The Key to CQI in Medical Education

As medical schools discover the enormous administrative challenges of meeting expectations for Continuous Quality Improvement (CQI), there is growing recognition of the importance of data - and data health in particular. Medical schools need to bring a stronger set of processes and policies to their data to build a robust CQI function. This white paper outlines a framework to address this urgent challenge.

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MedEd and CQI

Continuous Quality Improvement, or CQI, is a structured organizational process that involves planning and implementing ongoing improvements in order to positively impact outcomes.

CQI has a rich history and a sizable body of accompanying knowledge. From generic CQI frameworks like the **Plan-Do-Study-Act** cycle, to the Institute for Healthcare Improvement's **model for improvement**, to various frameworks for education (**here** is a good example), CQI is a set of processes and skills that can be gained with diligent work. At its core, CQI is a relatively simple concept (hint: the name gives it away), but it's the implementation and the idea of organizational transformation inherent in the concept that is difficult.

Measuring, thinking about, and working to improve the quality of one's medical education program is not a new idea, of course. Lowercase-q quality improvement is familiar to anyone that works in a medical school and wants to make things better. But CQI is no longer about just quality improvement. New accreditation standards and an evolving technology landscape make formal CQI a daunting, central challenge for every medical school.

Accountability -
CQI is Now Mandatory

Accountability in North American medical education flows back to the Liaison Committee on Medical Education, the LCME. The LCME accredits MD degree programs in the United States and Canada. Its accreditation standards, "**Functions and Structure of a Medical School**", lay out the fundamental standards schools must meet to gain and keep accreditation.

The very first standard, 1.1, mandates CQI:

> **1.1 Strategic Planning and Continuous Quality Improvement**
> A medical school engages in ongoing strategic planning and continuous quality improvement processes that establish its short and long-term programmatic goals, result in the achievement of measurable outcomes that are used to improve educational program quality, and ensure effective monitoring of the medical education program's compliance with accreditation standards.

LCME revised its standards in 2015. One of the changes in the 2015 revision was to bring this new standard on Continuous Quality Improvement to the forefront. That was 6 years ago. Given an 8-year accreditation cycle, this standard is still very new. Its implications and implementation are still being understood by medical schools.

One thing is clear, though: medical schools are now required to bring capital-C Continuous Quality Improvement in some form into their medical school. To respond to this mandate, some schools have created **offices** of Continuous Quality Improvement while others have formed CQI **committees.** But it's slow going. CQI efforts have a notable failure **rate**, and getting up to speed on the right framework, approach, and process can be a daunting set of tasks that can **obscure** the real work of CQI.

Data and Supporting Technology are Central to CQI Today

In the LCME standards document, "Functions and Structure of a Medical School", the word "software" is not mentioned a single time. The LCME's accreditation standards are deliberately non-prescriptive. As they state, the school must "engage ... in continuous quality improvement processes" but they do not say how. Nor should they. Using software is a prescriptive instruction, a *potential* solution to the problem of meeting a standard.

In fact, the word "software" is found only once on the LCME website: in a guideline that the LCME published in 2016 on, of all things, monitoring the components of Standard 1.1 - Strategic Planning and Continuous Quality Improvement.

If you are involved in a CQI effort at your medical school, this document is a good, short summary of many of the decisions medical schools will face when trying to implement a solution for ***Standard 1.1: Implementing a system for monitoring performance in LCME accreditation standards.***

While the document still clearly states that its guidance is not prescriptive, it calls for schools to consider staffing "IT support to develop mechanisms to store and retrieve data" and to plan resources "including IT hardware and software and other relevant infrastructure for the collection, storage, and reporting of data."

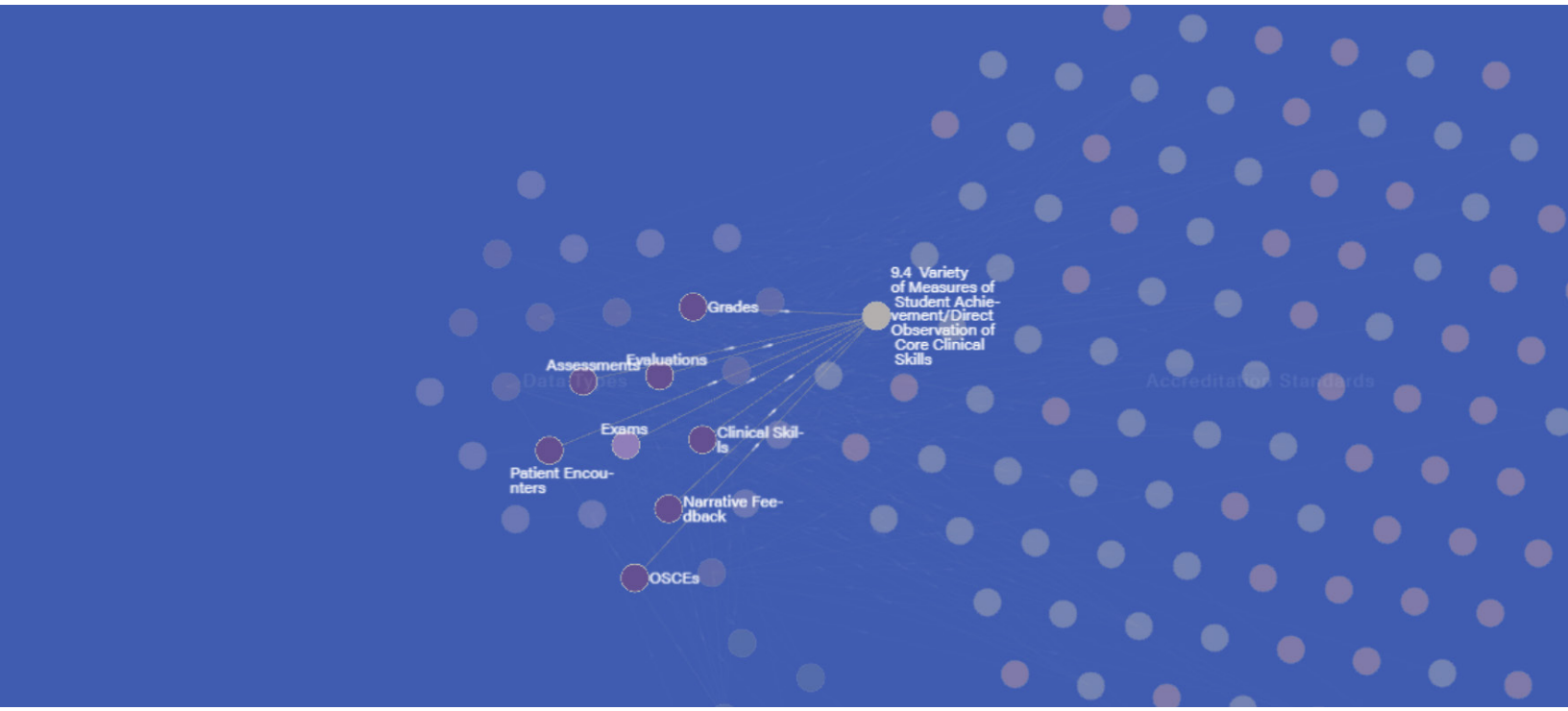
The document is a concession, of sorts, to today's world. In 2021's software and metrics-driven world, data is the substrate of medical education performance monitoring, the necessary ingredient to any CQI process.

To be effective, then, CQI must reflect a healthy appreciation and care for data. Data on its own is not enough. As the LCME authors say, correctly, "Data collection is only the first phase of the monitoring process. The data will need to be analyzed, 'packaged,' and reviewed before being acted upon."

Medical schools will need to bring a stronger set of processes and policies to their data if they want to build a robust CQI function.

The Growing Role of Data Warehousing and Automation

Monitoring accreditation standards holistically is no small deal. Evidence of meeting individual standards often comes from multiple data sources. This accreditation standards "**map of the universe**" illustrates how different standards pull information broadly from across the organization.



As portrayed by the map, LCME standards and data sources are heavily intermingled. The LCME **Data Collection Instrument** (DCI) provides a guide for presenting the data, but leaves the implementation up to each individual school.

With multiple data sources, reporting requirements, standards, and people involved, preparing for an accreditation review comes along with a large amount of administrative "scut work". Data from different sources needs to come together to build a complete picture of standards compliance. Some schools bring in temporary teams of people at accreditation time in order to extract, massage, and "package" data for external consumption.

And here lies the problem. Standard 1.1 is about continuous quality improvement. Instead of once every four or eight years, schools must be continuously extracting, massaging, and packaging data in order to stay compliant. The amount of scut work is growing tremendously. It could explain why the LCME published their follow-up document. It was a heads up to schools around this issue.

So, how can schools get out from under this administrative burden? **The most likely answer is data warehousing and data automation.**

Data Warehousing is the process of collecting data from all sources - software vendors, databases, and spreadsheets - and automatically aggregating it into a thoughtfully designed, easy-to-use warehouse.

Data Automation is the process of setting up integrations in software systems (Admissions, LMS, SIS, Assessment, Scheduling, Curriculum, or Exam products) to enable data to automatically flow into the data warehouse, without the need to do custom exports or data drops.

Together, these two technology approaches hold the promise of centralizing data for accreditation and massively reducing the administrative load of a continuous improvement process. This is the promise of data integration - and why it's critical for true CQI.

The Challenges of Data Integration

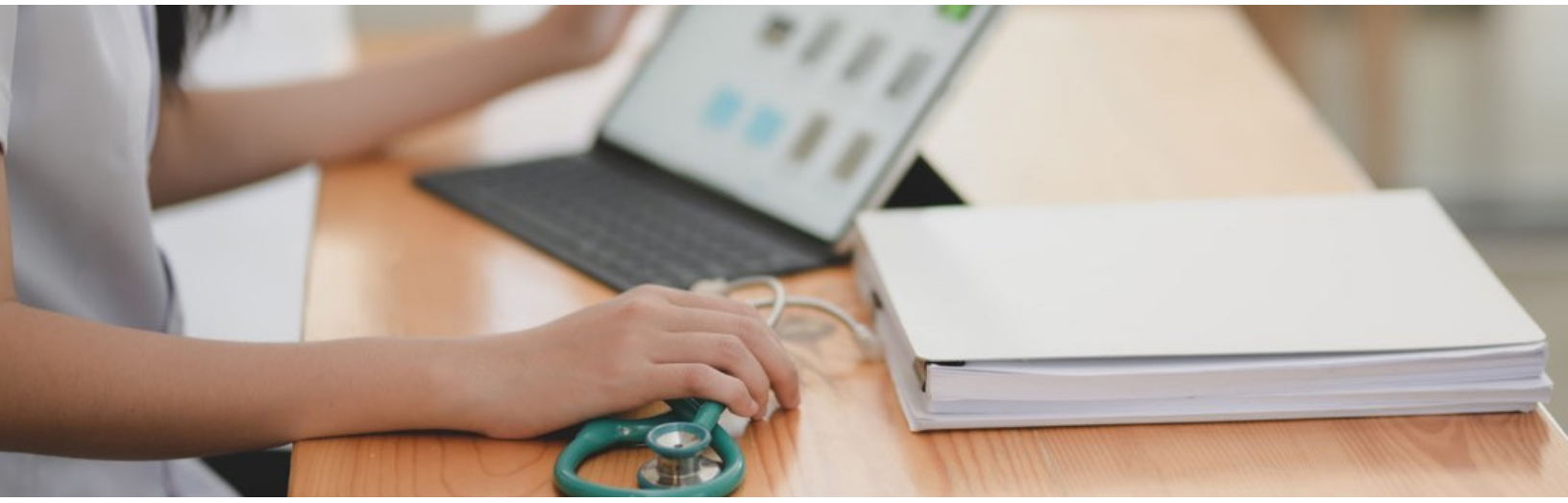
Many medical schools describe the "holy grail" of reports. It's a report that links the curriculum map with assessment outcomes and captures data from across the spectrum of internal software systems to build a complete picture of curriculum performance. This type of report is critical to a longitudinal analysis of something like Standard 6.1:

> **6.1 Program and Learning Objectives**
> The faculty of a medical school define its medical education program objectives in outcome-based terms that allow the assessment of medical students' progress in developing the competencies that the profession and the public expect of a physician. The medical school makes these medical education program objectives known to all medical students and faculty. In addition, the medical school ensures that the learning objectives for each required learning experience (e.g., course, clerkship) are made known to all medical students and those faculty, residents, and others with teaching and assessment responsibilities in those required experiences.

Producing reports like this can be done, but getting to the point where it can be produced is non-trivial.

Consider some of the data challenges required to link curriculum data to exam data:

- A strong curriculum map needs to be in place and up to date.
- Curriculum components in the map need to be mapped to individual exams. Most schools use more than one exam system.
- Because so much longitudinal "threading" of topics happens in MedEd today, competencies in the curriculum often need to be mapped to individual exam components. This requires a mapping between the exam's tagging system and the competency/tagging system that the curriculum map uses. Often these two systems use different "tagging" concepts altogether.
- Exam scores need to be normalized across educational components.



- Students in the various systems need to be reconciled with each other in order to centralize their scores.
- Curriculum components themselves need to follow some sort of standard, so the key elements of the curriculum can come to the forefront during the reporting process.

And this is just one set of data relevant to CQI and accreditation.

It's not a question of whether medical schools have unhealthy data. What they have, instead, is data that is likely *ill-suited* to the coming continuous integration and review cycle. When a school implemented its exam system 5 years ago, it probably didn't have the frame of reference that today's environment provides. A common refrain from medical schools they implement data warehousing and dashboarding solutions is "I wish I had known this back then".

Making Overall Data Health a Priority

If you have concerns about your data's ability to support a full CQI process and the accreditation risks that implies, consider making data health a priority in your organization.

It involves **three essential steps:**

1. Give data health ownership, visibility, and priority at a high level.

2. Build a nuanced understanding of the issues on the ground.

3. Work to make iterative improvements.

Step 1

Give data health ownership, visibility, and priority at a high level.

Medical school leaders today are busy. They often delegate the creation of reports to administrative staff. Administrative staff are extremely resourceful and aim to provide good support, so they often "clean" the data to make it look good. This hides data quality issues.

MedEd leaders tend to have their own "pet" reports that administrative staff generate for them. This means that different leaders apply different data cleaning rules to different reports. This can create or exacerbate data quality issues and, in some cases, can mean different segments of the medical school are looking at and making decisions based on different data.

When data quality issues are hidden, distributed, and nuanced, it affects CQI, which depends on good data. There are several ways to address this.

A) Assign data health to the CQI committee or a senior leader

Centralized, top-level ownership for data quality is the only way to bring about the whole scale change required to solve data quality problems. It gives this problem importance (by giving it to a key person or committee) and teeth (by giving that person or committee the authority they require).

B) Ensure data quality is tied to strategic priorities

Many medical schools' strategic plans and priorities leave out technology entirely, or create a single, separate technology focus area. This is a mistake. As discussed above, data and technology are now woven into the very fabric of how a medical school operates. Data quality issues, therefore, can impact each aspect of the strategic plan if not properly cared for. Institutions must make an effort to integrate aspects of data and technology into each component of their strategic plan, so that the committees and individuals responsible for the execution of that plan do not relegate these issues to IT or to the end of their projects.

C) Ensure the senior leader responsible for data health is technically knowledgeable and is involved in key committees

Data quality issues are nuanced and involve many stakeholders. In order to have the technical credibility to work with operational system owners (IT, admin staff), the data health lead has to be able to understand the subtleties of how data is captured, represented, and generated. To have the institutional understanding required to recommend the right changes to how data is captured, represented, and generated, the data health lead should have an appropriate role on a good proportion of the important data review committees (such as curriculum). A Chief Data Officer can serve in this role, but this is not necessary. What is key is that this person has a good feel for medical school operations, operational data issues, and has enough seniority to be present in the right meetings.

Step 2

Build a nuanced understanding of the issues on the ground.

Data quality issues often stem from the way operational systems (evaluation, exam, etc.) are used in day-to-day operations. Without a detailed understanding of how those systems are used and why, change will be difficult.

The people who use the operational systems that run the medical school are the ones whose jobs must change to ensure data quality is robust. They need a fair process to convince them that the change effort is absolutely necessary and has their best interests in mind.

The person responsible for overall data quality must be present and involved to make the effort work. This involvement has three critical elements.

A) "Go and see"

Toyota is a pioneer of putting true CQI into practice. Their Toyota Production System is the canonical example. And a central tenet of their system is **Genchi Genbutsu** (go and see). From Wikipedia: "It suggests that in order to truly understand a situation one needs to observe what is happening at the site where work actually takes place: the genba (現場). One definition is that it is 'collecting facts and data at the actual site of the work or problem '." This can be applied to data health and CQI in MedEd. The data health lead needs to sit with the people that use the operational data collection systems and observe how work actually gets done. It's essential to understand the work that creates the data quality issues in the first place.

B) Build a sense of urgency

Data quality issues will have severe consequences if not addressed. After sitting with the data collection systems, processes and problems, the data health leader must convince others of the need for a change. They must push to build a compelling narrative for why change is needed. In the book "The Heart of Change" by John Kotter, there's a **great story** of how to do this right. In the tale, a man named John Stegner collects 424 different pairs of safety gloves in use at his company. He stacks them all on a boardroom table in order to illustrate to his

leadership group just how wasteful his company's purchasing processes are.

Data quality issues bear a lot of similarity to the purchasing issues in a large manufacturer: they are small individually, confined to small teams, and silo'ed software systems, but have enormous consequences in aggregate. Each person who will be asked to change may not be able to see the value or the reason behind each change. Building great stories and communicating those consistently are critical to convincing all stakeholders to change.

C) Select your measures carefully

The "go and see" work will bring clarity to the data quality issues in your organization. The creation of a compelling story will get others to see the need to address those issues. The final step is to select the measures you will use to drive the change effort. As the old management slogan states "what gets measured gets managed". Careful thought must be put into both the outcomes sought through this effort (more accurate reporting, easier mid-cycle accreditation, etc.). Equal care should go into the selection of "**lead measures**" -- the handful of indicators that will tell you if the data health of the organization is improving on a daily basis.

Step 3

Work to make iterative improvements

After securing the organizational support to make data health a priority, and after gaining a deep understanding of the data quality issues in your organization and the potential gains from addressing them, the change effort can begin.

Describing the work required to bring about a successful change effort is outside the scope of this white paper. Our experience suggests, however, that adopting an iterative small-scale approach to change, even in the face of a big problem, is likely to result in better outcomes. In fact, the Plan-Do-Study-Act (PDSA) cycle is **designed** to bring about big changes through small-scale improvements. Almost all continuous improvement frameworks highlight the compounding effect that small changes can have over time.

So: start small and refine over time. Here is an example PDSA cycle for a data health challenge:

A) Plan: Build processes and policies

The heart of a plan for data quality improvement will be based on processes and policies. Select an area to improve, for example a course review process. Then, "go and see", which might include:

- Reviewing the operational subsystems that provide data for the course review process
- Sitting with the system administrators and watching them work
- Reviewing examples of reports produced by these systems, and if they exist, combination reports produced from multiple subsystems. Often administrators have binders with previous reports and calendars of report requirements -- these can be extremely valuable
- Review (if they exist) any policies covering how reports are produced or data is collected
- Reviewing the various reports with an eye to data quality issues, for example:
    - Naming
    - Linked identifiers

- Data owners
- Key measures

From this, work with the stakeholders to draft up new data collection policies, identify data cleaning priorities, and select the right measures of success.

B) Do: Implement changes and training

If the work covered above has been done, you'll have both leadership support to implement the change, and buy-in from operational administrators. What you're seeking to accomplish will be clear. Now, make the change.

C) Study: Review measures and outcomes

Hopefully, all your good work at understanding the problem will have paid off. You'll implement the change you identified above, and your success measures will change. They may not. What is critical is to review the measures against your expectations of success. Perhaps aspects of the course review process were improved, but others did not.

D) Act: Adjust

Once the measures are in, hold a **hot wash**, an immediate "after-action" discussion of the change effort. See what worked, what didn't, and what still needs to be done. Then, go back to the planning step. It will be necessary to "go and see" how the new policies and processes have impacted day-to-day work. You may decide that this particular issue has been dealt with, and you can move onto to another aspect of data quality.

Conclusion

Over time, a process to improve data quality which:

- Has appropriate leadership and strategic focus
- Is built on organizational trust from leaders willing to "go and see" their data quality issues in situ
- Is built on small, demonstrable wins that illustrate the power of continuous improvement

will result in both better data quality AND a firm understanding of how CQI can work to improve all aspects of a medical school.

AAMC has an excellent paper on building **curriculum dashboards**. In their words "As with any database, the quality of your output depends on the accuracy of the inputs". This statement has never been more true than today -- the quality of your accreditation review now depends on the accuracy of your data inputs.

Addressing data health today will deliver a significant return on investment in terms of reducing administrative burden, reaping the benefits of CQI, and avoiding the risk of not meeting accreditation standards.

Summary

Data Health Improvement Pathway

1. Give data health ownership and visibility at a high level

- Assign data health to the CQI committee or a senior leader.
- Ensure the senior leader responsible for data health is technically knowledgeable and is involved in key committees
- Identify appropriate measures

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2. Ensure the data health lead is actively leading the change process

- "Go and see": Observe first hand how data collection systems function.
- Build a sense of urgency to support the change process.
- Refine measures and communicate broadly.

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3. Apply CQI to your data - use a PDSA cycle

- **Plan:** Build processes and policies. Consider: naming, linked identifiers,data owners, key measures. Draft the plans and review them with the stakeholders.
- **Do:** Implement changes and provide training
- **Study:** Review measures and outcomes
- **Act:** Discuss, review and make adjustments to your cycle and processes.

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To enable CQI through data, you need a data warehouse that eliminates data silos and a turn-key analytics dashboard system designed for medical education.

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