


Effectual Diagnostic Approach: A New Strategy to Achieve Diagnostic Excellence in High Diagnostic Uncertainty

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Abstract: The accumulation of optimal decision-making is vital to achieving diagnostic excellence and preventing diagnostic errors. Diagnostic uncertainty (DU) determines the difficulty of each team member's decision-making process, including the patient, care partners, physicians, and healthcare professionals. The diagnostic approach in the low DU is already available, while the one in the high DU still needs to be clarified. In cognitive science, Sarasvathy et al established "effectuation", a theory of decision-making under the high-uncertainty condition, by analyzing how outstanding entrepreneurs make decisions when the future is unpredictable. Based on this theory, we developed the "effectual diagnostic approach (EDA)." This simple approach allows patients and physicians to "set" problems co-creatively, emerging the outlines of the clusters of health issues under high DU conditions. After DU declines enough, the traditional problem-solving approach will help the diagnostic team achieve the patient's well-being. EDA will offer us a guiding principle for action in the high DU. The co-creation of the "patient as an entrepreneur" with the "physician as a co-founder" will contribute to achieving diagnostic excellence.

Keywords: diagnostic excellence, diagnostic uncertainty, diagnostic error, effectuation, co-creation

Introduction

The diagnostic process has evolved; it begins with the patient's behavior during a medical visit and includes posttreatment follow-up.¹ Diagnostic excellence refers to making an optimal diagnostic process to attain an accurate and precise explanation of a patient's condition.² The optimal process needs to consider six dimensions of quality: safety, effectiveness, patient-centeredness, timeliness, efficiency, and equitability.³ Lack of diagnostic excellence leads to diagnostic errors, which refers to "the failure to (a) establish an accurate and timely explanation of the patient's health problem or (b) communicate that explanation to the patient."⁴ The diagnostic team must accumulate a series of optimal decision-making to achieve diagnostic excellence.

The difficulty of the decision-making for each team member depends on the diagnostic uncertainty. Diagnostic uncertainty refers to the "subjective perception of an inability to provide an accurate explanation of the patient's health problem."⁵ Diagnostic uncertainty consists of probability, ambiguity, and complexity.⁶ During each diagnostic process step, physicians and patients perceive diagnostic uncertainty.⁷

Low diagnostic uncertainty (low DU) allows physicians to take the traditional diagnostic approach: listing differential diagnoses, predicting the future, making decisions, and acting with adaptive support to the patient. An example of low DU cases is diagnosing a patient with chest pain as acute myocardial infarction and passing the patient on to the cardiac team.

In contrast, the traditional approach may not be practical in high diagnostic uncertainty (high DU) because the future is unpredictable. An example of high DU cases is the diagnostic approach to "mild fatigue" in a multimorbidity patient with diabetes, lung cancer, chronic heart failure, dementia, and depression. The previous review article suggests "consider various decision-making approaches" in high DU situations.⁸ One method is watchful waiting. Over time, information becomes more apparent, and

the degree of uncertainty decreases. Although it helps us understand better, this method may delay the diagnosis. Other methods, such as “cultivation of a tolerance of uncertainty”⁹ or “intuitive decision-making based on one’s experience”¹⁰, seem difficult for patients or beginners. Insufficiency of strategies discourages clear communication between physicians and patients and impairs patient-centeredness. The establishment of an optimal diagnostic strategy in high DU is warranted.

In cognitive science, Sarasvathy et al established “effectuation”, a theory of decision-making under the high-uncertainty condition, by analyzing how outstanding entrepreneurs make decisions when the future is unpredictable.¹¹ Entrepreneurs seek co-founders, make a series of decisions with them, and deal with business problems to succeed. On the other hand, the initial reaction of a patient with a health problem, they seek health advisors, make a series of decisions with them, and deal with health problems to achieve well-being. Based on this similarity, effectuation could be practical as a decision-making method in high DU. This paper proposes a new strategy for patients and physicians to co-create optimal diagnostic processes in high DU to achieve diagnostic excellence.

Effectuation: Behaviors of Expert Entrepreneurs

Through the research of many successful entrepreneurs, Sarasvathy identified four core factors of starting a business under uncertainty.¹¹

Start with the Available Means

Future prediction is extremely hard in a highly uncertain situation. Hence, expert entrepreneurs do not attempt to control the future. Instead, they focus on the means already available to them, which they can handle. Family members, care partners, physicians, healthcare professionals, and even Internet services could be available for the patients. Medical interview skills like inductive foraging,¹² a whole-body physical examination, and laboratory or image tests will also be valuable for physicians. In addition, the diagnostic management team or artificial intelligence will powerfully help them if available.

Focus on Affordable Loss

No one can predict the option that will bring the most favorable outcomes. However, we can decide how much loss we can tolerate. In the clinical setting, the “loss” includes time, financial cost, pain, invasiveness, and any risks. We reduce these losses using public or private resources, support systems, and medications. On this assumption, setting a bottom line makes it easier to reflect our preferences and values in decision-making.

Interact with Self-Selected Stakeholders

Identifying a specialist to solve the problem is only possible when the uncertainty decreases and the problem details are apparent. Thus, in the early stage of business, expert entrepreneurs consult several people who might be able to help. When they encounter a person willing to commit despite the high uncertainty, they ask them to become a co-founder.

Leveraging Contingencies

If we could predict the future, we would make detailed plans to prevent the occurrence of surprises. Expert entrepreneurs, however, assume that contingencies are bound to happen. Whether these events are good or bad, they devise ways to take advantage of them.

Sarasvathy named the entrepreneurial process with the abovementioned principles as “effectuation.” Additionally, they proposed the “effectual cycle”, a method that enables efficient implementation of this process.¹³ We developed the “effectual diagnostic cycle” inspired by their work (Figure 1). We named the diagnostic process with this cycle the “effectual diagnostic approach” (EDA). We illustrate below how primary care physicians become great “co-founders” of patients using EDA with a fictitious clinical case.

Clinical Scenario

A 54-year-old man got subacutely progressive edema of both lower legs (Health problem). He could not explain what had happened to him, and he perceived high DU. He and his wife wanted to seek treatment for this problem. The effectual diagnostic cycle started to run (Figure 2).

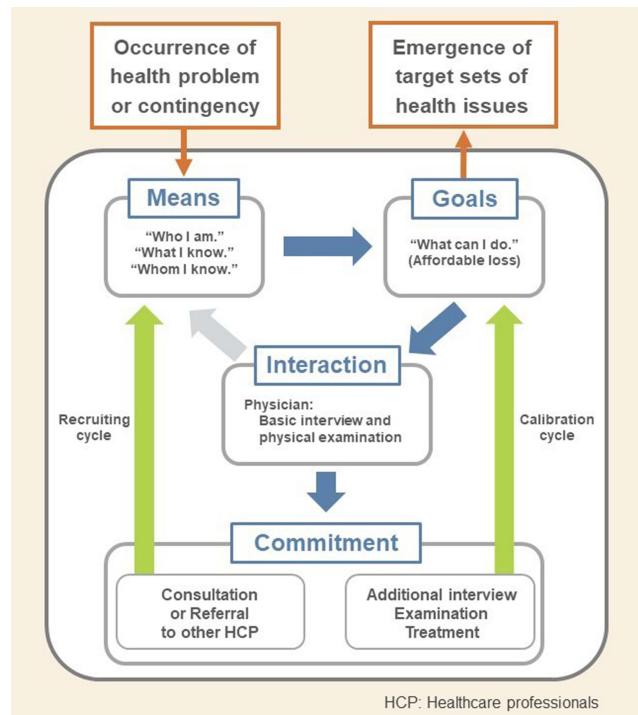


Figure 1 Co-creation through the effectual diagnostic cycle.

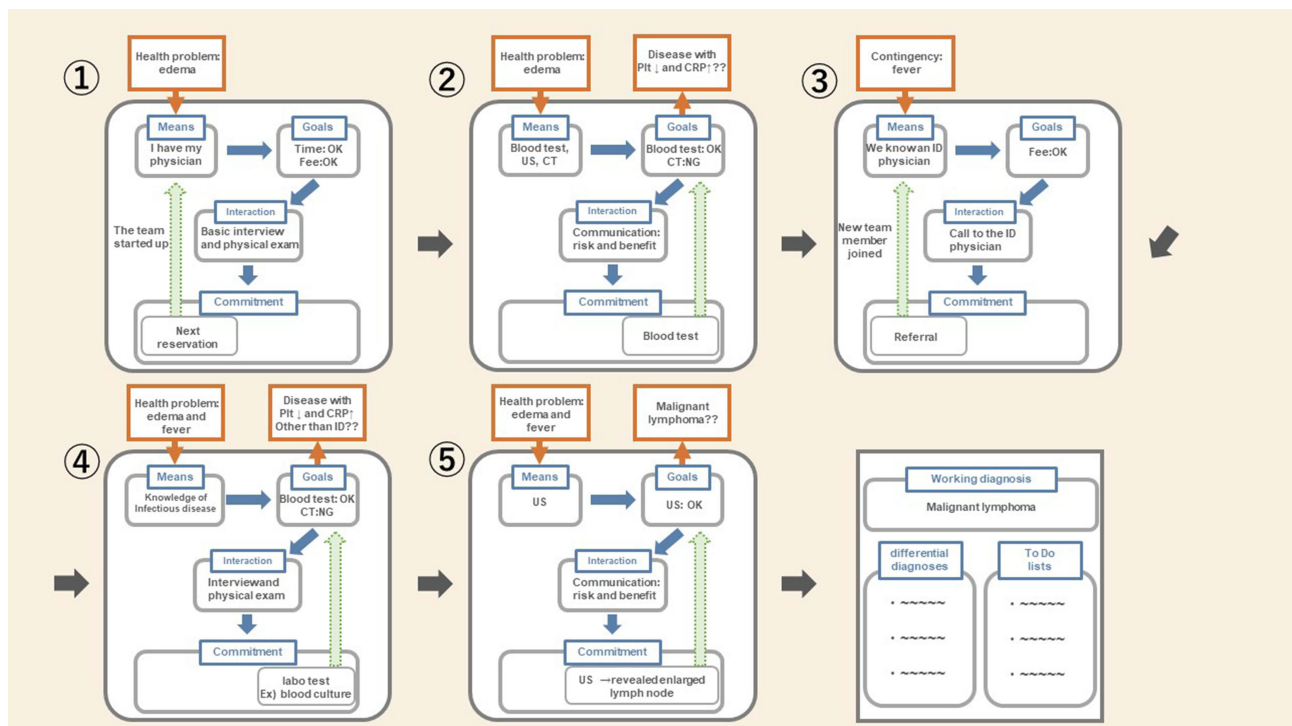


Figure 2 Each step of the effectual diagnostic cycle of this case.

First Cycle: Recruiting

He thought out the available means and decided to visit his primary care physician (start with means). He needed to allocate the time for consultation and prepare for payment of the consultation fee (affordable loss). At the first

consultation, the physician made a medical interview and essential physical examination (interactions). Although the physician was unsure of the diagnosis, he promised proactive involvement (commitment). “The patient as an entrepreneur” gained “the physician as a co-founder”, and the team started up.

Second Cycle: Calibration

The team then had the newly available options: blood tests, ultrasound examination (US), and contrast computed tomography (CT) (means for the team). The patient had a history of asthma. In addition, it would be three weeks before they could undergo the CT. Thus, the team decided that the risk of performing a blood test was affordable, and the time of three weeks was not affordable (affordable loss for the team). Blood test results revealed slight thrombocytopenia and elevated inflammatory response.

Third Cycle: Recruiting

A few days later, the patient developed a fever (contingency). It was surprising because it had been unpredictable due to the high DU. The team thought out the available means, and the physician wondered if his old colleague, an infectious disease (ID) physician, could help the team (means for the team). The physician called the ID physician and explained that this patient was unclear whether he had an infectious disease, but the team needed someone to help solve the problem (interactions). The ID physician was willing to see the patient (commitment).

Fourth Cycle: Calibration

This ID physician (means for the team) temporarily joined the team, saw the patient, and ruled out the infectious disease. The team then decided to consider diseases other than infections that induce edema and fever (new goals).

Fifth Cycle

If the team considers the abdominal US “affordable”, such a procedure will be performed, revealing multiple enlarged periaortic lymph nodes with splenomegaly, and malignant lymphoma will be suspected. With this reduced level of uncertainty, they can confidently select the right medical professional to treat the medical problem and the necessary tests to confirm the diagnosis. However, if the team recognizes that the abdominal US is not “affordable” for some reason or if the procedure shows no abnormalities, the team needs to continue to run this cycle.

The Critical Point of the Effectual Diagnostic Cycle

The commitment of the co-founder is essential. It provides the driving force for the convergence of the team’s undifferentiated health problem toward a cluster of possible issues. It also expands the team’s resources by bringing new resources to the team, such as medical knowledge, access to laboratory or image tests, and a network of medical specialists. If this physician decided not to make the next reservation, this patient would seek another physician’s consultation, resulting in doctor shopping. Three points should be considered for the physician to engage in this cycle as an excellent co-founder.

Establish Themselves as Effective Means

Physicians can only be involved in the effectual cycle when the patient asks them to. They need to build a good relationship with their patients so that the patients will feel that they can rely on their physician when they are experiencing health problems.

Co-Create an Appropriate Range of the Team’s Affordable Loss

Patient engagement is a critical element of diagnostic excellence. Patients often identify health problems long before physicians, and they would know best when to stop the evaluation.¹⁴ However, sometimes patients regard even too much loss as affordable and too little loss as not affordable for various reasons. In that case, physicians need to listen to the patient’s interpretation more carefully and discuss the importance of the intervention and the possibility of other, safer options. This discussion process leads to the co-creation of an affordable loss for the team.

Get Familiar with a Team Approach

Diagnosis is not solely a problem for one physician. A physician should not deal with diagnostic problems alone, especially in high DU conditions; instead, they should work with the patient, their care partners, other physicians, or healthcare professionals willing to help.

Discussion

Implementing effectuation into daily clinical practice could optimize our decision-making and behavior in high DU. To ensure the advantage of EDA, we need to make a clear distinction between EDA and traditional diagnostic approaches.

Sarasvathy distinguishes the traditional approach taken in low uncertainty situations from effectuation, calling it “causation.”¹¹ Therefore, the causational diagnostic approach (CDA) in clinical practice is almost identical to the traditional diagnostic approach in low DU: list differential diagnoses, use Bayesian reasoning, select efficient and practical tests, avoid pitfalls, select the most appropriate team members, and plan backward from the predicted future.

The clusters of health issues we need to deal with are somewhat apparent in low DU. CDA helps us to engage directly with the set and “solve” the problems efficiently. By contrast, the cluster of health issues is not clear in high DU. EDA allows patients and physicians to “set” problems co-creatively, revealing the clusters’ complement and emerging the clusters’ outlines (Figure 3).

The general principle of “EDA for high DU” and “CDA for low DU” would be effective in daily clinical practice. In the fictitious case above, the team initially applied EDA for the ‘problem setting’ in the high DU situation. After DU declined enough and lymphoma became the most suspicious diagnosis, they changed the strategy to CDA to solve this problem.

The major issues in general medicine today, such as undifferentiated health problems, multimorbidity, and social determinants of health, can easily result in high DU situations. Physicians working in primary care settings, like ER doctors and family physicians, or generalists like hospitalists, have many contacts with patients with these problems. Since patients and care partners are unfamiliar with health problems, and medical students and residents have limited experience, they will perceive more significant diagnostic uncertainty.

EDA provides a strategy for making better decisions and taking more fruitful action under uncertainty. In the future, we would like to consider setting up training courses to make EDA more commonly used. Additional studies to validate the effectiveness of this strategy are also warranted.

Conclusion

EDA will offer us a guiding principle for action in the high DU. The co-creation of the “patient as an entrepreneur” with the “physician as a co-founder” will contribute to achieving diagnostic excellence.

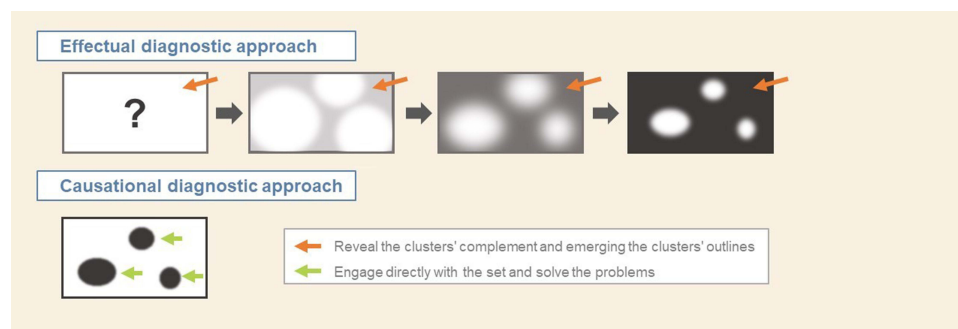


Figure 3 The difference between EDA and CDA.

Disclosure

Dr Yukinori Harada reports personal fees from PRECISION, Inc., outside the submitted work. The author reports no other conflicts of interest in this work.

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