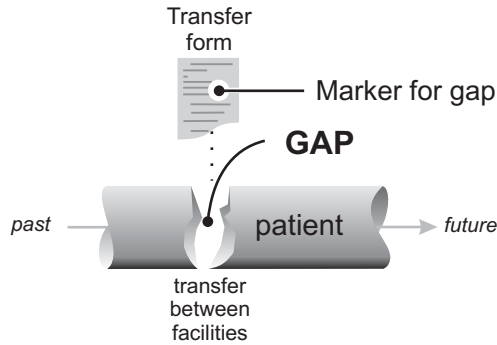


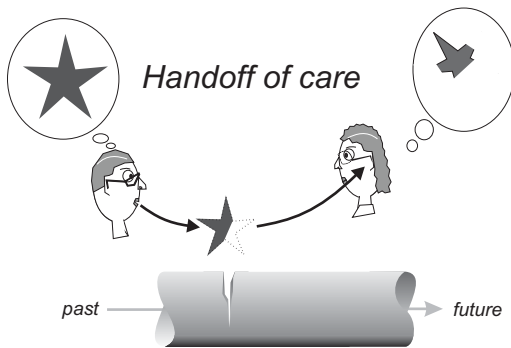
①



Big gaps are easy to identify

- Gaps in the continuity of care are common.
- Recurring, recognized gaps are partly offset by *cognitive artifacts* that make up for the discontinuities produced by gaps
- An example is patient transfer between facilities. Transfer documents *partly* offset the loss of continuity.

②

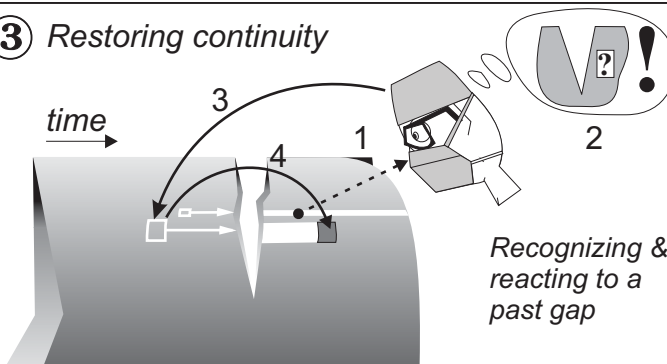


Small gaps may be harder to see

- Handoffs of care are a potent source of gaps.
- Example: *handoff at shift change or change in location.*
- Defenses include artifacts (e.g. checkout logs) and activities, e.g. conversational routines that exchange lead to exchanges of responsibility and authority.

The size of the gap doesn't determine the potential of the gap to cause harm.

③ Restoring continuity

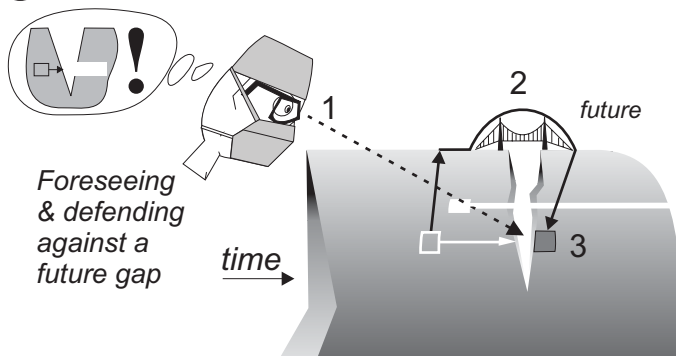


- 1: Past gaps are recognized by their effects.
- 2: Missing / inconsistent data or unexpected events alert practitioners to possible gaps.
- 3 & 4: Practitioners usually resilient and able to restore continuity, e.g. by searching for and finding missing data.

N.B. missing data that acts as a cue is not necessarily the data that needs to be recovered to restore continuity.

Sources of healthcare resilience

④ Sustaining continuity



- 1: Experienced practitioners can foresee future gaps.
- 2: Anticipating future gaps leads practitioners to construct bridges. These offset some *but not all* of the expected consequences of gaps.
- 3: Successful bridging limits the impacts of gaps. This has the paradoxical effect of making gaps seem less significant.

This activity is a primary source of the robustness of healthcare

Preparation of this version made possible partly through support by the Midwest VA Patient Safety Center of Inquiry (GAPS).

18 Characteristics of Complex Systems Failure

- 1) Complex systems are *intrinsically* hazardous systems.
- 2) Complex systems are heavily and successfully defended against failure.
- 3) **Catastrophe requires multiple failures** – a single point failure is not enough.
- 4) Complex systems contain changing mixtures of failures latent within them.
- 5) **Complex systems routinely run in degraded modes.**
- 6) Catastrophe is always just around the corner.
- 7) Post-accident attribution of the accident to a 'root cause' is *fundamentally* wrong.
- 8) Hindsight biases post-accident assessments of human performance.
- 9) Human operators have dual roles: as producers & as defenders against failure.
- 10) **All practitioner actions are gambles.**
- 11) Actions at the sharp end resolve all ambiguity.
- 12) Human practitioners are the adaptable element of complex systems.
- 13) Human expertise in complex systems is constantly changing.
- 14) **Change introduces new forms of failure.**
- 15) Views of 'cause' limit the effectiveness of defenses against future events.
- 16) Safety is a characteristic of systems and not of their components.
- 17) Failure-free operations require experience with failure.
- 18) **People continuously create safety.**

Additional details on these points appear in Cook, O'Connor, Render, Woods, "Chapter 2: Operating at the Sharp End: The Human Factors of Technical Work and Its Implications for Patient Safety" in Manuel & Nora, eds., *Surgical Patient Safety: Essential Information for Surgeons in Today's Environment*. (Chicago: American College of Surgeons, in press)

5 Characteristics of Patient Safety

1. **Safety is made and broken in systems, not individuals.**
Safety emerges from the *interaction* of the components of the system. Safety does not reside in a person, device or department. Improving safety depends on learning how safety emerges from the interactions of components.
2. **Progress on safety begins with understanding technical work.**
All progress on safety depends on precise, calibrated knowledge about how technical and organizational factors play out in real technical work.
3. **Productive discussions of safety avoid confounding failure with error.**
Folk models that "explain" accidents confound these two distinct terms. "Failure" is the outcome itself while "error" is the result of a social process of attribution of cause. Studies of "error" are actually studies of this social process of attribution rather than studies of how failure occurs.
4. **Safety is dynamic not static; it is constantly renegotiated.**
Systems under pressure move towards the edge of the performance envelope, shifting the tradeoff point. Risk and vulnerability change. People constantly adapt to perceived risk and vulnerability. These adaptations are only partly successful because the perceptions on which they are based are only partly calibrated. The result is that:
 - A. *Treating safety as sacred threatens safety.*
 - B. *Adding complexity makes safety harder to achieve.*
 - C. *The most important safety issues are those of the future.*
5. **Tradeoffs are at the core of safety.**
Trading off between risk / hazard and other goals (e.g. production) is required for real world work. No matter how much effort is expended, people will confront irreducible uncertainty, multiple hazards, and fundamental dilemmas. Understanding safety requires understanding how people act in the face of these challenges in the environment of technical work.

Warnings about Safety

1. *Treating safety as sacred threatens safety*
2. *Adding complexity makes success harder to achieve*
3. *The most important safety issues are those of the future*

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