This is a sample of the instructor materials for *Applying Quality Management in Healthcare: A Systems Approach*, fourth edition, by Patrice L. Spath and Diane L. Kelly.

The complete instructor materials include the following:

- An instructor's manual featuring explanations of the exercises
- PowerPoint slides for each chapter
- A test bank

This sample includes the instructor's manual section and PowerPoint slides for chapter 3, "Characteristics of Complex Systems."

If you adopt this text, you will be given access to the complete materials. To obtain access, e-mail your request to hapbooks@ache.org and include the following information in your message:

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Applying Quality Management in Healthcare: A Systems Approach

INSTRUCTOR'S MANUAL

SECTION I—QUALITY MANAGEMENT: A SYSTEMS APPROACH

Chapter 3

Characteristics of Complex Systems

This exercise is similar to the one in the third edition; however, a different scenario is used to more closely match experiences a health services manager might have. The example is intended to reinforce the definitions of dynamic complexity by asking students to identify its characteristics.

EXERCISE 3.1

Change: Lower reimbursements and resulting changes in staffing are the most prominent examples of change.

Trade-offs: This example describes at least two different trade-offs: (1) maintain existing discounts for managed care contracts versus lose managed care contracts, and (2) replace RNs with less expensive medical assistants (MAs) versus only use RNs but there will be fewer available because their salaries are higher.

History dependency: The senior physicians are accustomed to having RNs assist with patient care and are therefore reluctant to have MAs in this role. Whether quality of care is affected by using MAs hasn't been investigated because of the "We've always done it this way" attitude.

Tight coupling: There are no specific examples of tight coupling described in the scenario. It could be possible the MA's patient assessment process is tightly coupled with the subsequent physician services, making it harder to identify a mistake made by an MA. But this is only supposition, as the patient care processes are not described in the scenario.

Nonlinearity: To appreciate nonlinearity, one must play out the circumstances surrounding the situation. For example, how could one predict that replacing RNs with MAs would cause turmoil between senior and junior physicians?

RECOMMENDED SECTION IV COMPANION PRACTICE EXERCISE: Exercise 3

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SECTION IV—PRACTICE LAB

EXERCISE 3

DYNAMIC COMPLEXITY

The objective of this exercise is to practice identifying dynamic complexity surrounding a patient care experience to increase students' ability to observe its subtle characteristics. This exercise challenges students to appreciate the patient's encounter within the context of the larger healthcare system and introduces the concept of system implications associated with management decisions.

The case is based on actual events and represents a composite of the root cause analyses conducted in relation to the care of several patients who experienced hospital-acquired infections. The table below presents possible acceptable responses to the questions about the case.

J. D. Sterman (2006), whose article is cited as further reading for this exercise, is a well-regarded expert in dynamic complexity. In the recommended article, he provides different explanations of the terms, which some students may prefer to adopt.

System characteristic	How it was expressed in Mrs. B's story
Change	• Physiologic changes associated with aging • Mrs. B's changing clinical condition • Changes to Mrs. B's insurance benefits • Economic changes, such as increasing dollar amount of the copayment
Trade-offs	• Insurance company trade-off: lower price of preferred drug against patient or physician preference • Mrs. B's known or unknown trade-off: choosing least expensive medication against changing to an unfamiliar medication • Physician trade-off: treatment with a medication that had been effective with Mrs. B against following the conditions of the pharmacy benefit plan
History dependency	• Mrs. B's health history of hypertension and osteoporosis • Mrs. B's health behavior history of treating her own minor conditions with over-the-counter medication or home remedies • Mrs. B's socioeconomic history of being a widow on a fixed income • Physician practice patterns over time
Tight coupling	This characteristic may not be readily recognizable in the care system, but it is illustrated in Mrs. B's physiological status: (*Comment to instructors: Some readers might view this example as a stretch; however, an understanding of both physiology and biochemistry*

	is fundamental to clinical care providers' education. Pathophysiological relationships and biochemical reactions may be thought of as being tightly coupled. As a result, some care providers may understand organizational characteristics related to tight coupling on an intuitive level yet find it difficult to communicate to managers and administrators who do not share this common education base.) • Medication reactions like that seen between Mrs. B's blood pressure medication and pain medication may be thought of as tightly coupled, considering the strong interaction exhibited between these two pharmacological compounds. • Time-dependent connections may be seen in the condition of orthostatic hypotension—that is, moving too quickly from lying flat in bed to an upright position—the resulting light headedness caused Mrs. B. to faint, which in turn caused her to fall. *(Comments to instructors: Discussion around the boundaries of the "healthcare system" may be interesting here—that is, does the system include the patient? How do characteristics of the patient as a system influence the management of the organization as a system?)* • The relationship of the steps of the process: physician ordering, pharmacy dispensing, and insurance company paying could also be considered tightly coupled.
Nonlinearity	• Relatively benign action of Mrs. B treating her cough with over-the-counter medication set in motion a sequence of events that eventually led to her deteriorating clinical condition. • Relatively benign decision of a change in insurance payment benefit set in motion a sequence of events that eventually resulted in Mrs. B's death. *(Comment to instructors: Once again, some may view this example as a stretch; the intent is to illustrate this characteristic of nonlinearity in healthcare organizations. Usually, individuals do not have the opportunity to be aware of consequences of their actions that may occur outside the boundaries of their particular subsystem; whether individuals are aware of them or not, these consequences will still be present.)*

SAMPLE STUDENT RESPONSES

Following are student responses to the exercise. The examples are reprinted here with permission from the students: Carolyn Poe, RN, and Daniel Nissman, MD.

Example 1

Name: Daniel Nissman **Date:** February

1. Explain how these system characteristics are expressed in the case study.

Change—patient's insurance changed to use pharmacy benefits management and a formulary that did not include the medication the patient was on.

Trade-offs—a trade-off between maintaining low cost was made at the expense of increased/unknown side-effects

History dependency—this is represented by the patient's pre-existing osteoporosis and risk for fractures

Tight coupling—BP med (ACE?) ➔ cough ➔ osteoporotic fracture pain ➔ taking OTC pain meds ➔ interaction with BP medication

Nonlinearity—the seemingly "benign" switch to a formulary drug resulted in a cascade of events that resulted in the patient's death. The effect is clearly not proportional to the cause.

Exercise Addendum

Name: Daniel Nissman **Date:** February

Explain how these system characteristics are expressed in the case study.

Tight coupling—BP med (ACE?) ➔ cough ➔ osteoporotic fracture pain ➔ taking OTC pain meds ➔ interaction with BP medication

Thoughts about tight coupling:

First of all, the examples listed in the chapter are procedural. However, if you extend the definition of tight coupling to a "series of events where the next event/happening is highly predictable based on the previous event" then we can extend the examples to include drug interactions. (Codes, although driven by protocol, rarely proceed exactly according to the protocol, so there is not a 100% linkage between successive steps.) There are two possible pain med/BP med interactions that are fairly predictable that I can think of:

1. morphine and any BP med causing vasodilation → orthostatic hypotension
2. any NSAID + ACE inhibitor can cause renal failure by inhibiting the afferent and efferent arterioles feeding the glomeruli → orthostatic hypotension

It is likely this woman experienced #2. A second mechanism of tight coupling could be:

Orthostatic hypotension → fall; and then fall + osteoporosis → hip fracture. These are not 100% couplings, but they are highly predictable.

It's not clear that there was any procedural tight coupling that led to this woman's demise (except for the insurance company wants to save money and therefore the patient gets screwed).

Example 2

Name: Carolyn Poe **Date:** February

Change:

1. Mrs. B.'s insurance company contracted with a pharmacy benefits management company (PBM), thereby leading to a change in the insurance company's drug formulary, which led to a change in the medication that Mrs. B. was taking for her hypertension.

Tradeoffs:

1. Unless she wanted to pay five times more than she had been, Mrs. B. had to stop taking the anti-hypertensive drug she had been taking for the previous 10 years.

2. The physician felt compelled to switch Mrs. B. from a medication that he was familiar with to one he wasn't as familiar with so that Mrs. B. could afford to continue receiving treatment for her hypertension.

History dependency:

1. This is not exactly clear in this case in regards to the insurance company and their new relationship with the PBM; one can assume that as part of a dynamic system, the insurance company was trying to save money, either as a result of a decision made previously, or as part of a forward going effort to cut costs.

2. The long-standing relationship between Mrs. B. and her doctor, who had an understanding of her co-morbid condition (osteoporosis) as well as her prior response to the drug.

Tight coupling:

1. To some degree, the relationship between the insurance company and the PBM and the relationship between the PBM and the pharmacist(s) who would be put in the position of telling their customers that they could no longer get the same prescriptions that they'd been getting for the same price (undoubtedly, Mrs. B. wasn't the only person to be affected).

2. The relationship between the pharmacist and the physician. The pharmacist interacted with the physician to try to come up with a viable alternative for Mrs. B.

Non-linearity:

1. The effect of the cost-cutting measure by the insurance company that ultimately led to the death of Mrs. B. The two are seemingly unconnected but ultimately the decision of

the insurance company contributed to Mrs. B.'s broken hip and subsequent long, complicated, and expensive hospitalization.

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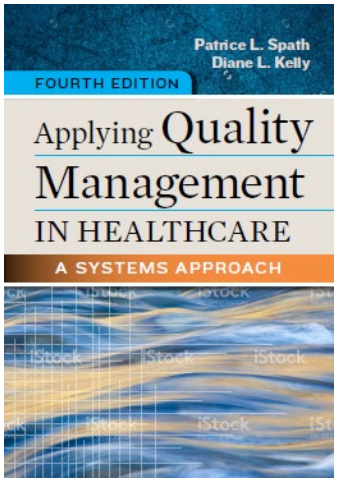


Chapter 3

Characteristics of Complex Systems

Learning Objectives

After completing this chapter, you should be able to

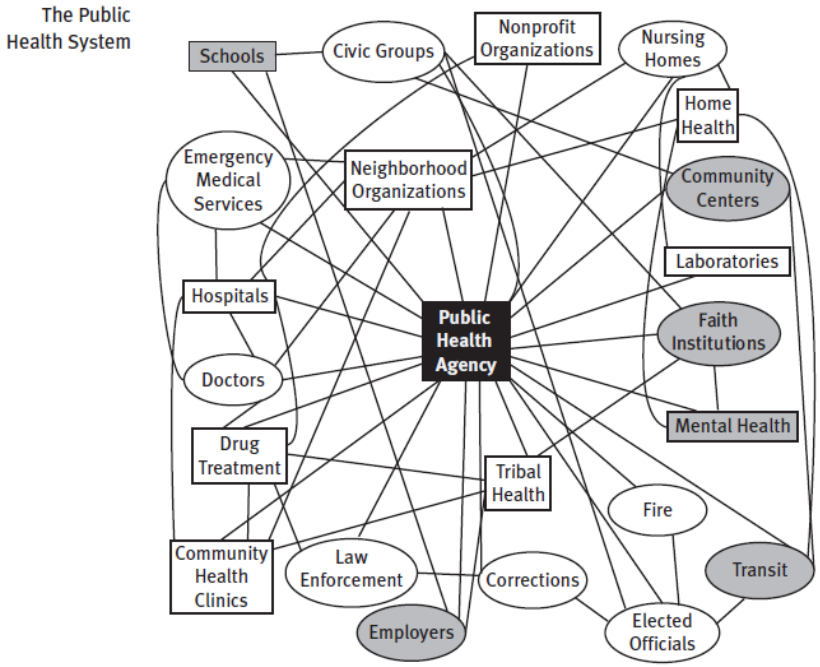
- discuss how a systems perspective can explain recurrent organizational problems,
- recognize different types of systems and the role of systems thinking,
- describe system characteristics that contribute to dynamic complexity, and
- explain the influence of dynamic complexity on managerial decision making

Complex Health Services

- The presence of a large number of variables that interact with each other in countless and often unpredictable ways
- Dynamic complexity: “cause and effect are subtle, and where the effects over time of interventions are not obvious” (Senge 2006)

Systems Thinking

- Healthcare systems contain a complex variety of interdependent organizations



Systems Thinking

"A view of reality that emphasizes the relationships and interactions of each part of the system to all the other parts"

McLaughlin and Olson 2012

Dynamic Complexity

System characteristics that contribute to dynamic complexity