

# UNLOCKING LAB RESULT REPORTING

with Physician-controlled AI



# MESSAGE FROM THE AUTHOR

"It's my hope that the process for communicating lab results and educating patients on their meaning, can be simplified through better understanding and the application of relevant technologies. In this way, we can improve healthcare for patients and the clinicians responsible for their care."



Dr. Mark Farber is a private practice hospitalist at Cedars Sinai, working with a multi-disciplinary team to provide the latest in evidence-based care and ensure optimal transitions out of the hospital.

***"The Aivio is the next giant leap forward in how people share content and communicate with their audience."***

**Vacit Arat**  
Chief Executive Officer  
HIA Technologies, Inc.



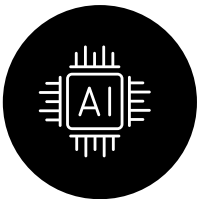
# LEARNING OBJECTIVES

Recent advancements in artificial intelligence, digital character creation, and mixed reality, have led to patient education and engagement technologies that are changing how clinicians interact with their patients. These new technologies create opportunities for clinicians and patients to interact in new, meaningful ways. This article details the impacts this technology is having on clinical laboratory result reporting.



## **No. 01 – Identify The Issue**

Understand the criticality of lab result reporting - including barriers faced by both the clinical practice and patients themselves.



## **No. 02 – New Technology Exists**

Understand the emerging technologies that combine to form the new Aivio approach to lab result communication.



## **No. 03 – Apply What You Learned**

Gain insights necessary to optimize your current approach to patient engagement and education

### **Terms - Aivio™**

**Pronounced "Aye-vee-oh":** A secure virtual environment where content is presented to an audience through various interactive tools and physician-controlled AI allows for live interaction with participants.

### **C-Me™**

**Pronounced "See Me":** Simulated assistants based on advanced digital human technology capable of guiding participants through interactive content with proprietary Natural Body Language GUI (NBLG).

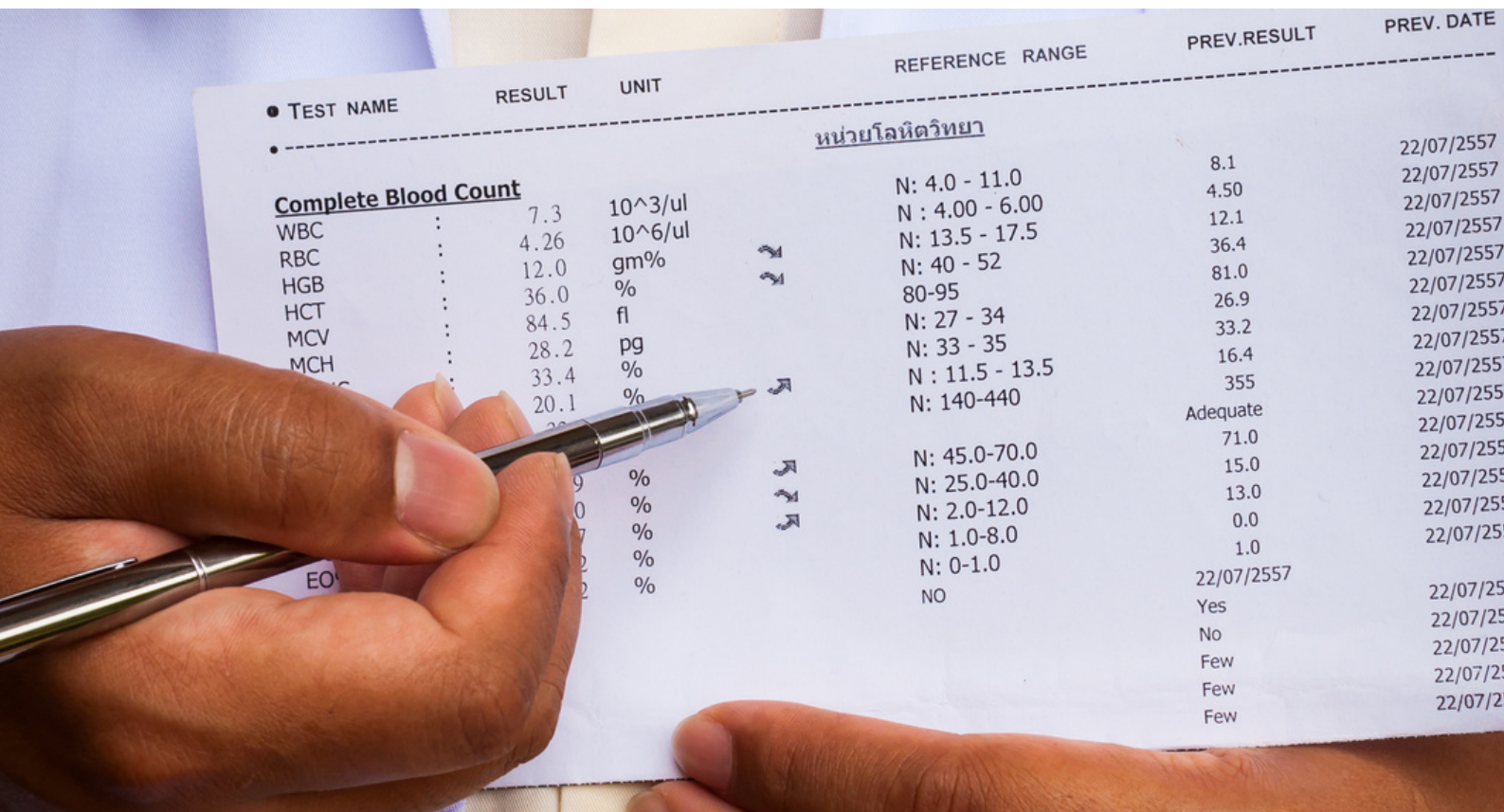
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# RESULTS ARE CRITICAL

You may have heard the term "critical results," - used to distinguish potentially life-threatening results from others. However, even "normal" lab results can be vitally important to patients. Communicating lab results to patients is essential for accurate diagnoses, building trust between the physicians and patient, and quickly enacting an effective treatment plan. Unfortunately, physicians face obstacles to relaying and acting on lab results while patients face obstacles interpreting lab results. Left unaddressed, this can lead to lower patient-physician trust and engagement, reduced patient adherence, increased costs, and poor long-term health outcomes.



TEST NAME	RESULT	UNIT	REFERENCE RANGE	PREV. RESULT	PREV. DATE
<b>Complete Blood Count</b>					
WBC	7.3	$10^3/\mu\text{l}$	N: 4.0 - 11.0	8.1	22/07/2557
RBC	4.26	$10^6/\mu\text{l}$	N: 4.00 - 6.00	4.50	22/07/2557
HGB	12.0	gm%	N: 13.5 - 17.5	12.1	22/07/2557
HCT	36.0	%	N: 40 - 52	36.4	22/07/2557
MCV	84.5	fl	80-95	81.0	22/07/2557
MCH	28.2	pg	N: 27 - 34	26.9	22/07/2557
MCHC	33.4	%	N: 33 - 35	33.2	22/07/2557
RDW	20.1	%	N: 11.5 - 13.5	16.4	22/07/2557
PLT	20.1	%	N: 140-440	355	22/07/2557
EO				Adequate	22/07/2557
			N: 45.0-70.0	71.0	22/07/2557
			N: 25.0-40.0	15.0	22/07/2557
			N: 2.0-12.0	13.0	22/07/2557
			N: 1.0-8.0	0.0	22/07/2557
			N: 0-1.0	1.0	22/07/2557
			NO	22/07/2557	22/07/2557
				Yes	22/07/2557
				No	22/07/2557
				Few	22/07/2557
				Few	22/07/2557
				Few	22/07/2557

HIA Technologies, Inc. has created the perfect solution for the gap in communication in reporting lab results by using an innovative interactive content delivery vehicle called an Aivio™. By utilizing Aivio's, patients will have access to a vast library of information about lab tests and lab results vetted by top medical experts personalized by their physician. Patients can use this information to:

- Understand their lab results (24/7)
- Get clinically-validated answers to their questions
- Reduce stress and anxiety related to waiting or uncertainty
- Better participate in their care and decision making

# Provider Perspective

Physicians use lab tests to supplement clinical diagnostic practice, preventative care, and management of chronic medical conditions. Over 7 billion lab tests are performed in the US each year. However, delays often occur due to the extra burden of documentation and clinical reporting requirements.

Lab results can be beneficial if not critical to delivering the proper treatment at the right time, but there is a wide variation in missed or "lost" reports for abnormal lab results. This loss can range from 6.8% to a staggering 62%<sup>1</sup> and may lead to misdiagnoses or delayed treatment.

# 40%

**of physicians state, a missed  
result led to treatment delay**

Upwards of 40% of physicians state that a missed result led to treatment delay<sup>2</sup>. Treatment delay can lead to worsening symptoms and damage patient-physician trust. If the patient can't count on the medical professional to catch abnormal test results, they may lose faith in the treatment plan. Moreover, failing to follow up on abnormal test results may open the physician to malpractice litigation<sup>3</sup>.





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Physicians recognize this issue all too well. Medical professionals understand both the obstacles to proper testing and that there may be multiple "solutions." However, implementing these solutions has proven to be more complicated than simply recognizing the issue, and the answers themselves can create new problems.

EMRs, or Electronic Medical Records, are one of the suggested solutions for improving convenience and transparency for the patient. However, EMRs have brought a few new problems to bear on physicians.

The main problem is time. Since implementing EMRs, physicians have decreased the time allotted for face-to-face visits<sup>5</sup>. With the increase in electronic records and email, physicians are splitting their time almost 50-50 between in-person meetings and so-called "desktop medicine." Overall, physicians spend about 18.5 minutes with each patient<sup>6</sup>. Unfortunately, due to EMRs and record-keeping requirements, many patients spend only a tiny fraction of that time discussing the medical issue troubling them<sup>7</sup>.

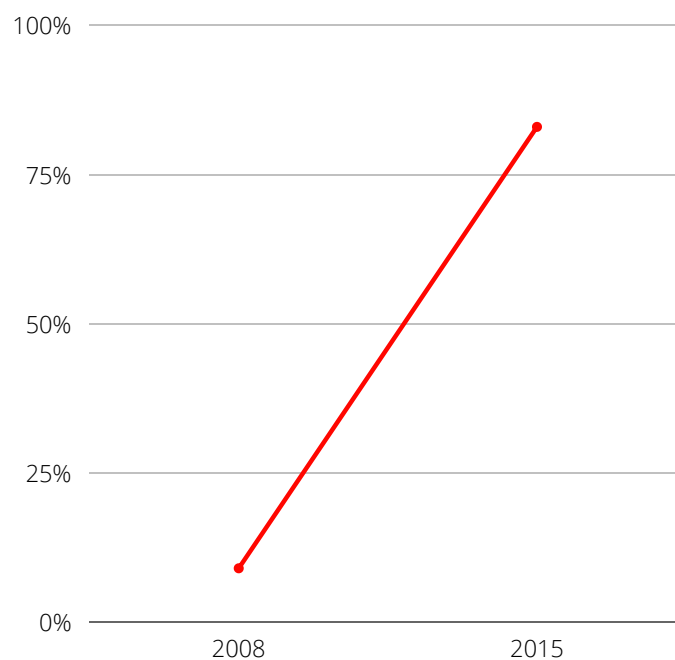
# 18.5 Minutes

spent with each patient on average



Another factor is cost. EMRs can cost over \$100,000 to implement, which many practices can spend over two and a half years to amortize<sup>8</sup>. At the same time, the substantial work it takes to maintain up-to-date EMRs isn't accounted for via RVUs<sup>9</sup>, or Relative Value Units, while inflation is outpacing reimbursement and widening the gap between expense and pay<sup>10</sup>. As a result, operational costs increase while the pay-off for increasing workloads goes down.

The Obama administration spent ~\$30 billion incentivizing hospitals and private practices to adopt EMRs, and it worked. Or did it? The number of hospitals using EMRs grew from 9% in 2008 to 83% in 2015; however, their improved adoption decreased transparency. Officials had naively believed hospitals would freely exchange or share information, which didn't happen. Billions of dollars later, they still rely on printing and faxing information.



### **EMR ADOPTION FROM 2008 TO 2015**

*“We don’t expect Amazon and Walmart to share background on their customers, but we do expect competing hospital systems to do so. Those institutions consider that data proprietary and an important business asset. We should never have expected it to occur naturally, that these organizations would readily adopt information exchange.”*

**DAVID BLUMENTHAL**  
**OBAMA ADMINISTRATION**  
**HEALTH POLICY COORDINATOR**



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"Information overload" is yet another complication born from EMRs and other systems. Physicians may program their EMRs to notify them of abnormal test results, but "abnormal" can mean large or small variations from the mean. Whether or not this justifies a diagnosis or treatment plan requires further work for the physician. Medical professionals are experiencing an "information overload" from the volume of pings they are getting, with over 80% saying that the number of notifications they receive is too much to handle<sup>11</sup>.

*"The number of notifications I receive is too much to handle."*

**-80% of Clinicians**

Physical barriers also obstruct the efficient handling of lab results. Physicians often need additional access to a separate lab's EMR to retrieve their patient data. Or they may opt out of the lab's EMR, requiring lab results to be hand-delivered and lengthening the time it takes to receive them and pass them on to the anxiously waiting patient.

You may not be surprised to learn that faxing is still a widespread and risk-prone method of sending lab results from the lab back to ordering physicians and PCPs. Those printed results may be lost or mishandled, opening physician practices to unnecessary risk. The fax is sometimes called the cockroach of American medicine: hated by doctors and medical professionals but able to survive in any environment. By one estimate, faxes account for about 75% of all medical communication<sup>12</sup>!

**75%**

**of medical communication  
is still sent via fax**



# Patient Perception

The patient faces trials in obtaining lab results, too. The first issue has become known colloquially as "scanxiety." Scanxiety is mental distress experienced by the patient as they await the results of their lab tests – imaging, cancer screenings, STD tests, etc. There is plenty of anecdotal evidence to confirm the reality of scanxiety<sup>13</sup>. Fear of the unknown related to potentially life-altering results puts patients on edge, leaving them distracted and unable to function productively. In addition, missed lab results lead to lower patient-physician trust, causing lower levels of patient adherence and poor long-term health.<sup>14</sup>



Physicians and patients must be involved to execute a successful treatment plan fully. Increased involvement translates to lower anxiety and may lead to positive health changes<sup>15</sup>. However, if the patient has low health literacy, access to their lab results may prove harmful to the trust between patient and physician. Most lab results are numerically based, and without the proper guidance from a medical professional, a patient's access to these records can lead to higher levels of mental distress<sup>16</sup>. The physician and patient need an efficient, transparent, and controlled solution.



# The Aivio™ Answer

HIA Technologies presents the solution: Aivio™, an interactive session for patients designed by their clinician, hosted by a digital rep of the practice known as a C-Me™. Aivios are the next step in patient-physician relationships. Behind the scenes, this secure environment runs a proprietary form of artificial intelligence known as "physician-controlled AI." This unique technology allows patients to interact with the Aivio host and ask questions but guarantees the response is correct. The right answer, of course, is the one that the physician authored. This physician-controlled AI cannot go rogue and only conveys the medically appropriate responses according to the physician.

The C-Me becomes an embodiment of physician knowledge that helps reinforce the authority and autonomy of the provider. Proprietary Natural Body Language GUI (NBLG) provides the C-Me with dynamic and human-like movement that can subconsciously ease the patient and reduce friction, unlike the tension created by viewing stocky and syncopated animations.

Via an Aivio, patients can receive lab results with an expert interpretation, reducing the time doctors spend explaining the results to the patient. Scanxiety is alleviated, and patients don't have to make multiple phone calls to the practice for follow-up. After their interaction with an Aivio, the patient can message the practice with more focused questions directly from the platform - allowing for smoother and more efficient communication.

## The Evolution of Engagement Interfaces

### Step 1

#### Traditional Methods

In-person, print material, video, text, email and web

### Step 2

#### AI-Driven Tools

Chatbots and Voice search  
Apple's Siri and Amazon's Alexa AI-assistants

### Step 3 Embodied-AI

Decades worth of scientific research culminates into a new UI comprised of:

- Voice
- Text
- AR/VR
- Rich Media
- Custom appearance
- Natural body language
- Touch-navigation
- Digital intake
- +More



# CASE STUDY

A study piloting HIA Aivios in an outpatient primary care practice demonstrated significant time savings. The study showed that patients who use Aivios to learn about their lab results needed 53% less time to discuss their lab results with their physician in person when compared with age/medical complexity matched patients who didn't use Aivios (4 min +/- 1 min vs. 8.5 min +/- 2.5 min,  $p < .001$ ).

In addition, patients reported that they enjoyed the experience, found it helpful, and would use it again to understand future results.



Actual image of Lab Aivio used in study

**Fast Facts** | Aivio's used: CMP, CBC, and Cholesterol Patient Age Range: 20 - 75 Study length: 6 Months

# 53%

less time needed to discuss results in person

In a similar study focused on pre-procedure education, 100% of respondents reported that they felt "well prepared" and that their pre-procedure concerns were "well addressed." 85.7% said they would likely use the program again for other procedures. None responded that they would have preferred to receive the education and information exclusively from a physician.

## Aivio Observations

The Aivio acts as a conduit between the patient and provider. It offers digestible information to the patient and pertinent data to the physician. Every patient-Aivio interaction is recorded, along with questions the patient asks or sections the patient revisits. The physician can then fill in the gaps in the patient's knowledge instead of starting from scratch and can also bill for the virtual interaction to earn extra revenue as follow-up care. The physician can also optimize the quality of patient interactions with each Aivio. For example, if patients review specific sections more than others or multiple patients ask the same question, physicians can rework the Aivio template to serve their patients better.



# CONCLUSION

The Aivio can aid in reducing patient anxiety and decrease missed abnormal results, too. The patient can watch presentations on the different lab results before receiving them. Instead of going in blind, the patient has introductory knowledge on the testing they received. The patient can also obtain preliminary information about abnormal test results from the Aivio before discussing it with their physician. Then, armed and primed with their expert knowledge from the Aivio, the patient can more calmly react and move on to the next steps with the doctor.

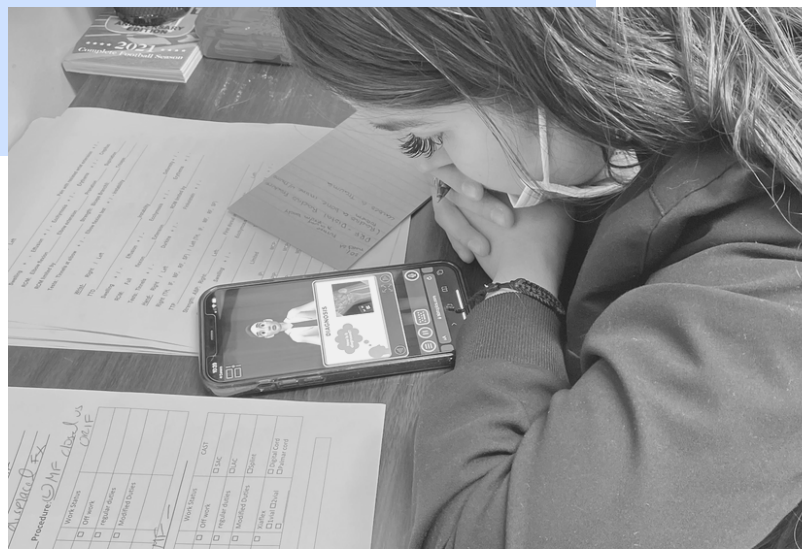
When "stay at home" has become a global mantra - it's more important than ever to allow patients access to medically validated content (like lab result reporting) from the comfort of their homes.

Lab testing is invaluable to healthcare. It can provide answers to hunches and illuminate problems no one suspected. However, the workflow contains many opportunities for disappointment for both the patients and clinical teams. HIA Technologies offers a comprehensive but straightforward solution that arms physicians with another tool to treat their patients better and gives patients better knowledge and resources to become more accountable for their treatment and health. In short, this technology provides value beyond merely patient education. Successful utilization of Aivio's can:

- Improved physician time efficiency
- Reduce the risk of mishandling PHI
- Improve patient health literacy
- Reinforce the patient-provider relationship and retention
- Reduce administrative burden
- Improve the quality of in-person time, enabling patients to better participate in their care.

*"My Lab Result Aivios allow me to get out ahead of patient questions and concerns for more proactive healthcare."*

**Mark Farber, M.D.**  
**Name of Practice**



### **About HIA Technologies**

HIA technologies is a Los Angeles based company, building the next generation of tools for communication between businesses and their constituents. Its Aivio technology is built on 20+ years of research into human-computer interactions, AI, VR/AR, and digital humans. If you're interested in what HIA and Aivio technology can do for your business, we would like to hear from you.



**To learn more about HIA Technologies**  
**Please visit [www.Hia.Ai](http://www.Hia.Ai)**

