(Accepted for Publication: *Academic Emergency Medicine & Teaching*)

Empowering Clinician Education with Patient-Outcome Feedback

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Abstract

Emergency physicians (EPs) often lack the information they need about their patients' outcomes so that they can both optimally adjust and refine their diagnostic and treatment processes and recognize their clinical errors. Patient-outcome feedback (POF) provides that information by informing clinicians about a patient's clinical course after that clinician's evaluation and treatment. This feedback may encompass the period after the EP has transferred a patient's care to another EP or after the patient has left the ED or hospital. EPs obtain POF through various *active* and *passive* methods, depending on their institutional and medical record systems. Active methods require that clinicians or others spend time and effort acquiring the information; passive methods deliver it automatically. POF is an excellent performance-based measurement that helps clinicians to stimulate their learning and to build their own validated mental library of outcomes with which to make clinical decisions, i.e., heuristics, System 1 thinking. POF offers especially useful feedback about patients who have been admitted, were referred to specialists, had major interventions, had potentially significant tests pending on discharge, or were handed off to another EP. The current healthcare system makes it difficult for EPs to discover their patients' outcomes, squandering significant educational opportunities. Three stimuli to improve this situation would be to require EPs to receive passive POF as part of hospital accreditation, for reviewing POF to be classified as a Category 1 Continuing Medical

Education activity, and to reimburse clinicians for learning activities related to POF. Research indicates that our healthcare institutions and systems would be well served to provide clinicians with ongoing automatic information about their patients' outcomes.

1. **Unique Nature of emergency medicine (EM) practice.**

Emergency physicians (EPs) normally do not learn their patients' clinical outcome.[1] EPs treat 146 million patients in U.S. EDs annually, of which about 16.4 million (8.7%) are admitted to the initial hospital (2.2% to critical care units) and 2.7% are referred to another hospital.[2] Each of the approximately 56,000 practicing U.S. EPs sees about 300 of these admitted or referred patients annually in addition to other emergency department (ED) patients they refer to outside consultants or who quickly return to the ED for their initial problem.[3] Unlike most other specialties, emergency medicine (EM) lacks its own inpatient service and EPs often do not have a close relationship with the consultants and primary care physicians to whom they refer patients. This results in very little feedback with which EPs can both validate their diagnostic approach and treatment regimen and recognize clinical errors they have made. As Gilfind wrote, it is as if "In the process of learning to shoot a basketball, . . one were to close one's eyes 90% of the time, and not know whether the target had been met, this would probably be detrimental to the learning process, and to the attainment of skill."[4]

To remedy the situation and improve individual learning, our specialty should enhance the availability of patient-outcome feedback (POF). POF is the information a clinician receives about a patient's clinical course after that clinician's evaluation and treatment. This feedback

may encompass the time after the EP transfers a patient's care to another ED or inpatient clinician or after the patient leaves the ED or hospital.

In this paper, the theoretical and practical reasons for enhanced POF are described, as well as some methods to achieve that goal.

2. Feedback: Summative, Formative, and Patient-Outcome Feedback

Educators, supervisors, and patients provide physicians with several types of performance feedback. *Summative feedback* is a high-stakes, after-the-fact performance evaluation that supervisors and educators often use to assess whether an individual should be retained, promoted, licensed or certified in their specialty.[5] It describes students' learning achievement at a certain time and is designed to generate a report for interested parties.[6] Summative feedback is "meant to determine some end point status (e.g., competent/not competent, ready to practice independently)."[7] Many practicing emergency clinicians periodically receive their supervisors' summative feedback, although it rarely focuses on specific clinical cases. This type of feedback rarely serves to advance physician learning or to promote self- and lifelong learning, and usually does not provide timely feedback customized to the individual clinician.

Medical educators ideally provide trainees with *formative feedback*, using ongoing, and usually ungraded, low-stakes methods to evaluate improvement and measure trainees' knowledge and skills.[8] In clinical medicine, these may involve supervising a clinical encounter or procedure or conducting a debriefing after a resuscitation. To be maximally effective, clinicians must receive formative feedback soon after the event. [9] For clinicians, a uniquely helpful type of formative feedback is *patient-outcome feedback* (POF). POF is the information

about what subsequently happens to patients. It is vital knowledge that physicians use to continually improve their practice of medicine, validate good medical practice, and avoid future errors. When errors do occur, POF allows clinicians to recognize and accept responsibility for them in a non-threatening manner and to make constructive changes to their practice methods.[10,11] When clinicians recognize errors in their practice, nearly all make at least one constructive change, the most common ones being that they pay more attention to details, personally confirm clinical data, and seek advice when necessary.[10]

3. What is POF

For clinicians, whether in practice or in training, an important way to improve future performance depends on regularly comparing patient outcomes against one's clinical diagnoses, management decisions and interventions. When this type of feedback goes directly to clinicians, they can match their diagnoses and clinical interventions with the patient's clinical course and final diagnoses. If the patient's outcome matches the clinician's expectations, it helps to validate their practice pattern. If they find discrepancies between the outcome and what they expected, they can determine whether and how much time to invest in updating their knowledge about the clinical processes (e.g., diseases, tests, and procedures) involved and can store significant cases in their mental library.[1,12-14] For emergency physicians (EPs), this feedback should be available in as short a time as possible after the emergency visit, and it should not require excessive time or effort to obtain.

The questions that clinicians need answered from POF are:[15,16]

1. Did the patient follow the expected clinical course?
2. Did the final diagnosis differ from their admitting diagnosis?
3. Did anything unexpected, especially anything preventable or foreseeable, happen during the hospitalization?
4. Were the results from laboratory or imaging tests the ordered different from those they expected?

When clinicians' actions and impressions coincide with what transpired, they will, in most cases, gain confidence in their diagnostic and treatment approach, and have their knowledge base reinforced. When it differs, POF allows them to "recalibrate," modifying their clinical therapeutic approach and learning about areas in which they can improve.[9,12,14] When clinicians fail to routinely receive feedback about their patients' outcomes, they assume that their clinical approach and diagnoses were correct, and endanger future patients by continuing flawed practices.[1]

When discrepancies arise between the POF and the ED record, clinicians should ask themselves a series of questions to advance their clinical practice (TABLE 1).

TABLE 1: Self-Assessment Questions for Discordant POFs [14]

- Did I ignore or misinterpret vital data?
- What about this situation was surprising or unexpected?
- For this type of patient, what am I assuming that might not be true?

- Is there a more useful way to view this patient's symptoms and signs to get a more accurate picture?
- Did I arrive at a diagnosis before considering all available information (i.e., premature closure)?
- What important aspects of this patient's presentation differ from similar situations?
- How might my prior experiences have affected my response to this situation?
- Do I need to learn more about the patient's illness or injury?
- Should this change how I practice?

POF has been found to be the EP's "greatest source of clinical knowledge for decision-making."[17] Consistent with research showing that diagnostic expertise relies on recalling prior patients and their outcomes, experienced EPs indicate that they rely on POF to improve their clinical accuracy.[1,9,18] One study reported that POF had a positive effect on EPs' diagnostic accuracy (97%), clinical efficiency (85%), treatment outcomes (96%), and job satisfaction (95%).[17] The same held true for EM residents who followed-up with patients they had identified during their initial encounter. While time intensive, they found POF to be educational with adult (83%) and pediatric (74%) patients, and in both admitted (88%) and discharged (70%) patients.[19]

4. POF and System 1 Thinking

Developing an accurate diagnosis from the many thousands of known human diseases involves selecting the right physical exams, laboratory and imaging tests, procedures, and

consultations to reduce diagnostic uncertainty. When approaching this daunting clinical task, especially in situations with a high level of uncertainty, experienced physicians use a rapid and seemingly effortless cognitive thinking pattern that Hammond described as intuitive, with decisions dominated by heuristics such as mental shortcuts, maxims, and rules of thumb.[24] These clinical shortcuts rely on a mental library of the cases clinicians have seen and the procedures they have performed. Such System 1 (i.e., automatic, nonanalytic, or blink) thinking is a highly efficient method of matching previous patterns with the situation at hand.[25-27] Also called *predictive processing*, it helps clinicians compare prior cases to current ambiguous situations.[28]

EPs disproportionately see patients that lack a previously diagnosed disease process to explain their findings. These undifferentiated patients represent a complex intellectual challenge. EPs usually compare the patient's findings with their personal memory of prior cases to make a diagnosis. To avoid misplaced confidence and the common cognitive errors associate with these heuristic diagnoses (Table 2), EPs need to validate their personal case-based knowledge and experiences. POF provides the information needed for that validation. Without POF, clinicians use System 1 thinking, a method with low cognitive awareness, without the confirmatory information needed to justify it.[27] Clinicians, like most people, assume that if they receive no feedback, they have done everything correctly. This can lead to the trap of consistently overestimating one's abilities, known as the Dunning-Kruger effect.[29,30] As Kruger explained, when people overestimate their abilities, they not only "reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the metacognitive ability to realize it."[29]

Clinicians constantly try to improve their competence through self-assessment and critical reflection of their own performance in relation to professional standards.[14,20,21] But the

accuracy of process-based self-assessment is frequently unreliable, whereas outcome-based self-assessment is usually more dependable.[22] When learning to improve their future clinical practice, clinicians do best when focusing on outcomes rather than process, called outcome-based education.[23] As Croskerry wrote, "Prompt and reliable feedback about decision outcomes appears to be a prerequisite for calibrating clinician performance."[9,27]

TABLE 2: Some Cognitive Errors in Heuristic Diagnoses[31]

Confirmation Bias: Developing a hypothesis without enough data and then seeking evidence to confirm rather than refute the hypothesis. This compound errors from anchoring bias, inappropriately bolstering prematurely formed hypotheses.

Overconfidence Bias: Placing too much confidence in one's own opinions, a diagnosis is made without having gathered enough information. Leads to acting with incomplete information and hunches.

Representativeness Error: Basing diagnoses on how well a patient matches the physician's mental template of a disease process. Classically, it is taught as "If it walks like a duck and quacks like a duck . . " It's obverse is Representativeness Restraint, neglecting a diagnostic possibility because it the pattern is not close enough to the mental template.

Vertical Line Failure: Rigidity and inflexibility when approaching diagnoses is also termed thinking in silos, thinking in grooves, and thinking inside the box. Considering alternative diagnoses (lateral or outside the box thinking) is not part of rapid, intuitive thinking. Not

stretching into slower, more deliberative and more logical thinking may fail to make some diagnoses.

5 Which Patient-Outcome Cases Most Help EPs? [9,15,32,33]

Because diagnostic (misdiagnoses and missed diagnoses) and treatment errors account for 6% to 17% of hospital adverse events, most EPs want feedback to learn whether their diagnoses and treatments were correct, especially in the patients at the highest risk.[34] But, even with electronic records, it is impractical for EPs to follow-up all their patients. To maximize the educational benefit, EPs need to prioritize which charts to review. This means identifying patients whose course may significantly deviate from the expected trajectory, particularly those whose disease course or outcome of further diagnostic or therapeutic interventions are uncertain (TABLE 3).

TABLE 3: Priority Patients for POF [32]

Those who have:

- Been admitted.
- Died in the ED.
- Been transferred for specialized or a higher level of care.
- Been referred to specialists.
- Received major ED interventions.
- Been handed off to EM colleagues at end of shift without a diagnosis or plan.
- Unscheduled returns to the ED within a short time.

- Been discharged with a potential high-risk, nonspecific diagnosis (e.g., abdominal pain, febrile child).
- Been sent directly to the operating room.
- A rare diagnosis or unusual presentation.
- Radiographs or ECGs that are misinterpreted or significant positive culture results.

6. Obtaining Patient-Outcome Feedback: Active and Passive Methods

EPs obtain POF through various *active* and *passive* methods (Table 4).1[,15,32] Active methods require clinicians or others to spend time and effort to acquire the information; passive methods deliver the information automatically. One survey of EPs in both rural and urban settings found that they received passive outcome feedback (e.g. outpatient consultation replies or copies of the patient's discharge summary) in about 10% of cases and they actively sought feedback in about 5% of cases. Nearly all those surveyed desired more POF.[17]

TABLE 4: Passive and Active Patient-Outcome Feedback Methods [1,15,32]

Active (time-intensive) feedback methods:

- Scheduling follow-up patient visits in ED or in ED follow-up clinic.
- Checking on admitted patients.
- Locating and reviewing specific patient charts, especially those that raised issues when in ED or that have been identified as readmissions, ICU transfers, or deaths.
- Contacting receiving physicians or hospitals.
- Contacting the medical examiner.

- Calling patients or family.
- Attending morbidity and mortality (M&M) and interesting case conferences, and the ED morning report.
- Talking informally with other providers (e.g., attendings, residents, PAs, NPs, RNs).

Passive feedback methods:

- Consultation reports.
- Hospital discharge summaries (EMR or paper).
- ED records or discharge summaries for patient transfers (EMR or paper).
- Feedback from another physician or family member.
- Information about unexpected ED revisits for same problem.
- M&M/Interesting case conferences. (Limited use)
- Feedback from Peer-Review or Quality & Safety Committees (Limited use)
- Spontaneous POF from colleagues.
- Malpractice threats and suits.
- Autopsy Reports.

Active POF

Active POF requires clinicians to consciously seek feedback, often expending significant time and effort. Some hospitals provide physicians with the medical record number of those patients that were readmitted, transferred to the intensive care unit (ICU), or died. These requirements limit the frequency with which it occurs. The frequency of active POF can be increased if a designated nurse or physician extender checks on admitted ED patients, makes

follow-up phone calls to patients or families and to hospitals receiving ED transfers, locates discharge summaries and autopsy results, and attends appropriate M&M conferences. They then can forward the information to the treating ED clinician (by secure email or paper note).

Passive POF

Obtaining POF automatically increases the likelihood that clinicians will use it. Using either EMR or the paper charts which are still the most common charting method around the world, EPs should need only check a box on the admission form saying, "discharge summary requested" and add the names of those who should receive the document. For example, an EMR system could automatically generate and forward discharge summaries or consultation reports to appropriate clinicians within the same interconnected system.[1] Likewise, it could forward notices or requested information to those outside the EMR system via secure HIPAA-compliant methods. This has been successfully done in multiple settings and was shown to improve patients' subsequent outcomes. [34-37] For those using non-EMR records, the check box could serve as a reminder to the medical record department to forward the information to EPs or to designate charts to be filed separately for EP review. Prior to EMR's introduction, a survey showed that 21% of ACGME-approved EM residencies had a mechanism for EPs to automatically receive discharge summaries for patients they had admitted.[38]

Spontaneous POF from colleagues is episodic and sometimes unreliable.[39] Often, it is a form of *schadenfroh* (gloating) limited to instances of erroneous or incomplete ED diagnosis or treatment. While informative, it provides clinicians with a distorted POF, skewing toward the negative rather than providing a balanced view. Similarly, M&M, peer-review, quality and safety and QA and similar committee reports and clinical conferences selectively present esoteric cases

or those with errors, rather than providing a balanced view of the EP's diagnoses and treatments. This, as Croskerry notes, "may contribute little to overall clinical performance."[9]

Reports about patients referred to consultants and from autopsies of patients treated in the ED can be very useful. However, one study showed that EM residency programs received reports on patients they referred to specialists less than 10% of the time.[38] Autopsy reports appear even less frequently. Even though about 30% of autopsies reveal diagnostic errors or unrecognized diagnoses,[40] the overall autopsy rate (i.e., medicolegal plus forensic cases) in the United States in 2007 was only 8.5% of all deaths, with hospital autopsies probably well below 4.3%. Most U.S. hospitals do not perform autopsies.[41] Getting these reports often requires active retrieval.

7. Barriers to Obtaining Patient-Outcome Feedback

Systematic POF rarely occurs for either trainees or practicing EPs, including the reporting of diagnostic errors detected after admission.[39] Many clinicians must find their own time-intensive methods to locate the information. Nearly all believe that more feedback would help improve their diagnostic accuracy, treatment outcomes, and job satisfaction.[1,15,17]

Several systemic barriers prevent EPs from receiving POF. Key factors include delays between the ED visit and information availability, inadequate information and communication systems, workload and time pressures on all clinicians, and a lack of reimbursement for the time clinicians spend locating or reviewing the information.[9,17] These barriers exist in the face of an unknown frequency of undiagnosed, underdiagnosed, and misdiagnosed patients.

The medical system rarely hears complaints about the lack of feedback. Croskerry suggests that EPs have acquired an adaptive myopia, learning to live with the lack of a necessary

POF system. It is, he says, analogous to the "normalization of deviance[42] where a significant defect in the operation of a system is progressively interpreted as normal and acceptable."[9]

One issue that is of no concern in obtaining or distributing POF is HIPPA. The law allows for patient follow-up for the purpose of provider quality improvement, with the Department of Health and Human Services writing: "As part of a quality review, a provider may need to know the health outcome of a patient that they treated but no longer have contact with (e.g., patient was transferred to another provider)." The records, of course, must be transmitted via HIPPA-compliant methods.[43]

As of 2020, neither the ACGME nor the Royal College of Physicians and Surgeons of Canada requires POF in their residency training programs.[44,45] Understanding the importance of patient follow-up, both the Residency Review Committee for Emergency Medicine (RRC-EM) and the Accreditation Council for Graduate Medical Education (ACGME) initially (beginning about 1980) required it, but that obligation has since vanished.[46] This unfortunate omission may have been due to a desire for residencies not to be cited for a lack of POF, one of the most frequent deficiencies in EM residency programs.[47]

8. Benefits of Patient-Outcome Feedback

Providing POF to EPs provides direct benefits to patients, clinicians and the institution. These stem from lessening "a wide range of cognitive errors, misinterpretation of diagnostic imaging, atypical presentations of relatively common conditions and failure to pay attention to abnormal test results," which clinicians are prone to commit.[4,42,48,49] Unlike other episodic educational methods, regularly bringing such findings to the EPs' attention appears to improve their diagnosis and treatment of subsequent patients. Chern, in a study involving EM residents who phoned patients flagged as high-risk, found that the rate of serious management error (i.e.,

misdiagnosis or erroneous treatment plan resulting in death, or admission for longer than 3 days) fell from 4.1% in the control period to 1.5% during the intervention period.[49] Reducing such clinical errors would also lower malpractice claims (and, possibly, costs).

Timely and consistent POF benefits not only the EPs and EM residents treating the patients, but also other EM clinicians, including those at receiving facilities, consultants for ED patients, primary care clinicians who refer or follow-up ED patients, and the patients themselves—individually and collectively.

An immediate benefit of providing POF to clinicians and their healthcare institutions and systems might be improved pride in being an EP and an increase in job satisfaction, which relates to decreased burnout.[15] In a study of practicing EPs, a large majority believed that increased POF had positive effects on their EM practice, including effects on diagnostic accuracy, clinical efficiency, treatment outcomes, and job satisfaction.[17]

Lifelong learning has long been a key element of medical practice. Practicing clinicians must continue to learn as medical practice evolves with new knowledge, procedures, medications, and equipment. Appropriate and useful feedback is essential to continue this process. While trainees have been the focus of feedback in the educational literature, practicing EPs also need this feedback to avoid "plateauing" in their diagnostic and therapeutic acumen.[49] POF enhances lifelong learning by focusing on the clinician's own patients, resulting in personalized, meaningful, high-yield, and time-efficient clinical education.[4]

Improved outcome feedback would also benefit institutions and clinicians referring patients to the ED or receiving consultations or referrals from the ED, allowing a more select cohort of patients to be referred in both directions. Clinicians who care for patients longitudinally would benefit from information about their patients' ED visits, while providing this feedback to

consultants would help improve the quality of referrals and result in a more optimal use of their services.[9]

9. Recommendations

Multiple possible methods could provide emergency clinicians, referring clinicians, and institutions with POF. The methods vary with the types and compatibility of various medical record systems. The most efficient method involves EMR systems that automatically generate feedback. The capability of some EMRs to provide discharge summaries to treating physicians, including community clinicians, already exists.[25,30,32] Unfortunately, not all EMR systems have been programed to do this relatively simple task and community clinicians are often on incompatible EMR systems.

Aside from inertia, the costs involved in modifying EMR systems could act as a deterrent to change. As has been repeatedly shown (e.g., EMTALA, EMR requirement), one of the most effective ways to guarantee change is to modify requirements for accreditation (e.g., The Joint Commission or ACGME/RRCs) or for reimbursement (e.g., Medicare, private insurance). The positive effects of POF on clinicians should impel both the regulating and insurance institutions to encourage its implementation. Since receiving automatic POF is posited to have immediate positive effects on most EPs' professional lives, they and their professional organizations may be motivated to strongly advocate for this change.

A more obvious and stronger motivation would be if the American Medical Association or the Accreditation Council for Continuing Medical Education could classify physicians' review of POF as a Category 1 Continuing Medical Education activity. If EMR systems are used, they could easily track clinicians' accessing these records. If not, the clinicians could log those cases. In both situations, they could record citations for the sources they then use to obtain further

information about the diseases, procedures, or decision making. All parties would benefit from reimbursing clinicians for participating in this process.

Ways to implement automatic POF for clinicians in several situations include:

1. *Clinicians connected to interconnected EMR systems*. When the EMRs of all clinicians providing medical care to a patient are interconnected, the system can provide hospital discharge summaries, ED records and consultant referral notes for patients linked to the EP or referring physicians. The system can then send either a substantive message or the complete record to those physicians whose names are linked in the EMR.
2. *Clinicians outside compatible EMR systems*, including referring or accepting EDs, primary providers, and consultants. When the EMR system automatically sends messages to providers in the system, it also sends HIPAA-compliant emails or messages with the record or a summary to those on the list not connected to the EMR. When electronic communication is not possible, it generates a printed copy and the provider's address so it can be mailed.
3. *Patients with unexpected return visits to ED*. In EDs with EMRs, the system can automatically flag these patients and send a notice or the ED record to the EPs who recently saw the patient. For those without EMR systems, these patients' names should be recorded in a special log, and the initial EP(s) should be notified.
4. *Clinicians without EMR systems*, such as in many resource-poor regions. This situation is akin to what occurs now in most settings. Clinicians will need to rely on a variety of methods (Table 4) to receive POF.

POF is the ultimate personalized performance-based criteria, designed to help clinicians stimulate their learning and build their own validated mental library of outcomes. Improved self-

assessment leads to increased motivation and improved knowledge, communication, and performance. What seems clear is that our healthcare institutions and systems could, with little effort and cost, automatically provide clinicians with ongoing feedback of patient outcomes.

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