

# Fallacious Reasoning and Complexity as Root Causes of Clinical Inertia

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**Background:** The quality gap and clinical inertia are stubborn problems that are prevalent, but difficult to explain. We puzzle why conscientious practitioners, who are keenly aware of appropriate evidence based treatments, avoid initiating or intensifying treatments. This has caused some to question that there may be hidden causes for these errors in the planning of chronic care.

**Methodology:** A timely clue enabled the author to recognize his flawed reasoning when planning the care of two elderly women sustaining hip fracture. The sudden awareness of planning error motivated a study of the under-treatment of chronic disease. Reference to fallacy and planning error were rare in the medical literature, but fallacious reasoning best explained the author's conscious decision to withhold evidence based treatment for osteoporosis from many elderly patients.

**Results:** Increasing awareness of cognitive error had immediate impact on the treatment of osteoporosis in nursing home residents. Similar planning errors for the care of other chronic illnesses were readily identified. These errors could be attributed not only to the author, but to other conscientious physicians involved in the patient's care as well as the patients'

families. The author's observations permitted a homegrown taxonomy of fallacious reasoning and complexity as it was observed. Examples of the fallacies and complexities are presented within the context of the author's four year study.

**Conclusions:** Fallacy and complexity contribute to clinical inertia and planning error on a regular basis in nursing homes. Gestalt for planning error, fallacy and complexity is not widely available to physicians, and they are remarkably unaware that their own cognitive limitations and biases have unintended adverse consequences for their patients. The author proposes that study of the cognitive psychology of longitudinal care is sorely lacking in current medical training. This type of reasoning differs from diagnostic reasoning, and may utilize a different part of the brain. Training in planning error should be introduced early, and refreshed periodically, as clinicians become more highly trained. Paradoxically, training and success seems to render the practitioner progressively more resistant to recognizing his entrenched fallacious belief systems. (*J Am Med Dir Assoc* 2007; 8: 349–354)

**Keywords:** Planning error; clinical inertia; quality gap; cognitive error; fallacy

## INTRODUCTION

The behavior of physicians who fail to implement evidence based treatments has been coined clinical inertia.<sup>1</sup> The impact of clinical inertia has been increasingly recognized as a pervasive and expensive national problem, and changing entrenched physician behavior has proven to be very complex.<sup>2</sup> Utilization of evidence based information does not increase with passage of time, as we once believed. A good example is

adherence to hand-washing; our compliance being 57% sixteen decades after being reported.<sup>3</sup> This performance is dauntingly similar to observations that Americans receive about half of evidence based interventions indicated for their health conditions.<sup>4</sup> The stubbornness of widespread under-treatment causes speculation that there must be unrecognized forces contributing to poor planning of care.<sup>5,6</sup>

One distressing example of the quality gap is the under-treatment of osteoporosis (OP) in the frail elderly.<sup>5,7</sup> Practitioners have ample evidence to document the benefit of treating this population, yet there is abundant and compelling evidence of widespread under-treatment of nursing home residents.<sup>8–14</sup> This is of special significance because poor treatment rates in the nursing home usually cannot be attributed to patient non-compliance or non-persistence.<sup>15</sup>

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This article proposes that such under-treatment of osteoporosis is often the result of unrecognized planning error. Ignorance is unlikely to contribute to this error because awareness of the medical evidence favoring treatment is so widely held. The real root cause of planning error is fallacious reasoning, a predictable result of human behavior. Largely unprepared, physicians are commonly as vulnerable to fallacy and complexity as patients and families.<sup>16</sup> This vulnerability is compounded by the prevailing misconception that diligence will result in perfection. Physicians are slowly being convinced that fallibility is the human condition, and most readily acknowledge slips and lapses, but seasoned practitioners have lingering doubts that their own reasoning could be flawed. The truth, of course, is that their reasoning is only human and to err is human.<sup>17-19</sup>

When addressing clinical inertia, Medicine has not remembered that restatement of compelling evidence has never been a sufficient force to change established clinician behavior.<sup>20</sup> Such a change is not so much the integration of new information, but a change in attitude.<sup>2,21</sup> In this context, change may represent a midbrain event more than a cortical event. The hypothesis of this article states that clinical inertia is a form of emotional resistance to changing long-held beliefs and attitudes among accomplished clinicians. Many solutions and beliefs are well established old friends that have given the clinician comfort in the past. They often reflect values adopted from mentors long before newer medical evidence was available. In many circumstances, effecting a lasting change in thinking of the more accomplished and highly trained is more challenging than for the lesser trained.<sup>21</sup>

The following vignette illustrates the author's epiphany regarding clinical inertia as events unfolded over a few days in 2002. This discovery was a profound experience for the author, but required a timely clue for its sudden recognition.<sup>22</sup>

*The worried nurse's assistant said "it just snapped and we were only rolling her over." I still remember the patient who had obviously broken her hip while being bathed in bed. It was the first time I had ever seen her in pain during the thirteen months since she was admitted to our SNF for long-term care. Her diagnosis was metastatic colon cancer and she had been bed-bound or in her bedside chair during the previous year. She had survived for longer than we had anticipated. She never complained and she seemed to enjoy life. The current pain was unbearable, and after a brief discussion with the patient and her family, she was sent to the hospital for repair of the hip fracture.*

*Less than fifteen minutes later I received a second call. Another resident from another home had fractured her hip with a minor trauma. This patient, too, had been almost completely bed-bound for several years. When I arrived ten minutes later, this severely demented resident was experiencing pain with any movement. It was only a few minutes until this patient was off to the hospital for a hip repair.*

*I remember saying to no one in particular, "that happens a lot, doesn't it?" I became immediately committed to study hip fracture rates in the four nursing homes where I was the medical director. Within minutes, I had permission from my superiors to conduct a limited study of hip fracture in the nursing home.*

**Fig. 1.** A Timely Clue.

**Table 1.** Hip Fracture by Gait Status 2000–2003

| Gait status | Fractures |
|-------------|-----------|
| I           | 10        |
| II          | 10        |
| III         | 10        |
| IV          | 18        |
| TOTAL       | 48        |

**Gait Status:**

- I = Walked without assistive device or cane.
- II = Walked with assistive device or cane.
- III = Could ambulate in wheelchair or similar device.
- IV = Bedridden or totally dependant on others.

**METHODS**

The study included analysis of hip fracture and the treatment of osteoporosis (RxOP) over three calendar years 2000-2002. The author recognized almost instantaneously that similar occurrences were not uncommon in bedridden patients, then recognized the inaccuracy of his perceived reality of osteoporotic fracture in the four nursing homes. Long held beliefs were incorrect, and their propagation must be avoided. Why had the author resisted providing evidence based RxOP to the majority of residents during the process of individualizing care for the frail elderly? Why were he and others so comfortable ignoring the advice of experts? This question triggered a study of the under-service of chronic illness. All nursing home charts were reviewed for under-treatment of the illness, and a study of the literature regarding under-treatment of chronic disease was conducted. The study began in October, 2002.

**RESULTS**

The informal study of the hip fracture experience showed hip fracture rates to be roughly at benchmark over the previous three calendar years. Extraction of data was done manually and the data was not acquired with an intention to publish. Forty eight hip fractures occurred during 1090 patient years. The rate of adequate RxOP was low, but identical to treatment rates described in other studies.<sup>13,14</sup> Testing the hypothesis that fracture occurred in bedridden patients, all 48 hip fracture victims were categorized into one of four gait classifications. Table 1 describes the gait status of residents sustaining hip fracture.

The literature review identified risk factors for under-treatment of chronic illness, but advancing age and the presence of multiple comorbidities seemed to place the nursing home population at extraordinary risk.<sup>16,23</sup> [Table 2.]<sup>1,16,23-32</sup> These risk factors were interesting, but did not suggest a unifying cause for withholding evidence based treatment. There was something about under-treatment in this context that the author did not understand. Continuing study led to the few articles that acknowledged planning error and fallacious reasoning.<sup>16,33-38</sup> Although improper reasoning seemed to best explain the author's under-treatment of many chronic conditions, the concept of cognitive error was new to the author. Further study revealed what he considered a blind spot

**Table 2.** Risk Factors for Undertreatment of Chronic Disease**Patient Factors and Underservice**

- Presence of multiple comorbidities
- Low socioeconomic status
- Advancing age
- Feminine gender
- Low medical literacy
- Lack of access to health care
- Patient non-adherence, non-compliance

**Physician Factors and Underservice**

- Clinical inertia
- Fallacious reasoning
- Ageism
- The dual task theory
- Tendencies to underestimate benefits of treatment
- Tendencies to overestimate adverse effects of treatment

**System Factors and Underservice**

- System of compensation
- Defensive medical record keeping
- Lack of training to manage multiple comorbidities

Table abstracted from references.<sup>1,16,23–32</sup>

in his formal education. Given new information and perspective, the author began to perceive multiple forms of fallacious reasoning as potential root causes of underservice.

Very few primary care practitioners attended at the four nursing homes, and the author was the primary physician for all but a few residents. This peculiarity produced a heightened sense of accountability for errors of omission. The necessity of reviewing large numbers of hospital discharge plans involving other fracture victims also contributed to the author's growing perspective of planning error for chronic illness in the elderly. This unusual job description required the analysis and correction of planning error on a daily basis. Flawed thinking and the inappropriate use of simple solutions were utilized by discharging hospital physicians in a manner similar to the author. These solutions often resulted in inappropriate withholding of evidence based treatments. Eventually, there was little doubt that most competent and conscientious practitioners exhibited planning error similar to that of the author. Developing perspective into this unexpected observation required development of jargon.<sup>21</sup> Jargon was borrowed from reference sources when possible, and when non-existent, the author created jargon intuitively.<sup>16,33–38</sup> Jargon permitted the development of taxonomy for fallacy and complexity as it was encountered. Fallacious belief systems and value systems were no longer subliminal and were increasingly recognized. The fallacies and complexities are listed and described in Table 3.

In the two cases presented above, the author was fooled by fallacy and complexity to arrive at a very comforting solution which "spared two elderly ladies excessive treatment near the end of life." In doing this, the author stumbled three times over the conjunction fallacy, once over the metaphor/context complexity, once over the consumer/beneficiary complexity, and almost certainly over the omission/commission bias. The following represents the author's analysis of his fallacious reasoning in the vignette as well as other fallacy and complexity encountered during this study.

**The Conjunction Fallacy**

Bar-Hillel's admonition seemed to describe the author's mindset at the time treatment decisions were made for the two patients in the vignette: "This systematic bias . . . can be used to enhance or decrease the relative attractiveness of gambles and . . . other uncertain outcomes . . . . The careful decision maker should keep this in mind when making intuitive judgments."<sup>34</sup> When caring for the two patients described above, he had made assumptions (intuitive judgments) about survival without measuring reality. The first incorrect assumption was that both of these residents would have died sooner. The reality is that the sickest 1% of our society survives much longer than commonly held. It was counterintuitive to the author that 60% of such patients live five years or more.<sup>36</sup> The second incorrect assumption was the author's belief that because these residents were inactive, they were unlikely to fracture. This belief maximized the association of fracture with trauma and minimized the devastating effects of extreme inactivity on bone metabolism. Eventually, the author proved to himself that the bedridden continue to fracture at an alarming rate. The third incorrect assumption was that these inactive patients near the end of their lives would not need hip repair even if they did fracture. This belief ignores the reality that hip surgery is frequently a palliative rather than a restorative procedure. These deeply held fallacious beliefs enabled the author to feel comfortable making the exception to withhold evidence based RxOP.

**The Omission/Commission Bias**

The omission/commission bias is truly a misnomer because the bias applies equally to omitting and to committing to treatment interventions. It more correctly speaks of the human tendency to select the safest option over a superior option which carries some risk. This bias factors heavily in most decisions to withhold evidence-based treatments for chronic conditions.<sup>27,35,36</sup> Patients and families seldom notice under-treatment of chronic conditions, and are far more likely to complain about polypharmacy, medication costs, or adverse

**Table 3.** Fallacy or Complexity With Aphorism

|   |
|---|
| <b>The gambler's fallacy:</b> The human tendency to define outcomes in terms of good or bad luck, ignoring recency.   |
| <b>Occam's razor:</b> The human tendency to accept an obvious solution.   |
| <b>The cost-value illusion:</b> The human tendency to equate value with cost.   |
| <b>The conjunction fallacy:</b> The human tendency to assume sensible outcomes of compound gambles incorrectly, without measuring the reality of such compound gambles. |
| <b>The omission-commission bias:</b> The human tendency to select safe management options over superior but more risky options.   |
| <b>The consumer-beneficiary complexity:</b> The inability of all humans to simultaneously consider the multiple factors involved in cost-benefit analyses.              |
| <b>The metaphor-context complexity:</b> The application of a good solution or schematic in an inappropriate context.  |

drug reactions. Colleagues frown at polypharmacy even when treatments are clearly indicated. Nursing home quality indicators infer that polypharmacy is bad. By contrast, physicians are seldom held responsible when complications occur in patients not treated for a chronic condition. In this way, the bias against polypharmacy favored the decision to withhold evidence based RxOP from the two patients in the vignette.

### The Consumer/Beneficiary Complexity

The consumer/beneficiary complexity is, in fact, almost too complex to consider in a short paragraph. But practitioners must deal with this complexity each time they individualize chronic care for one of their complex patients. The practitioner must consider simultaneously the technology assessment of the item to be provided or withheld. Acquisition costs and costs related to complications and monitoring for safety must then be measured against the value of the expected benefits of treatment. This must be done within time constraints of a few minutes scheduled for the patient encounter. The analysis is difficult because of the known limitations of the human brain regarding the number of variables it can consider simultaneously, and without tools and training would be beyond the capability of the practitioner.<sup>18</sup> The rapid explosion of technology has magnified the difficulty for a practitioner or family to make these calculations. Evidence Based Medicine has been a concerted effort to assist the practitioner in navigating these choppy waters.<sup>3,38</sup> As if this were not difficult enough, the practitioner must account for a rapid rotation in the positions of stakeholders. Those who pay for treatments may not be the real beneficiary of cost savings. For instance, families often pay for RxOP, when it can be argued that the principal financial beneficiary of fracture reduction is society. Consumers of treatments rotate rapidly in the nursing home and commonly change from the owner of the nursing home, to families, and eventually to society all within a matter of a few months. This helical rotation becomes disconcerting to practitioners and families, and is further compounded by insertion of coverage gaps, coverage caps, and donut holes. This complexity applies to additional diagnostic testing, consultation, and treatment. Practitioners find it difficult or impossible to know when additional information is worth its cost. Clinical prediction rules such as the Ottawa Knee Rule are designed to assist the practitioner with this type of complexity.<sup>39</sup> In the vignette, both patients were Medicaid status, so that no mismatch of consumer/beneficiary status existed. Medicaid was the consumer of healthcare and would have been the major financial recipient of the potential treatment benefit. In these cases, there was a miscalculation of the potential of these patients and society to benefit from treatment. This miscalculation was complex, involving underestimation of fracture risk and longevity. It also involved a miscalculation of the costs of treatment against the various outcomes, the costs of which would be borne by society.

### The Metaphor/Context Complexity

All physicians are subject to the human frailty of seeking simple and familiar solutions.<sup>40</sup> We all have our favorites, and we have often learned these from our mentors over our training

years. One such simple solution is that of compassionate neglect of potentially treatable comorbidities. On most occasions, the solution is appropriate, particularly when applied in hopeless situations near the end of life. So it had been for the author. He had learned this compassionate behavior from mentors, without ever seriously considering that this solution might be utilized inappropriately. In the vignette, the author's vulnerability to the conjunction fallacy permitted a bias to inappropriately select this solution. Two undesirable consequences of withholding treatment in this context were avoidable fracture and hospitalization, not to mention the dollar costs of treating the patients who sustained preventable hip fracture.

Although fallacies 5–7 did not factor in the cases presented, examples of each are included as they were actually recognized in the practice.

### The Gambler's Fallacy and Positive Recency

The gambler's fallacy would have us think that patients with many bad clinical outcomes would surely get lucky.<sup>33</sup> Unfortunately, the converse is the true human condition. Positive recency is the converse of the gambler's fallacy, and many evidence-based clinical prediction rules value recency rather than the gambler's fallacy. For instance, the Fine Index for prediction of mortality in pneumonia requires clinicians to value recency rather than luck.<sup>41</sup> Just as certain good and bad outcomes beget good or bad outcomes in pneumonia, so do prior fractures predict the likelihood of subsequent fractures. Similarly, as a result of genetic diversity, a family history may predict longevity or the occurrence of colon cancer. This may be the fallacy that medicine has addressed best as most physicians recognize the effects of frailty and recency as a predictor of adverse outcomes.

### Occam's Razor

The author's first recognition of Occam's razor occurred when a conscientious nurse was about to be terminated by her managers because she failed to recognize a hip fracture that occurred early one morning. The fracture was not recognized until another nurse discovered the patient to have all the classical findings of hip fracture. The assumption was that the first nurse had not carefully assessed the patient 5 hours earlier. The first nurse had no history of negligence and more than adequate assessment skills. Based on subsequent discovery, it was confirmed that the patient had been comfortable until about 7:45 am when the excruciating pain had begun. The more likely scenario was that the fracture had occurred at 3 am, but was non-displaced for several hours before becoming displaced around the time of the onset of the symptoms. Occam's razor encourages that we adopt the simplest conclusion rather than considering complex alternatives. It is one of the operative cognitive pitfalls encouraging the availability heuristic to contribute to medical error.<sup>18,39</sup> The concept of the differential diagnosis has been the time-honored clinical tool to cope with this human frailty, requiring the practitioner to consciously review other possibilities before closure. This is frequently the cognitive basis for attributing bad outcomes to human error while overlooking the contribution of system error.

## The Cost/Value Illusion

The cost/value illusion is frequently encountered when physicians equate value with the cost of medical care, testing or treatments. Humans can apply inconsistent reasoning when confronted by two equally important interventions with dramatically different costs.<sup>16</sup> In this context, the expensive intervention may be considered as far more important than the less expensive one. Aspirin, beta blockers, calcium, Vitamin D are examples of inexpensive, but critical treatments that are omitted regularly when patients are discharged from the acute care setting. Without systems, even the best institutions score poorly on compliance measurements.<sup>42</sup> The cost/value illusion is also encountered when additional testing or consultation of marginal benefit is ordered. The assumption that more testing or consultation will lead to improved outcomes is being challenged, as additional testing or consultation of marginal benefit may have unintended adverse effects on quality of patient care.<sup>6</sup>

## DISCUSSION

This article barely scratches the surface of the cognitive psychology of planning error. It is written by an amateur who has simply tried to organize and explain some of his recent observations. Articles describing error types are appearing with increasing frequency, and planning error as a specific cognitive error type needs to be included. An important distinction is that planning may be a different cognitive process than diagnostic reasoning. Furthermore, the author suspects that hunting and gathering more closely resembles diagnostic reasoning, and that planning more closely resembles the skill of homemaking and survival. These cognitive tasks are almost never done simultaneously, and may involve utilization of different parts of the brain. Taleb provides a partial explanation as he discusses how humans have gradually evolved with capability to plan for survival. During the past several decades, planning in medicine has become exceedingly complex in a very short interval, outstripping the ability for evolution to have prepared our brains for the task at hand.<sup>43</sup>

The human brain remains a remarkable computer and, given adequate time, it can solve all manner of problems, one at a time. Introducing time constraints and complexity, the brain will quickly fail us unless we have excellent and sophisticated tools. Humans, quite simply, are born statistically blind and with a vulnerability to information overload.<sup>18,43</sup> Practitioners struggle to be more analytical, and less emotional, in their practices, but, with ever increasing time constraints, it does remain a struggle. In addition, practitioners are vulnerable to human pitfalls in reasoning and this vulnerability assures that they will have an inherent error rate in diagnostic reasoning and planning. Circumstances inherent in episodic care have resulted that practitioners function for years without gestalt for his or her errors.<sup>44</sup> Limited opportunities to confront and correct mistakes render practitioners overconfident.

Humans, quite simply, learn best by experiencing mistakes, understanding them and correcting them for themselves.<sup>43</sup> Planning error is so seldom recognized by many practitioners that they can become convinced that they do not err. Ironically, developing gestalt for error does not prevent error. It

only enables us to recognize and correct our errors. Slowly over the past several decades, Medicine is truly beginning to impress physicians that medical error is abundant. Awareness, alone, will not help practitioners develop gestalt for planning error. At the current time, they must learn it for themselves. At this time, few practitioners are fortunate enough to have developed gestalt for planning error.

Overlap of jargon regarding human error types, heuristics, fallacy and complexity is unavoidable. For instance, there is similarity between memory bias and the metaphor/context complexity. There is also similarity between Occam's razor and the framing and availability heuristics. There is even some overlap of the fallacies presented in this limited classification. For instance, the cost/value illusion could be seen as a highly specific and over-learned application of the conjunction fallacy. This overlap is unavoidable and beyond the scope of this article.

This study is a dynamic process, and, unexpectedly, the author has discovered two additional planning error types that had been previously subliminal to the author at the time of the preparation of the text. These are Type I errors and Type II errors. Type I errors are failure to detect a signal, and Type II errors are incorrectly interpreting noise as a signal.<sup>45</sup> Since discovering the first Type II error in the practice, dozens more of these errors have surfaced that had been previously unnoticed. An example of the Type I error is *failure to impress* which is the leading cause of malpractice suits for neurologists.<sup>46</sup> An example of the Type II error is the 70% reporting of adverse drug reactions by families, consistently reported when later stage dementia patients are treated with placebo.<sup>47</sup> Further discussion of these error types is deferred.

## CONCLUSIONS

This article proposes one possible explanation for the clinical inertia experienced widely and in the nursing home. This limited taxonomy of fallacy and complexity might be a useful checklist for practitioners when planning the care for complex patients. It is based on terminology from cited references and the author's practice experience. It argues Goldratt's point that jargon is necessary so that we might recognize, discuss, and understand deficiencies in our formal education.<sup>21</sup> The author's experience supports the concept of pitfalls to planning longitudinal care for which many physicians are not well prepared.<sup>16</sup> It also proposes that the phenomenon of planning error may be one of the soft root causes of clinical inertia.<sup>1</sup> It is troubling that insight into fallacious reasoning is not readily available to front-line practitioners.<sup>48</sup> The rarity of references to fallacious reasoning in the medical literature suggests that this cause for medical error continues to be frequently overlooked by our profession.

Lack of training in the cognitive psychology of medical care is an example of where education in the clinical arena has lagged.<sup>49</sup> There is evidence that a few hours of remedial training early in our educational process might prepare us to recognize pitfalls of reasoning and to carry them forward into other domains in our subsequent practices.<sup>50</sup> The author argues that this preventive training should be introduced earlier, rather than later, and constantly refreshed as practitioners become more highly trained. As careful planners, we

should heed the advice of Ubel concerning the many patients and families who will ask us for our opinion. In those cases, withholding our recommendations is not beneficial to anyone, but when giving our advice, we should make every effort to minimize the influence of cognitive bias in the decision making process.<sup>37</sup> Additionally, when departing from provision of evidence based treatments, the practitioner should consider the limitations of his capabilities to think statistically. Decision making for that type of individualization should be well conceived and not based on simple solutions.

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