Evidence-Based Medicine and Primary Care: Keeping Up Is Hard to Do

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OUTLINE

ABSTRACT

Primary-care physicians feel pressure to be knowledgeable, efficient, comprehensive, and compassionate while delivering evidence-based medical care. Incorporating evidence-based medicine into practice requires training in the skills of finding and applying good evidence to patients, and, increasingly, infrastructure that supports the incorporation of evidence into electronic health records. Physicians cite many barriers to the use of evidence-based medicine in practice. In this review, we examine evidence of the value of evidence-based medicine in clinical practice, discuss the interface of evidence and shared decision-making, suggest tools and approaches for incorporating evidence-based medicine into practice, and discuss the impact of recent health insurance reform on expectations and incentives for physicians with respect to evidence-based practice. ***Mt Sinai J Med 79:545–554, 2012.*** *© 2012 Mount Sinai School of Medicine*

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Primary-care physicians (PCPs) are the bedrock of patient care. The PCP is the one doctor who knows patients best, navigates multiple health needs, and still finds time to ask how Mom is doing. Primary-care physicians need to stay current with a vast and ever-changing knowledge base, and they are expected to incorporate best practices into their daily routines. Evidence-based medicine (EBM) is defined as "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research."[1] The practice of EBM has come into greater visibility over the past 20 years and in the United States will soon be linked not only to excellent patient care, but also to reimbursement and incentives as a directive of the American Recovery and Reinvestment Act of 2009, and later the Patient Protection and Affordable Care Act of 2010.[2] Physicians' knowledge and skills in EBM are often in need of further development, and primary-care physician skills may rank lower than those of specialists.[3] A study of physician-reported practices with hypertension management found that a significant number of PCPs have higher thresholds for initiating and advancing medication than recommended by the evidence-based Joint

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National Commission guidelines, and those higher thresholds correlated with lack of familiarity with those guidelines.[4] Another finding in that study was that lack of awareness of the guidelines correlated with non–evidence-based first-line drug choices.[4] Primary-care internists are pressured to accomplish more during patient visits and need resources to help integrate EBM into their practice efficiently. At the same time, the evidence supporting much of routine primary-care practice, such as elements of the annual physical exam or frequently used imaging studies for nonspecific low back pain, is weak.[5,6] Discussion of this fact has also entered the lay press.[7] Practicing EBM requires skillful integration of high-quality resources balanced by awareness of the limits of how far evidence can, and should, go. Many PCPs would benefit from improved EBM skills.

Thousands of new scientific articles are published and catalogued each month. Keeping up with the literature is extremely difficult, and sorting through it to find the most valid and applicable studies can seem overwhelming. In addition, much of the evidence base for medical science as a whole has come under scrutiny for its high rate of inaccuracy and bias.[8,9] In 2010, an article in *The Atlantic* eloquently described work that has called nearly the entire research literature into question.[10] For those familiar with the practice of EBM, however, many of the findings were not news–that observational data can find misleading associations, that surrogate outcomes may not represent true clinical outcomes accurately, that people neglect an individual's baseline risk in assessing the impact of an intervention, or that bias can interfere with even well-conducted randomized trials. Though the literature may be flawed, clinicians can still arm themselves with the knowledge and tools to cut through the headlines and get to the bottom line they need for their patients' care. In this article, we will review evidence examining the value of EBM in clinical practice, the interface of evidence and patient preferences, tools and approaches for incorporating EBM into a busy practice, and the impact of recent health-insurance reform on expectations for physicians.

IS THERE EVIDENCE FOR EVIDENCE-BASED MEDICINE IN PRACTICE?

Staying true to their core values, proponents of EBM should demand evidence of benefit for the implementation of EBM into practice. Ideally, incorporating EBM into practice should improve physicians' skills and patients' clinical outcomes. An observational study of PCPs at the largest health-maintenance organization in Israel found modest associations between higher total EBM knowledge and quality of care indices for hypertension, diabetes, and hyperlipidemia.[11] If we wanted evidence less prone to bias, we would look for interventional trials that compare two different approaches to care, one that utilizes an approach incorporating EBM and another that does not. This work has been done in several ways. A randomized trial conducted in Germany examined the impact of one-sentence evidence summaries appended to letters from consultants to PCPs regarding treatment recommendations.[12] The summary sentences were formed based on rigorous evidence reviews for different clinical topics. They demonstrated a significant increase in PCPs' adherence to the recommended therapies across a wide variety of clinical conditions.[12] This study showed that, without any other changes in clinical care, simply alerting PCPs to the evidence base behind certain decisions was useful for improving care. Sometimes, tools can help in the process of bridging evidence-based guidelines and clinical care, and this is demonstrated in another study of a preventive health care checklist. In a randomized trial, preventive-care checklists that incorporated evidence-based recommendations and graded the strength of the evidence led to an increase in the percentage of patients with up-to-date services delivered from 52% to 72%, with a corresponding slight decline in the control group.[13] Use of the checklist did not require additional educational time for physicians, and 77% of physicians in the study said they planned to continue to use the forms.[13]

Other research has shown the value of connecting evidence with systems-based interventions within specific clinical arenas. One cluster randomized trial in the area of evidence-based quality improvement tested the effectiveness of evidence-based collaborative care models for depression management among primary-care practices at a Veterans Administration hospital.[14] Intervention patients were more likely to receive appropriate antidepressant medication (66% versus 43%), which was the primary outcome for which the study was powered.[14] This study is an example of implementing an evidence-based clinical approach that had an impact in a real clinical context. A blended package of evidence-based interventions for anxiety management in primary care has also shown benefit.[15] Investigators from Johns Hopkins Medical Center have studied "guided care," a collaborative approach to the management of patients with chronic medical conditions that integrates a registered nurse within physician teams. The

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aim of the approach is to improve adherence with evidence-based recommendations in clinical areas such as hypertension and congestive heart failure. The guided approach has been shown to improve patient-reported quality of health and reduce costs of care via incorporation of evidence-based clinical guidelines.[16,17] A randomized trial of evidence-based diabetes disease-management guidance at the point of care showed improved compliance with evidence-based care recommendations and nonsignificant trends toward improved glycemic and lipid control.[18] A randomized trial in pediatrics demonstrated that a real time point-of-care evidence-based message system could significantly influence prescribing practices for otitis media.[19] Perhaps most impressive was a pragmatic (clinic site-based) randomized trial conducted in Sweden beginning in 1995.[20] The investigators sought to measure the impact of case-based educational interventions regarding the provision of lipid-lowering therapy for secondary prevention in patients with coronary heart disease. They demonstrated a reduction in overall mortality from 44% in the control group to 22% in the intervention group over the course of 10 years.[20] This is perhaps the most compelling argument that primary-care practices should implement guideline-based care when those guidelines are founded on good evidence, as the impact on clinical outcomes can be profound.

Other studies have found less-impressive results. A study of evidence-based reminders during visits for patients with hypertension failed to show an impact on their primary outcome of patient quality of life, as well as secondary outcomes such as blood pressure readings.[21] A study of a complex case-management intervention for congestive heart failure, which included performance feedback to physicians on evidence-based pharmacotherapy, failed to show a difference in quality of life.[22] However, in this study, baseline adherence to recommended pharmacotherapy was high, >90% for angiotensin-converting enzyme inhibitors.[22] An older study using guideline-based recommendations for asthma and angina in primary-care practices with computerized records failed to show an impact on patient outcomes.[23] In this study, however, outcomes were assessed by manual searching of paper and computer records, and therefore the assessment may have been incomplete. Trials of heart failure and ischemic heart disease evidence-based decision support,[24] as well as computer-generated evidence-based care suggestions for asthma and chronic obstructive pulmonary disease,[25] failed to show an impact on quality of life or clinical outcomes. Finally, a systematic review of interventions aimed at improving adherence to evidence-based diabetes care found that most studies were of poor to medium quality, and data on outcomes were variable.[26] What should we make of such mixed evidence? Although it is reasonable to assume that more evidence-based information at one's fingertips during patient encounters is likely to be a good thing, the mode of implementation and local factors are likely critical to the success of the intervention. Further research regarding bringing evidence-based recommendations to the point of care is ongoing, as evidenced by a number of in-progress study protocols.[27–31]

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EVIDENCE-BASED MEDICINE AND SHARED DECISION-MAKING

Patient care relies not only on good evidence, but also on effective communication between patient and physician, and attention to patients' values and preferences. Evidence-based medicine has evolved from being presented as the primary basis for clinical decisions to being used as one element within shared decision-making (SDM) between patient and provider.[32] Many of the studies of implementation of EBM in clinical environments have measured success by the provision of interventions to patients. However, the receipt of an intervention is not solely an indicator of the clinical evidence involved—patients' preferences and values play heavily into what treatment is ultimately received.[33] A blend of EBM and SDM is ideal, but it is not immediately obvious how to execute the balance. The process of incorporating patients' values into decision-making has been presented as a framework in parallel with the process of acquiring, assessing, and applying evidence, in an effort to make this union actionable.[34] The authors state, "Preference-based medicine relies on evidence from patients and families about their goals of care and treatment preferences in light of a realistic assessment of benefits, burdens, and probabilities."[34] It is the responsibility of the clinician to provide the estimates of benefit or burden, and to communicate

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them effectively to patients. The communication of evidence, even the choice of words or images we use with patients, can significantly impact patients' decisions. There is a growing body of literature focused on the best methods of communicating evidence to patients,[35–38] and a full review of this topic is beyond the scope of this article. In short, EBM is important to patient care, but not sufficient on its own. We must incorporate evidence into patient encounters with attention to patients' needs and values.

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BARRIERS AND OPPORTUNITIES FOR EVIDENCE-BASED MEDICINE IN PRIMARY CARE

Physicians routinely encounter barriers to implementing EBM in their practice. Many have cited time constraints, a sense of EBM interfering with the doctor-patient relationship, perceived threats to professional autonomy, skepticism regarding the credibility of evidence, lack of efficient access to key information, and challenges in applying evidence to individual patients.[39–41] Additionally, PCPs too often lack education in the principles and techniques of EBM.[42–44] Despite the barriers, however, multiple resources make evidence-based practice easier. Physicians can readily be taught to incorporate EBM into their clinical practice, with attention to clinicians' concerns about the doctor-patient relationship and the time constraints that we encounter daily. Tutorials and workshops can improve searching strategies to locate best evidence and provide effective training in critical appraisal skills.[45] A study of workshops for training PCPs in the use of electronic evidence-based resources demonstrated both short- and long-term (37-month) impact on knowledge, skills, frequency of resource use, and incorporation of resource use into clinical practice.[46] A multifaceted EBM educational intervention had a significant impact on PCPs' attitudes and knowledge.[47] Unfortunately, this study failed to demonstrate an impact on test-ordering behaviors or patients' drug utilization, and larger-scale studies are needed to fully explore this connection.[47] Another study, a randomized trial of an evidence-based educational intervention for prescribing in hypertension, which included personalized feedback, showed a modest rise in PCPs' prescriptions for thiazide diuretics first line.[48] Thus, results of interventions at the point of care demonstrate differing impacts on clinical outcomes. As we have discussed previously, when practice improvements to advance guideline-based care in clinical settings are implemented, patients can benefit. In addition, data we have reviewed above have suggested that interventions need not be complex or time-intensive to have benefit.[12,13,19] These studies were not specifically using electronic health records, but the types of interventions they describe could certainly be adapted as such. Individual clinical environments can implement simple tools to bridge the gap between evidence and outcomes.

Interventions based on evidence need not be complex or time-intensive to have benefit.

RESOURCES FOR PRACTICE OF EVIDENCE-BASED MEDICINE

In keeping with these themes, some authors have suggested that training physicians in the individual skills of information retrieval and critical appraisal may be less useful than teaching physicians how to access and use rigorously developed evidence-based databases and guidelines.[49] Numerous high-quality databases are available for clinical use. For questions of screening and prevention, the United States Preventive Services Task Force (USPSTF, a part of the Agency for Healthcare Research and Quality) has an online searchable database of graded screening recommendations with rigorous assessments of the quality of relevant studies.[50] The USPSTF also contains a link to the National Guideline Clearinghouse, a searchable database of evidence-based clinical guidelines to facilitate informed patient-management decisions.[51] Other resources, such as the Database of Abstracts of Reviews of Effects (DARE), serve as a clearinghouse for multiple evidence-based guidelines and systematic reviews. See Table 1 for a full list of these and other resources.

The Cochrane Collaboration has developed rigorous methodology in conducting systematic reviews of research evidence for many important clinical questions, particularly those that focus on treatment of common medical conditions. Cochrane reviews are conducted when evidence from randomized trials accumulates in a clinical

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Table 1. *EBM Resources.*

Filtered Resources		
Name	URL	Description
Systematic reviews		
Cochrane Database of Systematic Reviews	http://www.cochrane.org/cochrane-reviews	Methodologically strong systematic reviews and literature syntheses on a range of clinical topics.
DARE (Database of Abstracts of Reviews of Effects)	http://www.crd.york.ac.uk/crdweb/AboutDare.asp	Summaries of systematic reviews of healthcare interventions and of the delivery and organization of health services.
AHRQ Evidence Reports	http://www.ahrq.gov/clinic/epcindex.htm	Systematic reviews on a range of clinical topics.
USPSTF Systematic Reviews	http://www.uspreventiveservicestaskforce.org/index.html	Well-conducted systematic reviews of a broad range of clinical preventive health care services (eg, screenings, counseling, and preventive medications).
Critically appraised topics		
Clinical Evidence	clinicalevidence.bmj.com/x/index.html	A database of systematic reviews grouped by clinical topic, as well as an assortment of EBM resources and training materials.
ACP PIER (American College of Physicians, Physicians' Information and Education Resource)	pier.acponline.org/index.html	A compendium of evidence-based clinical recommendations, free to ACP members. An upgraded version is to be launched soon, with new features (not available at the time of this writing).
Critically appraised articles		
ACP Journal Club	acpjc.acponline.org	Structured abstracts of recent high-impact articles in general internal medicine or medicine subspecialties, with assessment of methodologic strength, summary of results in clear EBM terms, and expert commentary.
Clinical guidelines		
National Guideline Clearinghouse	http://www. guideline.gov	Database of a large number of clinical practice guidelines about a wide variety of clinical topics; the included guidelines have varying levels of evidence behind them.
USPSTF Summary Statements	http://www.uspreventiveservicestaskforce.org/recommendations.htm	Condensed recommendation (extracted from the corresponding systematic review done by USPSTF) regarding preventive health care services.
NICE (National Institute for Health and Clinical Excellence)	http://www.nice.org.uk	Independent organization based in the UK that provides guidance on the most effective ways to prevent, diagnose, and treat illness, with goal of reducing inequality and variation.
VA/DoD Clinical Practice Guidelines	http://www.healthquality.va.gov	Selection of clinical practice recommendations that is a joint effort by US Department of Veterans Affairs and US Department of Defense to improve the health of active-duty and retired military personnel.
CMA Clinical Practice Guidelines	http://www.cma.ca/cpgs	A clearinghouse of clinical practice guidelines for numerous clinical topics.

(*continued overleaf*)

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Table 1. *(Continued).*

Filtered Resources		
Name	URL	Description
Unfiltered resources		
BMJ Evidence Updates	plus.mcmaster.ca/evidenceupdates	Free searchable database of abstracts of published studies found to meet basic validity criteria, with unfiltered user comments. Includes links to selected EBM resources.
ACP JournalWise	journalwise.acponline.org	Searchable database of abstracts of published studies found to meet basic validity criteria, with unfiltered user comments. Free to ACP members.
DynaMed	dynamed.ebscohost.com	Fee-based online reference that covers a wide range of clinical topics; provides links to original articles, often with mention of study design and some comment on validity, with substantial reliance on expert opinion.
UpToDate	http://www.uptodate.com/index	Fee-based online or CD reference that covers a wide range of clinical topics in a narrative style; provides links to original articles; substantial reliance on expert opinion.
MD Consult	http://www.mdconsult.com/php/343950483-663/home.htm	Fee-based text that covers a wide range of clinical topics. Includes full text of 80+ journals and 50+ medical textbooks.
MedlinePlus	http://www.nlm.nih.gov/medlineplus	NIH's website designed to instruct patients about various clinical topics. Materials are screened for accuracy and a lack of commercial bias.
PubMed Health	http://www.ncbi.nlm.nih.gov/pubmedhealth	Resource from the NCBI that collects and reviews clinical effectiveness research; provides summaries for patients and also full technical reports for providers.
Medscape	http://www.medscape.com	Fee-based collection of medical information and educational tools designed for providers, featuring news, perspectives, and journal articles.

Abbreviations: ACP, American College of Physicians; ACP PIER, American College of Physicians, Physicians' Information and Education Resource; AHRQ, Agency for Healthcare Research and Quality; BMJ, *British Medical Journal*; CD, compact disc; CMA, Canadian Medical Association; DARE, Database of Abstracts of Reviews of Effects; DoD, US Department of Defense; EBM, evidence-based medicine; NCBI, National Center for Biotechnology Information; NICE, National Institute for Health and Clinical Excellence; NIH, National Institutes of Health; UK, United Kingdom; US, United States; USPSTF, US Preventive Services Task Force; VA, US Department of Veterans Affairs.

area and may be combined to provide a more accurate estimate of treatment effects.[52] When an intervention has been in use for sufficient time for a number of trials to exist, a Cochrane review could be a physician's first step in assessing the value of the intervention, and will certainly be foremost in building guidelines. When only one or a few trials exist, however, the challenge is to assess the validity and value of these limited data and to decide if they should be used to inform patient care. For this purpose, one of the best sources of evidence for general medicine and medical subspecialties is the ACP Journal Club summaries, created by the American College of Physicians and published monthly in the *Annals of Internal Medicine*.[53] These summaries distill individual research study articles with attention to evidence-based quality indices and report the results succinctly in a 1-page format reviewing the study population, methods, and key results. Also included is an expert commentary placing the study in the context of what was previously known in this area. Studies are selected based upon their scientific validity as well as their clinical impact. Although the ACP Journal Club focuses on only the highest-impact papers, the summaries are an excellent way to establish the bottom line about the article's findings. Both ACP Journal Club and related sources such as BMJ Evidence Updates, by the *British Medical Journal* and McMaster University, provide searchable databases of valid clinical studies and will also e-mail summaries of high-impact articles in the subject area(s) chosen at regular intervals. Subscribing to BMJ Evidence Updates is free to the public but currently does not include structured abstracts or expert commentary.[54] Many physicians find this a useful strategy to stay abreast of high-quality publications in their field or to find valid research when looking for answers to clinical questions. Links to full-text articles are often available.

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Other commonly used resources include fee-based products such as UpToDate and DynaMed. These are similar to web-based texts that are being updated regularly. Both contain links to source articles, and DynaMed takes the additional step of giving mention to the study design and general quality of the source material. Both products rely heavily on expert opinion as well. We recommend the use of these programs for general searches and for background-knowledge questions; but for more specific clinical questions, it is best to use the sources mentioned earlier.

Some practitioners may wish to take a continuing education workshop in EBM to provide a foundation for their skills. Three well-established workshops in North America are available, through the Colorado School of Public Health, Duke University, and McMaster University, respectively.[55–57] Each of these courses includes approaches to teaching the material while also providing outstanding training to physicians wanting to learn EBM content. Short of attending a workshop, clinicians can find several texts and publications that provide an introduction to EBM concepts and interpreting the medical literature. Two foremost summaries of core EBM content include the *Journal of the American Medical Association* (JAMA) Users' Guides to the Medical Literature and *Evidence-Based Medicine: How to Practice and Teach EBM*.[58–60] Each of these offers not only core EBM content, but also numerous clinical examples that illustrate concepts. The JAMA Rational Clinical Examination Series contains many highly useful articles, now also integrated into a paper text, on numerous clinical topics summarizing the accuracy of components of the history and physical examination in pointing to a diagnosis.[61] These resources provide an outstanding means of assessing elements of the history and examination done in the clinic, with many of the findings surprisingly nonintuitive or quite distinct from what physicians are taught in their formal training.

FUTURE: EVIDENCE-BASED MEDICINE MEETS HEALTHCARE REFORM

The Affordable Care Act of 2010 has led to new requirements for Meaningful Use of electronic health records (EHR), and compliance will be tied to reimbursement and incentives.[2] Meaningful Use has 3 main components: use of an EHR in a meaningful manner, such as electronic prescribing; exchange of health information to improve quality of care; and use of the EHR to submit clinical quality measures.[62] Quality measures incorporate goals such as "effective,

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safe, efficient, patient-centered, equitable and timely care."[63] We believe EBM can play a role in meeting these quality measures. As health systems across the country either improve existing EHRs or establish new systems, many opportunities for incorporating EBM into the Meaningful Use process present themselves. Whereas some have highlighted the relative paucity of evidence of benefit of EHRs,[64] others expound on the potential of the EHR to bridge the gap between evidence and practice.[65] In a true electronic record, evidence-based reminders can be linked to patients' specific diagnoses, quality measures such as low-density lipoprotein cholesterol goals for patients with ischemic heart disease or glycated hemoglobin (HbA_{1c}) levels for diabetic patients can easily be monitored and highlighted when out of range, and decision support can be seamlessly incorporated at the point of care. Thus, evidence-based recommendations can be provided to physicians that are specific to the needs of their patients. For example, in a patient with uncontrolled diabetes, one can imagine an EHR offering that the addition of a sulfonylurea will reduce the HbA_{1c} value an average of 1.0%–1.2% and that switching to insulin can reduce the HbA_{1c} to a greater degree. Bringing EBM to the EHR has the potential to efficiently provide evidence-based practice recommendations for multiple chronic conditions. Links to the primary evidence or evidence-based guidelines could be provided for clinicians seeking more detail.

We believe evidence-based medicine can play a role in meeting these quality measures.

Bringing evidence-based medicine to electronic health records has the potential to efficiently provide evidence-based practice recommendations for multiple chronic conditions.

Studies of the clinical impact of EHRs in primary care have been mixed. Two large observational studies involving evidence-based management of diabetes and hypertension, respectively, have found benefit regarding patients' clinical outcomes in practices using EHRs, compared to non-EHR.[66,67] Conversely, another observational study of primary-care practices participating in a quality-improvement trial in the Northeast found no association between EHR use and greater adherence to diabetes-management recommendations, and in fact found the opposite–that practices without EHRs did slightly better.[68] In that study, 38% of practices reported using EHRs, and duration of use of EHRs was not recorded. Many EHR practices were early adopters of the technology and may not have established stable patterns of use.[68] Also, it is not clear whether the EHR systems in these studies contained links to evidence-based reminder systems. New EHRs offering evidence-based information at the point of care have greater potential to impact clinical outcomes and should be studied in high-quality randomized trials. Clearly, the study of EHRs is an evolving science, and we should expect to see more in this area as the technology is more widely adopted.

CONCLUSION

Primary-care physicians face formidable challenges in providing their patients efficient, evidence-based, and timely care. We need to balance complex clinical knowledge with patient preferences and circumstances while at the same time helping patients navigate our complicated health care system. Increasingly, we are now learning to use new EHRs, which can serve as both an aid or an obstacle to improved care. We believe there is no group better prepared than PCPs to serve as "medical expert, scholar, communicator, professional, collaborator, manager, and health advocate."[69] We have a responsibility to stay current with the vast and evolving medical literature. Thankfully, new electronic resources can efficiently make available the information we need at the time and place we need it. With the skills and knowledge to find and correctly utilize the best information, the PCP can put evidence into practice and improve important patient outcomes. Physicians can and should arm themselves with educational courses, informative texts, and online resources to help guide clinical care and answer questions with strong evidence.

DISCLOSURES

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