to foster collaborations among CCHT, MHV, and the VA research community. VA's Quality Enhancement Research Initiative (QUERI) implementation research program is intended to improve the quality of healthcare for veterans through the implementation of evidence-based clinical practices as well as the translation of research findings and recommendations into routine clinical work. In April 2011, VA established a new QUERI center dedicated to eHealth with a focus on "consumer-directed" ICT innovations intended for use by veterans and their families. The eHealth QUERI has two major goals, 1) to augment access to VA healthcare services through implementation and use of eHealth; and 2) to enhance veteran self-management and participation in collaborative care through the design, evaluation, and implementation of appropriate eHealth tools⁴⁵. In the first two quarters of 2011, eHealth QUERI investigators submitted 11 grant applications intended to support these goals. eHealth QUERI has also begun to facilitate dialogue between the VA research community and relevant program offices to align researchers with the goals of the CCHT and MHV programs and the system-wide pursuit of the PACT model. In the long-term, we believe that such research will be a driver of innovation, and see the eHealth QUERI as an organizational entity which will play an important role in exploring issues of interoperability and integration between the evolving CCHT and MHV programs, and new emergent eHealth technologies.

2. At the Organizational Level, Support Healthcare Teams to Incorporate CCHT and MHV into Clinical Practice

Across organizational contexts, there is a growing realization that healthcare providers play a key role in shaping the adoption of eHealth technologies^{46,47}. The integration of the CCHT and MHV programs into the PACT model raises questions regarding how this can be practically accomplished in the course of daily clinical work. PACT members must not only be educated about such tools, but inspired to use them in combination, leveraging their respective strengths to optimize access to care, the delivery of services, and ultimately veteran health outcomes. The MHV secure messaging function currently being deployed nationally is a case in point. Secure messaging is being integrated within PACT as a communication platform to supplement existing communication channels and represents an effective linkage between CCHT and MHV. For veterans who are already using CCHT in their homes, the ability to exchange secure messages with PACT members represents a promising means to further support interaction and communication, as well as self-management.

Incorporating CCHT and MHV into the clinical practices of PACT members will not be without challenges. Available evidence from other healthcare systems suggests that in some cases, healthcare providers may have only limited awareness of eHealth technologies and a limited view of their functionalities and benefits⁴⁸⁻⁵⁰, while others may have questions about the validity of patient-entered data and apprehension about potential liability. Furthermore, in the case of CCHT and MHV, more responsibilities may be added to already overburdened clinical staff in terms of monitoring, management, communication, and the handling of potentially large volumes of data originating from patients^{51,52}. These points further underscore the need to deploy and integrate available technologies in the most efficient manner possible.

Table 3. Comparison of Healthcare Elements and Functionality of CCHT and MHV

Healthcare Elements	CCHT Functionality	MHV Functionality
Target population	Veterans with one or multiple chronic conditions	All veterans
Equipment/technologies	In-home: messaging/monitoring devices, biometric devices such as blood pressure cuffs and glucose meters, videophones, telemonitors, interactive voice response, digital cameras	Internet web portal
Access to Care	Frequent input of key vital signs and information, available for viewing at any time by the care coordinator, including viewing during patient clinic visits	Online prescription refills Appointment requests (through secure messaging) Laboratory results (in field testing) View VA appointments and notifications (in field testing) Secure messaging (non-urgent requests) Advanced clinic check-in (future development)
Coordination of care	Frequent information regarding vital signs and other clinical information sent from patient to care coordinator; coordinator intervenes if data indicate patient is at risk	Store and maintain information regarding providers, treatment facilities and locations, and insurance coverage Documenting test results Health calendar VA Blue Button My Complete Medications (both VA and self-entered medication history)
Communication (between providers and patients)	Frequent transmission of patient data to coordinator Coordinator contacts patient if there is a need; may also interact with provider	Secure messaging between patient and health care providers
Disease Prevention & Health Promotion	Regular monitoring of health-related data Can provide education and information on health lifestyle, and customized messages on select devices	Wellness reminders Health risk assessments (in development) Screening tools Health education resources

Table 3. (Continued)

Healthcare Elements	CCHT Functionality	MHV Functionality
Self management (patient takes responsibility for care)	Reduce/avoid hospitalizations and ER visits by identifying and intervening on adverse events, knowledge deficits and negative health related behaviors	Condition-specific and Healthy Living Centers Medical databases Mental health resources Online courses and learning center My Health Goals (in development) Personal health history Military health history Family health history Personal health summary Allergies, immunizations Food and activity journals Medications, over the counter drugs, herbals, and supplements records, my complete medications Veteran delegation of MHV access to family members, healthcare providers, or others of their choosing (future development)
Self monitoring (patient records vital status over time)	Patient information sent to care coordinator over telehealth system (patient typically does not see or have access to data)	Health eLogs (blood pressure, blood sugar, cholesterol, body temperature, weight, heart rate, pain, pulse oximetry) (only accessible to patients unless hard copy printed and shared with provider) Medical events log VA prescription history

3. At the Veteran-Patient Level, Tailor use of CCHT and MHV to Reflect Personal Preferences and Circumstances

As PACT is integrated into clinical practice, we should anticipate that the experiences of veterans accessing care through VA will also shift. In the course of their interactions with the system and their teams of providers, it will be essential to understand their unique circumstances, their awareness of and orientations toward eHealth technologies, and to prioritize use of programs like CCHT and MHV accordingly. Moreover, the appropriateness of such tools should be continually assessed and their use adapted so that they align with changes in a veteran's health management trajectory. This raises a set of social, cognitive, technical, and health issues that must be addressed.

To begin, the usability of eHealth technologies can be problematic. Devices and websites are sometimes poorly designed and not intuitive to use^{53,54} leading to lower overall satisfaction. This point can be further compounded among individuals who have mild to moderate cognitive impairment and struggle to understand and use ICTs independently⁵⁵. Further, despite some evidence that individuals with high numbers of chronic conditions are more likely to use eHealth technologies⁵⁶, veterans who could benefit the most from CCHT and MHV may be less amenable to using them. Similar to the larger population^{33,47}, some may worry about the privacy and security of their health information, either self-entered into MHV, extracted from the medical record, or transferred to VA healthcare providers. In addition, the presence of telehealth devices in the home and even the use of particular Web-based health resources may make it more apparent that a person has a chronic disease, something that some individuals prefer not to disclose⁵⁷.

Finally, for many, managing personal health information is often a collaborative process involving an individual and members of their social network^{58,59}. Data from the Pew Internet and American Life project⁶⁰ suggest that 48% of those who report using the Internet for health are looking for information for someone other than themselves. Veterans, their spouses, children, friends, and other informal caregivers all may play an important role in access to care and patient self-management. One could consider use of CCHT and MHV as a set of family system interventions. Moving forward, VA should proactively include veteran-delegated informal caregiver support and data sharing in the policies, technical functions, and implementation programs for CCHT and MHV.

4. Examine How Disparities May Encumber use of CCHT and MHV and Intervene Accordingly

Following the incorporation of PACT into clinical practice and the accounting of veteran preferences and circumstances, we must consider how disparities can hinder access to and use of programs like CCHT and MHV and identify strategies to address those disparities. Factors leading to disparities may exist within or outside of the VA system, and some will be more amenable to immediate intervention than others.

Perhaps the most practical issue we are currently confronted with is differential access to Web-based tools among veterans. A recent study found that 55% of veterans had Internet access, but that access was more common in younger veterans and in those who were white, had greater than a high school education, and an annual income greater than \$12,000/year⁶¹. McInnes and colleagues⁶² reported that approximately 29% of veterans used the Internet to search for health information and that higher education, urban residence, and poorer self-reported health status were positively associated with health-related Internet use. Many existing telehealth technologies still require a telephone land line for data transmission, but even when land lines are available, telecommunications infrastructure, particularly in rural areas, can be unreliable²⁹. Reliance on cellular and smart phones to the exclusion of land lines by some veterans may yield further disparities in CCHT use. VA is currently contracting for interactive voice response (IVR) technology that can be

accessed from any phone and adapters that can interface with CCHT messaging devices to support communication through a veteran's cellular service. If a telehealth application requires use of a personal computer with a broadband Internet connection, both cost and lack of broadband access can impede use.

Although MHV strives to accommodate the simplest means of connectivity (e.g., dial up), the aforementioned limitations are still applicable. Point of care kiosks designed to allow veterans to manage their personal information, check-in for and schedule appointments, complete business transactions, and complete surveys, may also offer a means to increase access to MHV in-clinic as could Internet-connected computers available in public community settings (e.g., libraries). Finally, with rapidly increasing cell phone use, mobile smart phone platforms are quickly becoming a viable alternative to PC-directed web applications. Provision of mobile phone applications could not only provide equitable access, but enable momentary interventions, unchained from the desktop PC. However, the additional costs of such interventions should be considered. Further research, including budget impact analyses and simulation experiments are needed to understand the potential for these solutions to reduce differential access.

CONCLUSION

As Fortney^{11,12} has argued, access is a multidimensional concept of which digital access, the connectivity that enables communication and information sharing among healthcare stakeholders, is a key domain. In the years ahead, the number, type and sophistication of eHealth technologies that support communication and information sharing will continue to grow. Home telehealth and PHRs are just two examples of technologies that can improve health care access and further enhance the patient's role as an important stakeholder in care management and decision making. As eHealth initiatives continue to evolve, different barriers may become more or less important over time. Similarly, new, and as yet, unidentified challenges may emerge as healthcare systems attempt to pursue more patient-centric models of care. The proliferation of eHealth technologies themselves may become a barrier, particularly if they do not communicate with the electronic medical record and patients must deal with multiple, non-integrated user interfaces. Despite these barriers, home telehealth and PHRs provide a set of complementary tools that can be employed to enhance access and meet individual patient needs in the context of their specific condition(s), living situation, and care management preferences. Taken together, these eHealth applications can support transitions and ongoing care along the health management trajectory.

VA is a leader in the use of eHealth applications to improve healthcare access and ultimately, health outcomes. The patient-centric healthcare model that VA has recently adopted, with its focus on information technology and coordination, team-based practice, routine patient feedback, and improved access to care (e.g.,⁶³), underscores the importance of embracing the kind of complementary vision of the CCHT and MHV programs that we have articulated here. To do so will require a paradigm shift to go beyond the organizational construction

and management of eHealth tools into “programs” and reconsider eHealth features as a repertoire of tools available to patients and their healthcare teams. As such, the dramatic transformation of VA healthcare currently underway may represent an opportune time to do so. Certainly from a veteran perspective, this kind of synergy is both optimal and a reasonable expectation. Ultimately, the direct application of these tools in optimal ways across care settings will be a litmus test of progress in this area.

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