

Effective Cognitive Responses to Treatment Failure

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Abstract

Half of current treatment plans in psychiatry disappoint, and 3/4 of our medical errors are cognitive in nature. We can positively influence clinical outcomes by reconceptualizing our suboptimal results as single treatment failures (TF) and temporary impasses, rather than misapplying the term “treatment resistance.” Reflective consideration of TF as feedback on our diagnostic and therapeutic hypotheses triggers alterations in our conceptual structure apparatus that can lead to new, creative insights and result in more effective clinical solutions. This requires conscious awareness of our clinical reasoning strategies and the diligent collection, recording, and utilization of our data.

Keywords: Treatment failure, Treatment resistance, Cognitive error, Medical error, Clinical reasoning, Clinical or treatment impasse, Meta-cognition, Heuristic, Eristic, Abductive, Debiasing, Multi-source feedback, Chunks, Templates, Illness-scripts

Abbreviations: TF: treatment Failure; TR: Treatment Resistance; SSRI: Selective Serotonin Reuptake Inhibitor; SOAP: Subjective, Objective, Assessment, Plan

Commentary

Treatment failure (TF) often mislabeled as “treatment resistance” (TR) [1-3], has become common in today’s psychiatric practice, with approximately 50% of all efforts resulting in no or insufficient improvement [4-8]. These clinical impasses might be expected, given the myriad ways we humans err. Three quarters of our medical errors have been directly linked to faulty cognition [9-11], far more than the more frequently cited systemic malfunctions [12]. While human cognitive frailty will persist, and an emphasis on lower quality clinical reasoning dominates all levels of medical education [13-19], we can exert a positive impact on clinical practice by considering treatment “resistance” as treatment *failure* [3]. TF must represent a clinical *impasse* along the way to recovery and remission [20], rather than a final result in itself. Our attitudes towards therapeutic disappointment, ours and our patients’, will determine how successfully we redirect and move towards eventual success.

Conceptualizing suboptimal or overtly ineffective treatment plans as *information* will usefully redirect us from blaming the problem itself (i.e., employing the term TR), and towards

revision of our assessments and formulations. The results of failed efforts represent *data*, essential information that must be examined and then added to our ever-evolving model of a problem and its possible solutions. There are important and useful steps we can and must take to effectively respond to clinical impasses. Rather than continuing to search for new treatments for “TR cases,” we should be learning these advanced methods of clinical reasoning and applying them regularly.

Monitor Your Clinical Reasoning

The human brain is one of our world’s most remarkable biological structures, encoding terabits of information and performing up to 10^{17} operations per second [21]. This pace of our information processing is limited by our average number of 10^{11} neurons and 10^{14} synapses [21], as well as their signal conduction rate [22], the number of concepts we can simultaneously hold in working memory (7 ± 2) [23], and the circuitry necessary for processing and acting on complex visual images [24,25]. It takes longer to process more complex data and, therefore, to make decisions and act [26]. While we gather sensory data at a rate of 10^9 bits/second, our consideration of

behavioral choices proceeds at a much slower pace, a mere 10 bits/second [27]. We should appreciate, then, that we must allow sufficient time for our brains to perform at their best.

When we utilize abductive logic, the most appropriate method for clinical practice [28], we consider a treatment failure to be the result of our tests of our hypotheses about both diagnosis and treatment efficacy, and outcome data is always useful. As practioners, we overestimate our actual knowledge and understanding of mechanism, for example, showing a strong preference for mechanistic explanations in place of the truly useful outcome studies [29]. Mechanistic reasoning, when based on incomplete understanding, is the lowest level of evidence for practicing evidenced-based medicine [30,31]. Observing a TF outcome informs us that our model needs revising. These clinical impasses must be anticipated as expected and essential parts of our clinical reasoning. Such an attitude and approach are most likely to eventually result in good and complete outcomes for our patients.

To most effectively utilize clinical reasoning, we must consciously know what method we are using at all times, making sure our approach best matches the available data and opportunities. To do this we must be ever applying *metacognition*: thinking about how we think. Reflection has been identified as the main skill that is missing in most cases of TF [32]. If we don't examine ourselves, we function on cognitive autopilot, which may keep us from failing, but only until we are confronted with a more challenging task.

Throughout our practice we should be applying the best clinical reasoning to match the situation. When we have little data to consider, and time constraints are pressing, it is even considered logical to resort to illogical approaches, and rely on beliefs and strong emotions, even allowing for cognitive bias. This is *eristic* information processing, which relies on hedonistic urges [33,34], as no competing information is available to balance it. When forced into an urgent decision, with little objective guidance, we choose what makes us feel good, including overconfidently (and wishfully) counting on success, trying to avoid loss, maintaining the status quo, and even securing economic gain [35-37].

Obviously, whenever possible, we must recognize that this is a low information, high uncertainty environment, and alter it as soon as possible to allow our use of our better cognitive faculties. When eristic decision making has led to TF, our next first step is analyzing and identifying the process we used, and then making the effort to add information so that we can move to at least the next level: *heuristic* decision making. This requires us to identify information gaps in our clinical assessment, diagnostic procedures, and even deficits in our clinical and therapeutic skills. Inadequate communication with a patient, their significant others, and other professionals may also be limiting the amount of data we have to reason with.

Before embarking on our next treatment, we must create greater opportunities for success by increasing our *affordances* (recognized opportunities for action) and *effectivities* (our available skills to act on those opportunities) [38]. We must not repeat the original error with a second eristically-based decision, but immediately seek new information, some of which is contained in the TF itself: the diagnosis may be incorrect, the treatment misapplied, comorbidities may have been missed, pharmacological influences may have interfered, or lifestyle factors might have complicated response. Our next step is not writing a new prescription, but gathering data to answer these and other unanswered questions.

Once we have an improved psychiatric and general medical history, and have expanded our therapeutic options by adding to our skills or identifying colleagues who can complement them, we can then take advantage of the heuristics *Homo sapiens* have evolved to help us survive. Consisting of hard-wired steps to decision making, this form of reasoning aligns with brain structures that help provide boundaries to rationality, as we can never consider everything at once. Heuristics offer us quick short cuts to *estimation*, based on our recent individual experiences, rather than calculation [39]. As they bind rationality by skewing towards recent recall and not considering the experiences of the larger world, though, they carry biases that can seriously distort our estimations and lead us to incorrect conclusions. Still, like eristic thought with little data, heuristic problem solving is our best option given moderate amounts of information and uncertainty. As you might guess, the best solution, which avails itself of the highest level of human reason and is least likely to lead to error or TF, is to gather even more data so that we can consider global experience over broad time frames through *abductive* reasoning with Bayesian inference. We then estimate our uncertainty and, through competitive hypothesis revision, repeatedly test our evolving models, revising them based on each test result. The result is clearer and even simpler formulations and solutions.

Too many clinicians, after diagnosing major depression and seeing TF with the first selective serotonin reuptake inhibitor (SSRI) prescribed, prescribe a second and maybe a third very similar antidepressant, rather than reexamining their diagnosis(es) and considering alternative treatment options [40]. Following additional failures, they blame the illness, labeling it TR. What *is* resistant is their own overconfidence, and their resulting rejection of feedback, self-examination, acknowledgment of error, moral distress, looking at the problem differently, and rationally trying something new.

The Essential Role of Feedback

In addition to obtaining sufficient data from history, physical, laboratory, and other diagnostic procedure results, we must seek feedback on *our* approach and performance. Multi-source feedback, including that from patients, has been identified as the most helpful stimulus to prompt self-reflection on our

medical practice [41]. Feedback is readily available to us, if we only *listen* and *ask* for it, maintaining and projecting an attitude of openness to and desire for this information. We must, therefore, always respond openly, gratefully, and reflectively; never defensively. This includes seeking and listening to the perspectives of patients, peers, and paraprofessionals. After considering this informal feedback, we will want to seek formal consultation where our colleagues will have the opportunity to fully evaluate clinical situations themselves, not just those filtered through our perspective in the hallway. Plus, always remember, TF is feedback.

Effective Data Management

It is also essential to nurture our databases, and even redefine them. Our personal biomedical knowledge must remain complete and current, but we must also become more skilled at *distributed cognition*, where we learn to identify evolving valuable resources, as needed, and collate differing perspectives as we attempt to solve clinical problems. The depth and breadth of the knowledge necessary to solve clinical problems has long since exceeded the capacity of a single human brain; we must not try to be the only library in town, but know how to network with other sources, including other people and respectable online searches [42].

Additionally, we must cultivate and protect our database for each patient, turning their chart into an actual workbook. We must record complete assessments to be consulted again and again after TF, as our memory will retain only the diagnoses we made and not the raw data on which they were based [43]. We typically exclude and do not recall outlying information and atypical presentations; if not meticulously recorded in a patient's chart, this data will be forever lost and unable to help us reformulate the clinical situation following an impasse. Contemporary electronic medical records, while offering useful advances such as automatic checks for drug-drug interactions, may also make it too easy to copy previous assessments and substitute them for new ones. Each visit should be uniquely recorded in maximal detail, or the opportunity for meaningful reevaluation of the chart will be eroded.

Not only must we collect and record all information, but we must also *account* for every bit of it. If data will not fit with a diagnosis, then the diagnosis is likely incorrect and/or we have missed a comorbidity. Our most common misdiagnoses are of the most commonly presenting diagnoses [44]. In psychiatry, it is not only the more difficult diagnoses that are initially missed (e.g., schizoaffective disorder [75% of the time] and schizophrenia [23.71%]), but psychiatrists initially misdiagnose major depression, one of our most common and basic diagnoses, in over half of our cases (54.72%) [45].

Atypical presentations are not expected by the expert mind, which, over time, narrows decision making into pattern matching, and excludes ill-fitting detail. We must be sure we form diagnostic and therapeutic hypotheses only *after*

gathering and considering all the necessary data. The longer we practice with insufficient feedback and reflection, the more we rely on the same small number of steps and hypotheses [46]. We must, therefore, consciously strive to avoid rapid diagnosis except in the most exigent circumstances.

Debiasing

As discussed, we unconsciously turn to heuristic reasoning when faced with moderate amounts of information and uncertainty, a situation common during early assessment and treatment efforts. It is not the use of heuristics that leads to error as much as their misapplication. We must become aware of our human cognitive biases on which heuristic reasoning is based, and aggressively attempt to debias our reasoning before proceeding with heuristic estimation. It is possible to reduce the cognitive error related to our use of heuristics when we learn how misunderstanding their power and accuracy can easily lead to their misuse [47].

Debiasing techniques have been shown to improve decision making in practice, without resulting in the rejection of all heuristic reasoning attempts [48]. The biases described as *anchoring*, *hindsight*, *availability*, *confirmation*, *optimism*, *framing*, and *base rate* fallacies have been most frequently addressed. For example, confirmation bias can be reduced by consciously resisting *confirmatory hypothesis testing* (the selective search for, testing, and interpretation of evidence to support prematurely formed hypotheses that are based initially only on existing beliefs) [49].

Cognitive heuristic biases are difficult to overcome, and it may be most effective to employ explicit multiple, complimentary methods [50]. The techniques utilized in studies have included didactic, behavioral, and technological efforts (i.e., restructuring information or presenting it in complimentary formats, such as raw numbers and graphs) [51]. We can recall, for example, that a 5% chance of a problem also means a 95% chance it will not occur. Debiasing will help us think more probabilistically, as with the abductive theory of mind, measuring and accounting for our uncertainty. The intention and effort to study and learn about bias in clinical reasoning are important first steps, and self-observation with reflection essential ones to follow with. As addressed above, it has been demonstrated that attention to feedback about our judgments can help us correct our biased decision making [52].

Reformulation of Embedded Error

Our brains are able to collate multiple pieces of data from our environment into a single entity called a "chunk." These are composed of elements that have a strong association with each other, and weaker associations with the information making up other chunks. Our short-term memory can hold three to five of these larger packets of information, expanding our otherwise limited memory and processing power [53].

Examples are useful moves in chess or diagnostic and treatment options in our practice. As we acquire knowledge in field, such as psychiatry or medicine, through study and practice, this gradually leads to the creation of a greater number of and larger chunks. Recognition of information within chunks is rapid, and faster than across chunks. Larger chunks result in quicker response times than when elements are spread across smaller chunks. Chunking also allows humans to better solve complex problems [53,54].

This process is divided into automatic “perceptual” and conscious “goal directed” chunking [23]. Perceptual chunks, naturally created by our study and experience, are primarily stored in the parahippocampal and fusiform gyri of our temporal lobes [53]. A goal directed chunk is formed by a conscious choice, such as using mnemonics (e.g., SOAP: Subjective, Objective, Assessment, Plan), or dividing numbers into segments, such as with phone numbers (e.g., 123-456-7890 rather than 1234567890) [55]. Efforts to form goal directed chunks activates the prefrontal and parietal areas in our brains [56].

After about six years of study and practice, expert knowledge further restructures frequently used chunks into “templates.” Also stored in our parahippocampal and fusiform gyri [53,56], these even more complex structures represent a core of constant information alongside slots which can hold variable information, further extending our memory and processing capacity [54]. At this point, we are no longer accessing our memory of biomedical knowledge, but matching clinical presentations to *illness-scripts*, which automatically link the features of an illness with its consequences [57]. Templates provide an even more powerful level of thought, as they can involve schematic knowledge and planning. Emotional responses that have become associated with templates during study and practice result in what we call “intuition.” This can allow experts to quickly achieve broad understanding of complex problems [58].

Chunks and templates are very helpful for extending our limited, serial mental processing ability, but may also lead to erroneous assessment and incorrect clinical decisions. Although we all share the same conceptual structure apparatus, individual chunks and templates are created by a single brain. There is no uniform or required agreement they will match concepts formed by other human brains, as they are based on an individual’s experience. For this reason, an embedded error, such as false information or an unrecognized misconception, is likely to continue to contribute to decision error unless identified and corrected.

It is fortunate, then, that our brains also contain a separate mechanism for breaking down these structures and replacing them with new ones. Unfortunately, though, this process is not automatic; we must trigger it with effort. Once an impasse is consciously acknowledged, however, the anterior cingulate cortex switches to creative search and discovery from the

analytic planning it had been pursuing. Unnecessary or inaccurate restraints on creative problem solving attached to existing chunks can then be eliminated, allowing the clinician to conceive of new clinical answers and move beyond an impasse [59,60]. The original representation of a problem must be altered by discovering new aspects (elaboration), correcting incomplete or incorrect representations (re-encoding), relaxing the constraints of our increasingly narrow mindset, and decomposing the existing, misleading chunks [60].

This decomposition can be divided into elements that carry distinct meanings (loose decomposition), or into components with no meaning when considered alone (tight decomposition) [61]. Tight decomposition, then, may include atypical, seemingly irrelevant data that has been previously ignored. This latter process is more difficult, but as previously discarded or partial clues begin to associate with long-term memories in the medial temporal lobe [62], the context and our awareness of possible applications may be shifted. These reformed chunks or templates, then, may provide fresh, creative insights and result in more useful clinical solutions. It is essential to remember, though, that conscious cognitive direction is necessary to initiate and achieve essential reconstruction.

Best Practices

Just as our human brains may unwittingly lead us astray as we practice our profession, they also contain features we can consciously access to reduce error and more rationally respond when TF does occur. Because we preferentially attend to positive feedback as we mature [63], as clinicians we must develop positive responses to clinical impasses in order to recognize and effectively react to them. This is not only a practical, but an ethical imperative.

Best practices include identifying and filling information gaps; obtaining, preserving, and accounting for all of our data; avoiding rapid diagnosis; seeking, acknowledging, and utilizing feedback; developing and adding to our clinical and therapeutic skills; and anticipating clinical impasses as a stage of treatment, not the end. We must adopt a pluralistic approach to assessment and formulation, examining problems from multiple frames of reference (i.e., biological, psychological, and sociological) and also different theoretical dispositions [64]. Further, we must take responsibility for and nurture our therapeutic alliances; exhibit humility and respect as we encounter and develop knowledge of other cultures, races, and ethnicities; and begin now to enhance our communication skills with peers and patients alike.

Most importantly, we must be able to identify and monitor our current method of clinical reasoning by taking the time for self-awareness and reflective metacognition. Flexibility, along with identifying methods of data analysis that best match each clinical situation, helps clinicians of all levels of

experience and competence learn, develop new skills, and find better outcomes for our patients [65,66]. Once we are aware of our individual cognitive style, have broad and current biomedical and psychiatric knowledge and skills, and have practiced these cognitive techniques, we can find solutions to TF. These cognitive strategies will stay with us throughout our careers, if they are routinely applied [67].

Our patients seek help from us at the most vulnerable points in their lives. We can only honor this privilege by possessing as much knowledge about ourselves and how we function as we seek about them. We can only fulfill our commitment to our therapeutic alliances by bringing our very best cognitive efforts. We must recognize the moral distress of TF as motivation for self-examination and the impetus for improvement and maturation of our clinical skills. To do anything less is a failure to meet our ethical duty.

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