



White Paper

**The Path to Fact-based Patient
Engagement Improvement
Starts from Technology**

EXECUTIVE SUMMARY

In this white paper, we will review and elaborate on the opportunities in patient engagement that only technology can bring. While the discussions around engagement seem to touch the abstract topic of patients' willingness and ability to actively participate in their health and care, we want to make a U-turn and approach it as a value that can be measured, analyzed and improved.

Through this white paper, we are defining 3 levels of tech-run patient engagement, explaining their specifics and showing how they work in a system. Then, we introduce a custom system of patient engagement ranges and provide a few examples of measures to calculate each range. Finally, we list the challenges that technology can address in patient engagement.

It is challenging to keep up a high level of patients' engagement in their health and care in between face-to-face appointments with their physicians. Relying only on a patient's self-discipline and memory isn't an option. Be it a relatively healthy patient or a Medicare beneficiary with MCCs, he or she needs to feel cared of, supported and guided all along.

If consider patients who don't require a daily help from home care specialists, it is possible to keep their motivation high **only through technology**. This will enable to:

- Track and bridge care cycle gaps that result from rare appointments
- Meet patients' needs outside the health organization's doors
- Gather and analyze patient feedback remotely
- Enable patient-generated health data (PGHD) analysis to ensure timely interventions

LEVELS OF TECH-RUN PATIENT ENGAGEMENT

Good or bad, no stand-alone solution can manage patient engagement end-to-end. It takes a system of interconnected solutions to process individuals' information, embrace their needs and then analyze the progress. We identify **3 levels** of this system (*Fig. 1*):

- **The patient interaction level**
- **The core level**
- **The analytic level**

THE PATIENT INTERACTION LEVEL

At this level, the main objective is to communicate with patients. The level can be embodied in a *patient portal* and an *mHealth application*. We suggest using the two together, yet it is possible to adopt only one of them depending on caregivers' goals.

Patient portals

Portals provide patients with a secure access to their health records. By integrating patient portals with EHR, caregivers can create a personalized experience for each patient by

tailoring the content to the patient's problem lists (health risks, disease, conditions and more), lab results, medications and more. The functionality can feature the following:

- Basic functions (access to lab results, scheduling, refilling, billing)
- Engagement-oriented features:
 - Secure message center or Q&A chat
 - Social media integration
 - Interactive learning

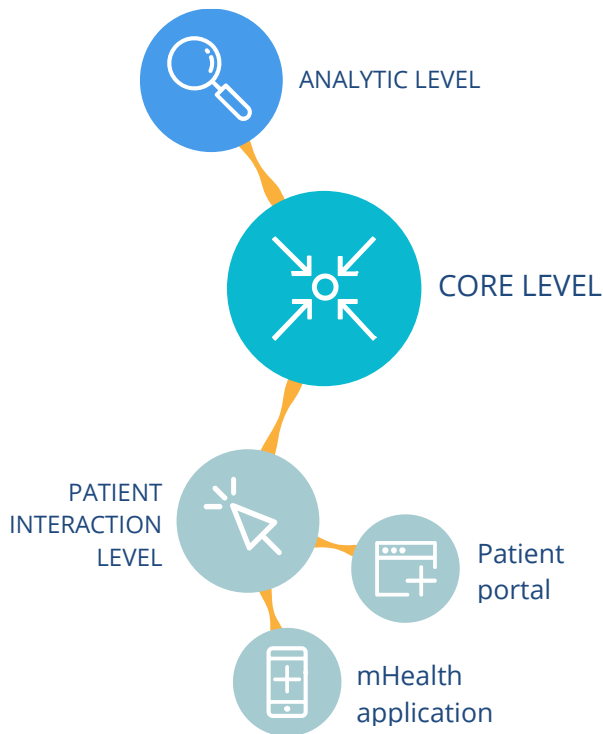
Despite a range of benefits, patient portals lack an essential part of patient engagement that is physicians' **feedback** on changes in their patients' health statuses. While some portals allow recording patients' vitals, it remains a one-way communication with no response to these measurements from a physician. This makes it impossible for patients to make a timely decision on scheduling an appointment or passing additional tests.

mHealth applications for patients

Patient engagement highly depends on *providers' timely support*. Unlike patient portals, mHealth applications are designed to create a **dialogue** between a patient and the caregiver. Moreover, convenience and accessibility of mobile apps in

general makes it a preferable channel of patient-provider communication.

Fig. 1 – Levels of tech-run patient engagement



Depending on patients' needs, there are **3 types** of mobile applications:

- Universal patient app
- Chronic disease management app
- Post-surgery recovery support app

Such a breakdown can suggest dividing a particular caregiver's patients into **three respective groups** (general patients, chronic patients and post-surgery patients).

Although the app types all differ in their purpose, they share a scope of functions and features regarding easing up patients' daily healthcare routine and engaging them at the same time:

- Basic functions (access to lab results, scheduling, refilling, billing)

- Recording and sharing PGHD (weight, heart rate, blood pressure, blood glucose, temperature, oximetry results) with a caregiver
- Nutritional tips (a food diary with a calorie calculator, recipes and weekly menu plans)
- Medication intake schemes with customizable reminders
- Motivation (gamification elements with achievements, badges, goal setting and social media sharing)
- Guidance to physical wellness and fitness (warm-up and workout videos, meditation podcasts, breathing techniques)
- Remote consultations (the emergency button, secure video conversations and more)

A tip on technical implementation:

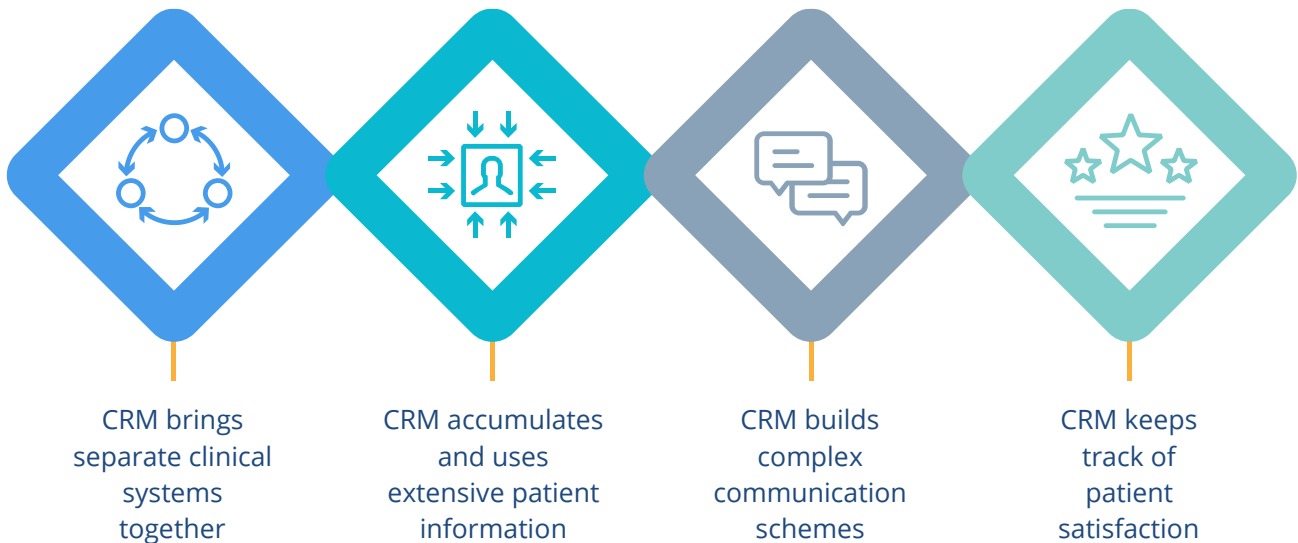
We recommend a cross-platform application on Xamarin to support patients with iOS and Android devices. The app could connect wearables and chronic condition-related devices (such as CGMs, smart watches, insulin pumps, fitness trackers, etc.) to update patients' health status overviews with the collected PGHD.

THE CORE LEVEL

The core level powers up that of patient interaction with relevant information, thus helping to build patients' thorough profiles. For this purpose, we put CRM at the core of the patient engagement system. This choice may seem questionable for the healthcare environment when there is already one patient-oriented system – EHR. Still, there are at least 4 reasons (Fig. 2) to choose CRM over other systems:

- 1) CRM brings separate clinical systems together.** Clinical, financial and administrative

Fig. 2 – Reasons to choose CRM as the core of a patient engagement system



systems (such as EHR, mHealth patient apps, patient portals, clinical mobile applications, appointment scheduling systems and more) deal with patients from different angles. CRM can create a 360-degree patient profile through integration with each of relevant systems and aggregation of all accessible information into a holistic picture.

This way, CRM can track scheduled and missed appointments, suggest to recommend a patient to visit a particular doctor (e.g., patients with gastritis may be advised to see their gastroenterologist twice a year to make sure they will not have any exacerbation), and alert both physicians and patients to health status changes (based on lab results or vitals recorded via the mHealth patient app).

2) CRM accumulates and uses extensive patient information. As CRM synchronizes patient data from different sources, providers will have access to additional entries on individuals' relatives, contacts, interests, income levels and preferred / needed care levels. With this information, caregivers can ensure a more

personal approach to every patient both during particular interactions and over the entire care cycle.

3) CRM builds complex communication schemes. CRM provides access to various communication channels in patients' preferred way – from emails and texts to personalized messages sent to the patient portal's profile or the mobile app.

After every interaction with a patient, the system can respond to different patient events by sending automated notifications to both patients and providers. Such events can include missed appointments and tests, significant changes in an individual's condition or upcoming support group meetings.

Let's see how healthcare CRM can support diabetes management, for example. Backed by data analytics, it can identify the rising trend in the blood glucose level, which poses a risk of hyperglycemia. The system then sends notifications to both the patient and the caregiver. Then, the caregiver can suggest the

patient to check the HbA1c level to prevent complications and assure the treatment plan is still working.

If a patient gives up on care in any way, CRM can handle their reengagement with the system's intelligence and communication logic. Based on information from other systems, it can reach out to individuals with an effective, relevant message without irritating them.

4) CRM keeps track of patient satisfaction.

CRM stores patient feedback that was entered directly or sourced from other systems, automatically adjusting subsequent communication to address concerns or respond to positive reviews. This allows to engage patients in their health in the way they want it, not the way providers guess it would work.

A tip on technical implementation:

The core-level CRM can be based on such platforms as Microsoft Dynamics CRM and Salesforce, or come as a custom-developed solution.

THE ANALYTIC LEVEL

Patient engagement depends not only on a technical solution, but also on doctors and nurses, processes, prices and even such amenities as parking. Without a proper analysis, caregivers can never know how patient engagement works in real life. It can be either efficient or not, but there can be only guesses without the data to support assumptions. Thus, *data analytics* is a must.

Data analytics can show the true level of patient engagement and highlight the periods of lower motivation. To provide valuable insights, the analytic level needs to cover 4 information flows:

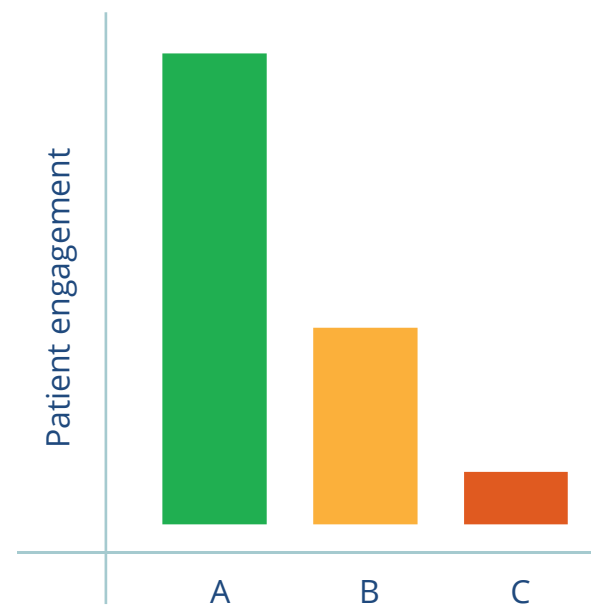
- Scheduled / missed appointments, tests, procedures
- PGHD shared via the mHealth app
- Patient behavior regarding the app
- Satisfaction surveys

Analyzing each flow separately and comparing them against each other allows caregivers to range patients according to their level of involvement. For instance, it can be a simple **ABC rating** (Fig. 3), where group 'A' would consist of patients with top engagement levels while group 'C' would relate to individuals with critically low levels.

Here are a few examples of how analytical insights can be used in ranging patients.

Note: Where no particular values are suggested in the examples below, the measures may change depending on a particular healthcare organization and its patients.

Fig. 3 - ABC rating of patient involvement



The frequency of patient portal logging in / mobile app launching

Applicable to all patient groups. Here, the estimated values for groups 'A' and 'B' overlap as the target frequency may vary depending on a provider.

- **'A':** high frequency – a few times a day, daily or weekly
- **'B':** medium frequency – daily, weekly, monthly
- **'C':** low or no frequency – rare, down to a few times a year

The scope of patient portal / mobile app features used

Applicable to all patient groups. These criteria are useful to highlight the interests of relatively healthy patients, define the services they can benefit from and reach out to them via the app or the portal they use. Depending on the available functionality, the feature scope can include vitals recording, calorie counter, goal setting, activity support, etc. It's estimated that an app or a portal contains several feature scopes, and each one is evaluated separately.

- **'A':** high use
- **'B':** medium
- **'C':** low or none

The percentage of completed appointments

Applicable to all patient groups.

- **'A':** 80 - 100% of completed appointments
- **'B':** 60 - 80% of completed appointments
- **'C':** less than 60% of completed appointments

Attendance of recommended follow-up appointments

Applicable to all patient groups. This criterion shows how engaged a patient is according to his

or her attitude to follow-up appointments, for example, when a physician recommends an individual to come back every 6 months for a regular checkup.

- **'A':** 70 - 100% of recommended appointments are completed within 1-2 months from the desirable date
- **'B':** less than 70% are completed within 1-2 months
- **'C':** less than 30% are completed within 1-2 months

PGHD sharing

Recommended for chronic and post-operative patients. There is also a possibility to pick one target PGHD measure for a certain disease (the blood glucose level for diabetes, SpO₂ for COPD).

- **'A':** sharing is regular. The target frequency should be individually configured for particular patient groups. For example, patients with diabetes can share their blood glucose a few times a day, while COPD patients will share their oximetry results once or twice a week.
- **'B':** inconsistent sharing, some gaps in measurements (interrupted measurements, incomplete data, systematic errors, etc.).
- **'C':** patient makes significant gaps in measurements, which interfere with the adequate health status evaluation.

Adherence to the medication plan

Applicable to patient groups with treatment plans and medication intake schemes delivered via a mobile app or a portal. However, it is recommended to track medication intake via an app with a preset medication timer.

- **'A':** 80 - 100% of prescribed medications is taken within the day
- **'B':** 50 - 80% of medications is taken within the day
- **'C':** less than 50% of medications is taken within the day

Evaluation of physical activities

Applicable to all patient groups. We suggest setting different and sometimes even individual activity targets for patients with certain conditions. A physical activity can be evaluated via data flows from a smartphone's default pedometer as well as wearables connected to the mobile patient app.

- **'A'**: a patient's actual physical activity is 70 - 100% of the target
- **'B'**: the actual activity is 50 - 70% of the target
- **'C'**: less than 50% of the target

Survey participation ratio

Applicable to all patient groups. Individuals can receive various surveys to fill in, and the topics can vary as well. Therefore, we suggest not to focus on particular figures but rather go for the ratio of completed-to-received surveys.

- **'A'**: a patient completes 60 - 100% of the surveys received in the last 12 months
- **'B'**: a patient completes 30 - 60% of the surveys received in the last 12 months
- **'C'**: a patient completes less than 30% of the surveys received in the last 12 months

A tip on technical implementation:

The analytic level can be fulfilled in 2 alternative ways:

- *Loading data to the central clinical data warehouse and conducting analysis there*
- *Creating a dedicated analytical system for measuring patient engagement with a data warehouse, backed by OLAP cubes and visualized with reports*

THREE-IN-ONE: A USE CASE

STARTING OUT

It all starts with a face-to-face appointment, where a patient gets to know the portal or the mobile app, be it universal, chronic or postoperative. This allows getting a patient's written consent and, what is critical for post-surgery recovery or chronic disease management, to put correct data about the patient into the portal / app. Moreover, individuals can be sure that the software they will use is authorized as it is issued by the caregiver and set up in the presence of a physician, and that all their information is secure. All primary patient data gets into the portal / app through EHR-CRM integration and can be then manually modified.

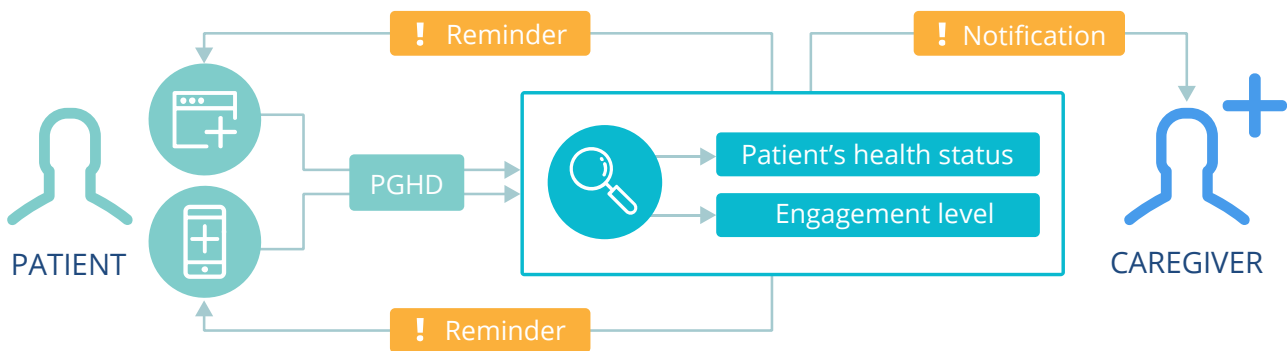
Then, depending on a patient's condition, the initial care plan is created. It can consist of different goals, activity and weight targets, medication intake, wholesome nutrition, blood glucose (for diabetes), oxygen saturation levels (for COPD) and more.

Addressed challenges:

Patients who consider themselves healthy tend to avoid 'unneeded' checks and save their time and money on appointments. By giving them the possibility to manage their health outside their doctor's office yet within one tap away from professional assistance, a caregiver engages them more and increases patients' loyalty.

Of course, chronic patients also need to feel connected to their caregiver, and in this case the connection is even more important. Here, the mobile app solves the problem of interrupted care cycles, making care delivery more consistent.

Fig. 4 – Processing and analyzing PGHD



KEEPING IT UP

When a patient steps out of the doors of their healthcare organization, he or she can be equipped with the mHealth app as their individual health management tool, or introduced to their new patient portal profile.

The patient keeps track of and shares daily achievements and challenges (such as PGHD as SpO₂, blood glucose, blood pressure, heart rate, diet, physical activity, sleep, mood, pain and medication intake) with the caregiver.

The data analytics module collects PGHD along with the data from 3 other flows (surveys, appointments and patient behavior) and puts these raw information pieces into a data warehouse. A warehouse is a must here, as caregivers need to store PGHD in its initial form somewhere, and neither EHR nor CRM can support this.

After the data gets into the warehouse, it is processed and analyzed to define **1)** the patient's health status and **2)** engagement level (Fig. 4). The patterns are found to highlight both positive and negative trends, as well as correlations in everything the patient reported.

1) The analytics of the patient's health status is targeted to improve health outcomes, reduce hospitalizations and acute complications. Say,

when the analytics module detects abnormal blood glucose (for diabetes) or SpO₂ (for COPD) trends, it sends this information back to the CRM. From there, the notifications and reminders travel to the physician's and patient's mobile app, so that they can discuss scheduling an appointment, taking tests and changing the treatment plan.

2) The patient's engagement level is calculated in line with the measures above. If the patient gets into group 'B' or 'C', reasons are analyzed and patient engagement improvement activities are initialized. Particularly, a set of automated rules can be created to target certain patient engagement gaps. For example, if the patient doesn't record PGHD frequently enough, a few reminders can be sent to the app or the personal profile on the portal.

Addressed challenges:

- Reducing the number of complications and exacerbations by timely defining alarming symptoms
- Identifying patients with low levels of engagement, defining the reasons and addressing them
- Reaching out to patients between appointments in the most convenient way for them
- Delicately helping patients to manage their conditions

SUMMING UP: PATIENT ENGAGEMENT HAS THE TECHNOLOGY FACE

Originally, patient engagement is triggered during personal appointments with a physician. However, this type of engagement can't be lasting, since it is fostered only during these 10-20 minutes. After patients close the door, they again face their conditions all alone.

Also, there are always some ifs and buts in patient engagement if it is reduced only to appointment times and inspected only in personal communication. Patients can be too anxious to relax and ask important questions, and physicians are just not in the position to educate them about everything concerning their current and new health goals within a limited appointment time. This doesn't help to encourage patients to actively participate in their care process either.

So, if we give it a closer look, there are a few reasons why **patient engagement should be rooted in technology**. Not only because this way patients will get continuous support outside their doctor's office, or because a lot of people will feel more comfortable with their gadgets than with humans. Only with technology, providers can make a shift from *abstract ideas* to **real-life measurements** and **definable patient engagement levels**, resulting in fact-driven decisions and improved health outcomes for patients.

ABOUT THE AUTHOR



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