Process Mapping — The Foundation for Effective Quality Improvement

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Process maps are a key quality improvement tool used to visualize how healthcare, and its complex processes, are delivered. It is used for determining the step by step flow of the process, its timing, handoffs, and identifying outputs that can be visualized, measured, and studied. Due to the complexity of healthcare, process mapping must be a foundational element of both healthcare process design and quality improvement.

Curr Probl Pediatr Adolesc Health Care 2018; 48:177–181

"Draw a flowchart for whatever you are doing. Until you do, you do not fully understand what you are doing. You just have a job. Words have no meaning unless they are translated into action, agreed upon by everyone. An operational definition puts communicable meaning into a concept. The first step in any organization is to draw a flow diagram to show how each component depends on others. Then everyone may understand what their job is. If people do not see the process, they cannot improve it."

- W Edwards Deming (1900-1993)

Overview

The core premise of process mapping, regardless of the industry or setting, is that you cannot manage what you do not measure. By extension, it is difficult to determine what and how to measure if the steps, and the order they fall in, are not known. In a primary care clinic, it is easy to believe that it is too small of a setting to require something as formal as a process map to understand how patients flow through the clinic. In fact, even in a small clinic, there are multiple, complex processes that occur throughout the day. Registration, billing, delivery of procedures, scheduling, and patient flow for routine visits all represent processes that can intersect, overuse resources and require monitoring and improvement. Even the most efficiently run clinics with well-designed processes can drift over time and introduce redundancy and wasted time as new activities are introduced, staff is replaced, and patient volumes change.

Process mapping in its simplest form is a visual representation of the flow of one step of a process into the next, defining precisely:

- who (is responsible).
- What (is done).
- When (what time and/or what order).
- Where (system, equipment, unit, facility, etc.) for each task in the process.

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When a process map is completed, a complete picture of a process and its moving pieces and handoffs can be visualized and studied. Further study and data collection of the process using the completed map captures the duration of process steps, wait times, queues, flow, and/or physical pathing within the process space. When a process is well understood, then the maps can be used to identify steps where reliably measurable metrics can be collected that evaluate the effectiveness of the step in the process or the

From the Dayton Children's Hospital, One Children's Plaza, Dayton, OH 45404, United States.

Curr Probl Pediatr Adolesc Health Care 2018;48:177–181
1538-5442/$ -see front matter

https://doi.org/10.1016/j.cppeds.2018.08.010

outcome of completing the process. In addition, opportunities for error and waste reduction can be identified and quantified.[1]

A Healthcare Example

Process mapping is as important in healthcare quality improvement as it is in any other industry. The following is a healthcare example of a process map: An interdisciplinary team aims to reduce wait times for patients arriving for flu vaccinations in a pediatric clinic prior to flu season. The goal is to expedite those patients coming in for only vaccinations without adversely impacting the wait times for patient families coming in for other scheduled appointments. The first step is to create a current and comprehensive process map of patient pathing in the clinic. This interdisciplinary team includes clinic registration/office staff, medical assistants, nurses, and clinicians (though depending on the size and complexity of the clinic, others could be included). Team members determine that the map should start with the arrival of the patient to the clinic, and end at the checkout desk with the patient receiving their post-visit summary. For the map to be complete and useful, all required patient preparation steps (registration, consent, vitals, patient history, vaccination, post-vaccination assessment, and instructions to parents, etc.) and hand offs (registration to medical assistant, medical assistant to nurse, nurse to clinician, etc) in the process must be included between those two points. Once this initial mapping is complete, a data gathering exercise of following patient families through the clinic is conducted to ensure all steps and handoffs were captured in the map. Since time is a critical factor to be optimized in this process, the next step is then to follow a representative number of patients to capture timing and duration of each step. The completed process map, with timing data, is now ready to be used to brainstorm potential opportunities for improvement that will reduce wait time while understanding the upstream and downstream impacts to the pre-operative process. See Fig. 1 for an example of completed process map.

Many healthcare related processes are straight-forward business processes that can be mapped and measured with easily obtainable measures such as time and distance traveled. Additional considerations are required when the measureable output is the outcome of a medical procedure. This is because outcomes can be multi-factorial, or success is measured by the absence of an intervention/recurrence, or can have significant delays to measurement (such as measuring improvement in chronic disease or improving patient experience). The "success" criteria may not be as

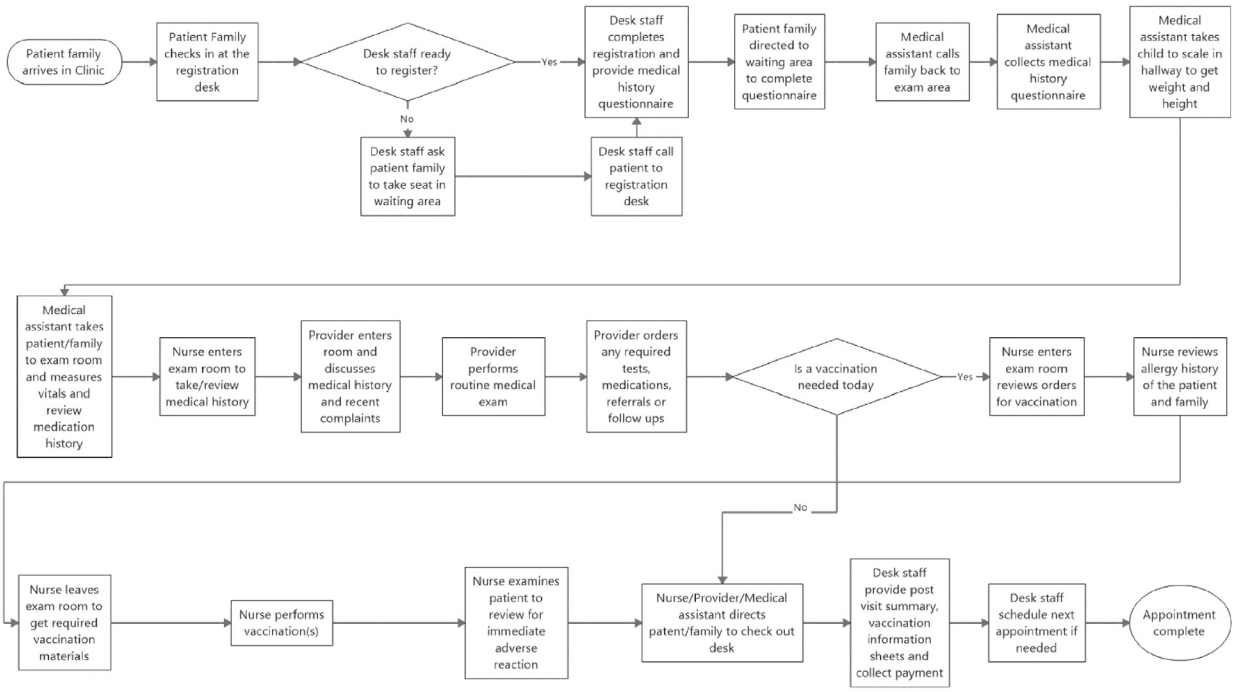

Fig. 1. Pediatric clinic visit process map.

straight forward to measure by assessing a single dimension of the patient alone.

Because of this complexity, robust process maps facilitate the design of a measurement system specific to the process to collect data. The following list includes factors (though not comprehensive) that influence process and/or flow in the healthcare setting:[1–4]

- The more people, groups, departments, and/or specialties involved, the more complicated the process will become.
- Care pathways often evolve over time and changes that may improve clinical outcomes may change the patient experience or capacity of patients that can be treated.
- New technology and techniques do not always easily fit into existing training and infrastructure. (A process map is a great tool for planning for implementation of the "new" in a healthcare setting, not just for improvement of existing processes)
- New business and documentation processes may not seem like a burden in a vacuum of solely the new activity, but when overlaid into existing patient care plans or handoffs among departments, new processes can become a source of errors and frustration by clinicians.
- If patients and/or clinicians are involved in mapping, then the process can be viewed from their point of view
- Applying different mapping tools can provide unique perspectives to a process. For example, a spaghetti diagram shows the distances patients need to travel within a healthcare setting or a swim lane diagram can be used to show how a patient moves between departments when receiving complex care from multiple clinicians.[2]

Due to the complexity of healthcare, process mapping should be a foundational element of both business design and quality improvement.

Due to the complexity of healthcare, process mapping should be a foundational element of both business design and quality improvement. Process mapping is critically important to understand how to achieve the intended outcome of what an organization is trying to implement while avoiding unintended consequences.[2,3]

Fig. 2.1. Box: activity step of process.

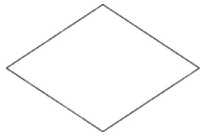

Fig. 2.2. Diamond: decision step of a process.

Tools For Process Mapping

The importance of process mapping in a healthcare setting has been described above. Useful process mapping tools includes software to facilitate process mapping, commonly employed symbols, and a number of basic process mapping/flow chart types.

Process Map/Flow Charting Software

There are a number of software tools that facilitate the manipulation of symbols that may be organized into a flow chart. In fact, most office software solutions (Microsoft Word and PowerPoint as well as others) offer the same shapes and symbols for use within a document, so specialized software is not needed. However, the general office products are not as user friendly (as compared to other available products) to use for linking between steps. They are useful for simple charts with a limited number of steps that will not require much manipulation or modification. Microsoft Visio is one of the most common tools used for creating flow charts, but there are other open source tools that provide the same type of drag and drop capability that Visio provides.

Fig. 2.3. Arrow: linker between process steps.

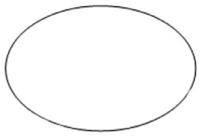

Fig. 2.4. Oval: process beginning or end.

for a clinic appointment. It clearly identifies the beginning and ending of the process that was mapped. Each box describes what action is taken and identifies who takes the action. The decision step is tied to a discrete question that determines which path will be taken.

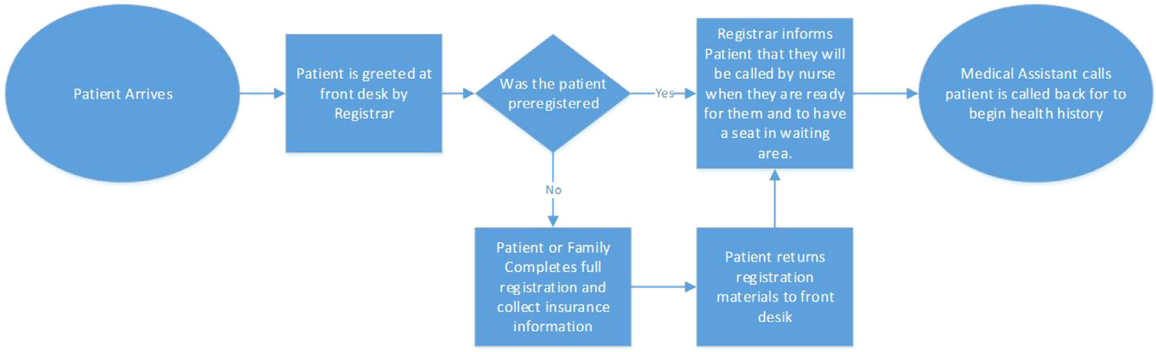

Fig. 2.5. Process map/flow chart.

Process Map/Flow Chart Symbols

A variety of flow chart symbols are used to represent different types of activities. In creating a flow chart, the most commonly used symbols/shapes are the box, diamond, arrow, and oval.[4,5]

Boxes are used to represent an activity step in the process flow (see Fig. 2.1). The process step is described briefly within the box and should include identification of the person, function, or organization responsible for that step.

Diamonds are used to represent decision steps (see Fig. 2.2). Diamonds are tied to a question (e.g. Is the criteria met?) and based on the answer (Y/N for example) a different next step will be followed.

Arrows point the direction of the process flow from one symbol to the next. (see Fig. 2.3)

Ovals represent the beginning or end of the process. (Fig. 2.4)

Basic Process Map/Flow Chart

Fig. 2.5 is an example of a simple process map that is focused on the patient flow when arriving

Spaghetti Mapping

A spaghetti map is a specialized process map that is used to visually represent the movement of things and/or people within a defined physical space that is used for the process. Lines between locations where steps are performed are used to show the physical path through the space. This tool is used primarily to evaluate if a process is efficiently organized within a physical space or if there is overlap and chaos created by the movement between steps.[5] (Fig. 2.6).

Conclusion

Process maps are a quality improvement tool for the visualization of how a healthcare related process is performed. It is a critically important tool to clarify the flow of a process, its timing, handoffs, and identifying outputs that can be visualized, measured, and studied. Due to the complexity of healthcare, process mapping must be a foundational element of both healthcare process design as well as quality improvement.[1–5]

It is a critically important tool to clarify the flow of a process, its timing, handoffs, and identifying outputs that can be visualized, measured, and studied.

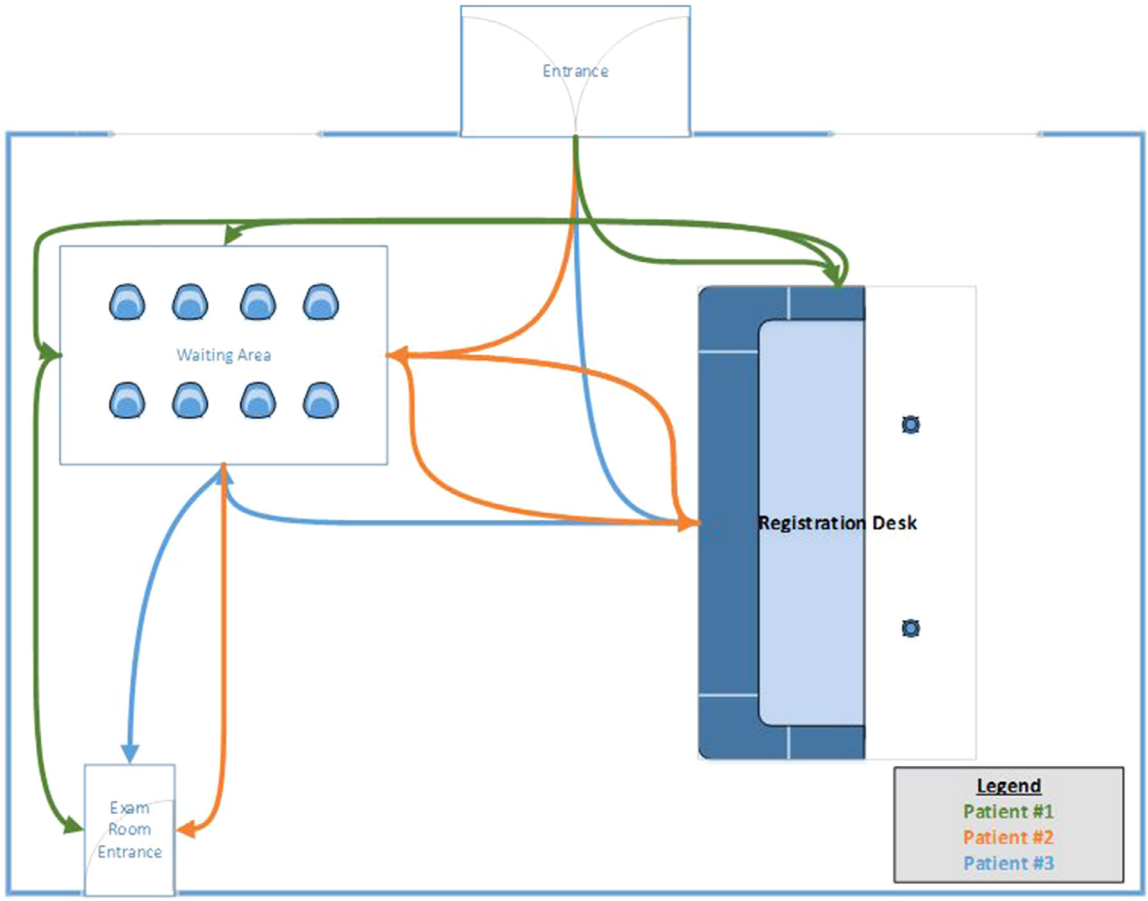

Fig. 2.6. Spaghetti map.

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