

Conducting Medication Reconciliation in Various Patient Settings



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Purpose: The goal of this article is to describe medication reconciliation and its use to prevent medication errors in a variety of patient care settings.

Objectives:

1. Understand the definition and purpose of medication reconciliation
2. Describe how to collect a medication list and conduct medication reconciliation
3. Address barriers that may influence medication reconciliation
4. Describe how medication reconciliation occurs at different points in the transition of care
5. Explain the role of the pharmacist in medication reconciliation

Medication errors occur daily and usually at transition points of patient care, such as on admission, transfer and discharge to or from hospitals, long-term care facilities and other patient care settings. According to the Institute for Healthcare Improvement (IHI), 50 percent of medication errors and up to 20 percent of adverse drug events in the hospital were a result of poor communication of medical information at one of these transition points⁴.

Medication discrepancies (unexplained differences among documented regimens across different sites of care) are very prevalent; according to one report, 67 percent of inpatients had at least one error in their medication history at the time of admission²⁰. In 2006, preventable adverse drug events (PADEs) injured 1.5 million people and cost an estimated \$3.5 billion dollars for hospitalized patients alone³. An estimated 800,000 PADEs occur in long-

term care settings and roughly 530,000 occur just among Medicare recipients in outpatient clinics every year⁷. An analysis of PADEs found that 72 percent of errors occurred at the time of the pre-admission medication history review compared with during medication reconciliation (30 percent, 2 percent caused during both)⁹. In addition, most errors occurred at discharge (75 percent) rather than at admission (25 percent). The most common errors were omissions (60 percent), followed by discrepancies in dose (21 percent), discrepancies in frequency (10 percent), additional medications (5 percent) and substitutions (5 percent).

Medication reconciliation can virtually eliminate errors occurring at transitions in care^{8,10}. An inherent flaw in the medication reconciliation process is that patients and caregivers, notoriously poor historians, are relied upon to provide accurate medication lists. In addition, nurses who have limited drug information expertise are typically the health professionals performing the initial medication history assessment.

The purpose of this article is to describe medication reconciliation and to review the use of medication reconciliation in different practice settings and at different points in the transition of care.

Medication Reconciliation: What It Is and Why It Is Needed

According to the IHI, "medication reconciliation involves a three-step process: verification (collecting an accurate medication history); clarification (ensuring that the medications and doses are appropriate); and reconciliation (documenting every single change and making sure it 'squares' with all the other medication information)." Medication reconciliation is the process of comparing a patient's medication list to all of the medications that the patient has been taking. The reconciliation is conducted to avoid medication errors such as omissions, duplications, dosing errors or drug interactions. The process of medication reconciliation involves five basic steps:⁴

1. Developing a current medication list
2. Developing a list of medications to be prescribed
3. Comparing medications on both lists
4. Making changes and interventions accordingly
5. Communicating the newly developed list to providers, caregivers and the patient

Medication reconciliation does not specifically include patient counseling, but it is strongly encouraged. In the hospital setting, once the home medication list is established and documented, the inpatient medication

list should be compared to confirm no accidental omissions, duplications, interactions or drug selection errors. A medication administration record should be developed, and practitioners should be notified of the most up-to-date list. This process should occur at every transition of care, including changes in patient care setting, medication team or service, practitioner or level of care. Upon discharge, a post-discharge medication list should be developed for the patient, and any changes in medications should be clearly communicated to the patient. Patient instructions and education should coincide with dispensing of outpatient medications. The final step is documenting and informing inpatient and outpatient prescribers of the final medication list.

Medication reconciliation at the transition of care has been shown to significantly reduce medication errors and improve patient safety. Medication reconciliation may prevent up to 70 percent of all potential errors and 15 percent of adverse events¹⁵. The Joint Commission (TJC) (formerly known as the Joint Commission on Healthcare Accreditation) has mandated that hospitals, ambulatory care, assisted living, behavioral health and long-term care organizations build medication reconciliation protocols into their systems. Since 2006, inpatient medication reconciliation has been one of TJC's National Patient Safety Goals (NPSG). Since its introduction in 2005, many organizations have struggled to develop and implement effective and efficient processes to meet the intent of NPSG 8, which is to accurately and completely reconcile medications across the continuum of care. As a result, TJC will not score NPSG 8 in 2009². TJC plans on refining the expectations throughout 2009 and collecting data for process improvement with the goal of implementation of NPSG 8 in 2010.

Medication Reconciliation at Different Points in the Transition of Care

According to TJC's NPSG 8 the implementation expectations are, "At a minimum, reconciliation must occur any time the organization requires that orders be rewritten and any time the patient changes service, setting, provider or level of care and new medication orders are written. For transitions not involving new medications or rewriting of orders, the organization should determine whether reconciliation must occur"²¹. In addition, the full scope of this safety goal is across the continuum of care, which means medication reconciliation applies to all care settings including ambulatory, emergency and urgent care, long-term care, home care

and inpatient services. Examples of medication reconciliation at different points in the transition of care are presented. It is important to realize that besides implementing these practices in the different setting, the practices must be coordinated among the different point of care.

Ambulatory Oncology Clinic

Few models of medication reconciliation in the ambulatory care setting exist. Weingart et al¹⁴ describe a process that begins with clinic assistants providing patients with paper medication lists, having patients update the list, clinicians review the list and pharmacists update the electronic medication record. The medication reconciliation program was piloted at the Dana-Farber Cancer Institute with 46 physicians and nurse practitioners. In this program, the pharmacist was responsible for collecting paper medication lists from the clinician work area and then correcting the electronic medication lists to reflect changes approved by the physician or nurse practitioner, verify correct medications and query clinicians about ambiguous medications or possible drug interactions. Changes were made at a rate of 31 changes per 100 medications reconciled. At baseline, 81 percent of medication lists contained at least one error or omission. Compared with usual care, medication list errors were reduced by 90 percent with this medication reconciliation program. The first full year of the program required 257 hours of pharmacist time, and the fully implemented program requires 0.6 of a full-time equivalent. The authors noted the importance of patient participation in the program and suggested the involvement of patient family and friends. This model may be appropriate in other ambulatory care settings such as surgery, obstetrics-gynecology, pediatrics and adult primary care. Another example of a multidisciplinary medication reconciliation model is described by Nassaralla et al¹⁸.

Outpatient Setting

The outpatient setting is another point in the transition of care that would benefit from medication reconciliation. Investigators conducted a prospective trial of 104 primary care patients at the Mayo Clinic and compared standard care (before intervention) to a reconciliation process (after implementation). The medication reconciliation process consisted of mailed letters before appointments to remind patients to bring medication bottles or updated medication lists to their visits; medication verification by health care providers; correction of the medication list in

the electronic medical record by the patient; and academic detailing and weekly audit and feedback of performance.¹² Interventions resulted in a decrease in prescription medication errors from 88.9 percent of the visits before implementation to 66 percent of the visits after implementation of the medication reconciliation process ($P = 0.005$), and the average number of discrepancies per patient decreased by more than 50 percent. The majority of discrepancies were minor. Various health care providers, including pharmacists, were involved in the reconciliation process. Nurses conducted the medication list review. The role of the pharmacist in this program was not clearly described, although for this study the pharmacist assisted with coding of the medication errors and provided feedback to study authors. The authors commented that resources required to conduct this medication reconciliation program include nurse and pharmacist personnel, a physician champion to provide initial academic detailing of providers, and mailed letters that served as reminder tools for medication lists and/or bottles.

Emergency Department

Many hospitals have limited pharmacy services in the emergency department. In an eight-week pilot analysis, a pharmacist conducted medication reconciliation in the emergency department³. A medication reconciliation form was used for 78 percent (78 out of 100) of patients in the control group (retrospective analysis of admitting physician-obtained histories) and 100 percent (60 out of 60) of the pharmacist-acquired history group ($P < 0.001$). There was no difference in the number of medications recorded per form between groups. In all, 117 errors were identified in the completed forms for the control group, but only two errors were found in the pharmacist-completed forms. Allergy documentation was recorded for 79 percent of patients in the control group compared with 100 percent of the study group patients. This study supports the use of pharmacist-led medication reconciliation services in an emergency department setting.

University, Teaching Hospital

At the University of Michigan, a prospective study of medication reconciliation found that 66.2 percent (477 out of 721) of patients were able to be interviewed to assess current medication use and only 34 percent (248 out of 721) of patients were counseled at discharge¹³. The most common reasons for failure to conduct medication reconciliation and patient counseling were time constraints,

weekend/evening discharges and lack of notification of discharge. An average of three medication discrepancies per patient were observed during the inpatient analysis and were resolved in 63 percent of patients. Follow-up phone calls within 72 hours and at 30 days revealed a total of 123 post-discharge problems, which were resolved by the clinical pharmacist. Investigators noted that medication discrepancies at discharge were common and that pharmacist-facilitated discharge increased recognition and resolution of medication errors. Follow-up telephone calls provided the opportunity for pharmacists to reinforce discharge instructions and to recognize and resolve post-discharge medication-related problems.

Community, Nonteaching Hospital

Wortman et al describe the development and implementation of a medication reconciliation program in a 250-bed community, nonteaching hospital and found that a successful program requires a multidisciplinary approach¹⁶. A multidisciplinary team consisting of nurses, pharmacists, physicians, and representatives from health information management, risk management, performance improvement and management information systems was assembled and met monthly. A pilot program for discharge reconciliation was developed and implemented. On admission, the emergency department nurse obtained the list of home medications and allergies from the patient, family or both to be entered into the computer system. The list was printed and sent with the patient to the nursing unit. The nurse at the inpatient unit reviewed the list, updated it and checked for inconsistencies. If clarifications were needed, the nurse would contact the patient's pharmacy, primary care physician or other sources as needed. There was no interface between the inpatient nursing and pharmacy computer systems. Throughout the process, physician orders were faxed to the pharmacy for review according to current hospital practices. The pharmacist was responsible for reviewing orders, entering the orders into the pharmacy computer database, reviewing home medication lists and attending interdisciplinary rounds biweekly. Baseline assessment revealed that 15 percent and 18 percent of medications were unreconciled at admission and discharge, respectively. After implementation of the program, the percentage of unreconciled medications decreased to less than 5 percent. Progress and problems were addressed. Eventually the program was expanded. Key components to this program

were education, audits and feedback.

Health Care System

The most common example of medication reconciliation is in the inpatient health care setting; however, a collaboration among institutions is unique and worthy of pursuit. Patients may transfer between institutions, and changes in medications may go unnoticed. A description of how six hospitals collaborated with each other and the Institute for Healthcare Improvement to decrease ADEs was recently published¹⁵. Investigators conducted an analysis of medications on admission, transfer and discharge. On admission reconciliation, the home medications were compared to the initial physician orders; on transfer reconciliation, the medications the patient was taking as indicated by the previous nursing unit were compared to the orders on the current unit and discharge reconciliation compared all current medications to those the physician ordered for discharge. Any variances between the two lists were reconciled by the nurse or pharmacist with the prescriber within 24 hours. According to the authors, "One of most popular changes has been the availability of pharmacists on the nursing units to review and enter medication orders. This provides the double benefit of saving nursing time in addition to providing the pharmacist a first-hand look at the orders to identify potential dosing errors, drug interactions, and the like. Because of these efforts, our Ordering Failure Mode Effects Analysis Hazard Vulnerability Score has decreased from 157 to 103, for a 34 percent reduction." Using a multifaceted approach of instituting a safety culture, addressing high-risk medications, assessment of medication dispensing processes and medication reconciliation over 20 months, this health care system decreased the rate from 3.84 to 1.39 ADEs per 1,000 units of medication administered.

Skilled Nursing Facility

The impact on mortality and use of health care services after use of a pharmacist-managed medication reconciliation program for patients discharged from a skilled nursing facility was evaluated by Delate and colleagues¹. Sixty days after discharge, patients who received pharmacist-provided medication reconciliation had a 78 percent reduction in the risk of death compared with usual care. A trend toward an increase in physician visits was also noted (adjusted incidence ratio 1.17: 95 percent CI, 0.99 to 1.37). No differences in emergency room visits or re-hospitalization were noted. The researchers concluded that medication reconciliation

conducted by a pharmacist decreased mortality in patients discharged from a skilled nursing home.

Hospice

An analysis of 58 patients transferring into two hospice centers was conducted in which medication histories were first completed by nurses and then completed by pharmacists five days later⁶. Pharmacist-completed histories revealed an average of 8.7 medication discrepancies per patient, with the majority being errors of omission. More than 190 drug interactions, most moderately severe, were uncovered. Pharmacist histories were considered more completed and accurate. Patients used on average 18 medications concurrently. Nearly half of these medications had a discrepancy. This population has a high potential for ADEs based on the severity of illness and number of medications and would benefit from standardized medication history and medication reconciliation processes to reduce errors.

Challenges with Conducting Medication Reconciliation

The medication reconciliation process can be challenging for practitioners for multiple reasons. Often, patients are unaware of the name and strength of their current medications. In those circumstances, it is helpful to ask a family member or caregiver to provide this information. If a local pharmacy is listed on file, they may be able to provide the active medications on the patient's profile. Sometimes reading the medication list to the patient will help them recall what is current and what has been discontinued. Finally, drug databases can help identify medications based on markings, size, color or shape, if the patient can only provide this information. Patients may maintain a list of medications; however, this should not be completely relied on as the list may be old (dose or medication changes) or incomplete. The health care provider must confirm that the list is accurate and current. Caregivers may bring in all of the patient's medication bottles from home; however, this also must be verified for the reasons just mentioned.

Institutions are converting from paper to electronic medication charts and medical records. Electronic medication records can increase the accuracy of the medication reconciliation process. Pitfalls with paper charts include poorly written orders; unclear abbreviations; misspelled medications; or omission of the dose, route or frequency. If the institution has transitioned to an electronic format, incorrect abbreviations may still be

an issue. Selection of the incorrect medication, dose and frequency could still occur because of human error in data entry. Miscommunication of the medication therapy list by the patient to the health care provider can lead to errors. Communication barriers may require the assistance of an interpreter such as with patients who are deaf, hard-of-hearing, visually impaired or limited or non-English speaking. A complete medication list should be collected to ensure patient safety (see Table 1). Taking an accurate medication history can be a challenge. Patients may have multiple outpatient prescribers and pharmacies, and none may have an accurate list of the patient's entire medication regimen. Inadequate health literacy may limit the patient's understanding of medication regimens. Communication with community pharmacists, outpatient physicians, family members and caregivers is needed to obtain a complete medication history.

Pharmacists as Providers of Medication Reconciliation

Although there is evidence that pharmacist-conducted medication histories are more accurate, save money and increase patient safety, this service is not widely implemented in the United States. Hayes et al³ evaluated the effect of medication reconciliation on resolution of medication discrepancies in patients admitted to the emergency department. Pharmacist-acquired medication histories had significantly fewer errors in documentation and more documentation of patient allergies compared with medication histories obtained by admitting physicians. The majority of medication errors were incomplete orders that often led to a delay in medication administration. Nester et al¹⁹ found that pharmacist-acquired medication histories were more effective in uncovering medication discrepancies than nurse-obtained histories. Authors noted that nursing staff strongly supported the prospect of pharmacists conducting medication history interviews. Maintaining good nurse-pharmacist and physician-pharmacist relations is important for the success of medication reconciliation at all points of care.

Kaboli et al¹⁷ conducted a systematic review of clinical pharmacists and inpatient medical care and determined that the addition of the pharmacist in the care of inpatients generally resulted in improved care; one of the pharmacist-provided services analyzed was medication reconciliation. Pharmacists are the most qualified professionals to take a complete medication history and appropriately determine the necessary

contents of the medication list. Pharmacist-provided admission histories have been shown to decrease costs and provide better patient care. Therefore, the American Society of Health-Systems Pharmacists (ASHP) Initiative for 2015 encourages pharmacist involvement in managing inpatient medication admission histories.

Overcoming the Challenges of Conducting Medication Reconciliation

To overcome the challenges of conducting medication reconciliation, the following are recommended. Become the medication reconciliation champion at your institution (see Table 2). To do so, you will need to educate yourself on the process of medication reconciliation using evidence-based literature. Refer to TJC NPSG 8 to support conducting a baseline assessment of the accuracy of medication lists at transitions points of care in your institution. Once this has been accepted, you can move on to do a baseline assessment of your institution. Assess the medication history process and determine the number of unreconciled medications per patient or per unit to determine the need for medication reconciliation at your institution. Do this at every point of transition in care. Keep in mind that some health care providers may not be convinced that there is a need at your institution and this baseline assessment is to gather data to compare to data from similar patient care sites. A baseline assessment will be used to assess the impact of medication reconciliation after the process is implemented. Use this data to educate staff and pharmacy and therapeutics members about medication reconciliation and to determine how your institution compares to other institutions. To help you move forward, create a team or committee of health care providers in your practice setting who will work together to develop and implement medication reconciliation policies and protocols. Always use evidence-based data to support your policies. An example medication reconciliation policy and description of how to take a medication history are provided at www.ih.org. Remember key personnel at your institution who can facilitate the medication reconciliation process. Work with information technology personnel to incorporate home medication lists into electronic records. Educate other providers about the importance of medication reconciliation and ADE prevention and train them on how to conduct medication reconciliation. It is wise to do nursing and physician in-services at breakfast or lunch time and get support from these key medication history

takers. Do not forget the night shift; these staff members must be included in the design and implementation of the program, too.

It is important to conduct a financial assessment of the additional pharmacist and other health care provider time to conduct medication reconciliation. If possible, attempt to assess the cost avoidance with reduced medication errors. Medication reconciliation protocols should include an algorithm indicating who is responsible for conducting the medication history and when (usually not more than 24 hours) the history should be obtained in relation to a change in service or care (e.g., admission, transfer, discharge). Example protocols and algorithms are available at www.ih.org.

Be sure to individualize it to suit your institution's needs and culture. Pilot the protocol in one unit or area of your institution before expanding it to multiple sites. Pick an area that is supportive of the process and wants to pilot the program first. Assess the effectiveness of protocols by randomly auditing patient charts. Reinforce education and training by having periodic updates for staff. Develop institution-specific work flow diagrams and algorithms to help identify breaks in the steps to conducting medication reconciliation appropriately. Schedule staff "town meetings" to discuss current policies and protocols; encourage feedback and constructive criticism. Keep in mind that NPSG 8 will be a mandate of The Joint Commission very soon.

There are many resources available to help with the development and implementation of medication reconciliation. A list of these resources is provided in Table 3. The 5 Million Lives Campaign is a national voluntary initiative by IHI to dramatically improve the quality of American health care by protecting patients from the five million incidents of medical harm between December 2006 and December 2008²¹. Pathways for Medication Safety is a set of tools designed to reduce medication errors (www.medpathways.com). The Joint Commission Resources (JCR) and Simpler Healthcare experts offer medication reconciliation consulting services to help provide a step-by-step approach to medication reconciliation implementation and success.

Conclusion

Medication reconciliation improves patient safety and reduces medication errors. Institutions are struggling with developing and implementing medication reconciliation programs into daily practice. Barriers to implementation include limited resources (personnel), lack of understanding of the potential impact to patient safety and diffi-

culty instituting the program into daily practice. Research supports that pharmacists obtain an accurate and complete medication history and should take the lead in providing medication reconciliation. While medication reconciliation is important and should be implemented at every transition point of care, it should not occur alone; patient education should be provided and other medication safety tools should be used to prevent medication errors.

Affiliation and Financial Disclosures

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References

References available upon request to the MPA office.

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Table 1. What to Do to Obtain a Medication List*

Activity	Action
Contact pharmacies where medications are filled	Community and mail order Location Phone number Date contacted
Assess medication allergy history	Document the type of medication and patient response to medication allergy Examples of allergies that may be omitted : latex, IV contrast dye, environmental, food
Develop a comprehensive medication list	All preadmission or pre-transfer medications Over-the-counter medications Medications given occasionally to prevent allergies or adverse effects Medications taken seasonally As-needed medications Multivitamins or herbal supplements Recent use of antibiotics (within three weeks) Patches or topical medications Immunizations
Communication	Talk to patients and families about medications Obtain medication lists from patient/family/medical records Contact physician offices Place the pre-admission and pre-transfer medication list on the patient chart Provide a copy to the patient and primary health care provider

*Adapted from www.ashp.org/s_ashp/docs/files/PS_Educating%20Nonpharmacists%20about%20MedRec.pdf

Table 2. Tips to Improve Medication Reconciliation*

<ul style="list-style-type: none"> • Implement policies and procedures to outline steps and roles of those involved in the reconciliation process • Use a systematic approach when conducting medication reconciliation; for example, always begin with prescription medications, then over-the-counter agents, then herbal, vitamins and other supplements • Create a pre-admission medication list and attach this form to discharge orders form • Establish appropriate time frames for when medications should be reconciled between transition points of care • Provide further training to staff to improve medication lists and histories during patient admission. • Establish the variances between physician, nurse and pharmacist in the medication reconciliation process • Create a standardized form that lists all of the medications the patient has been receiving in the hospital, and include space for prescribers to document reasons for omitting or including medications at discharge • Develop a surgical medication review order form that includes all medications the patient was receiving prior to surgery; the form allows the surgeon to select which medications should be continued or discontinued after surgery

*Adapted from IHI.org

Table 3. Useful Medication Reconciliation Resources*

- American Society of Health-System Pharmacists Medication Reconciliation Toolkit www.ashp.org/Import/PRACTICEANDPOLICY/PracticeResourceCenters/PatientSafety/ASHPMedicationReconciliation-Toolkit_1.aspx
- Example of a hospital medication reconciliation policy www.ashp.org/s_ashp/docs/files/PS_MedRec%20Policy%20Final.pdf
- Institute for Healthcare Improvement Web site www.ihl.org
- 5 Million Lives Campaign www.ihl.org/IHI/Programs/Campaign/
- Getting Started Kit: Preventing Adverse Drug Events. Medication Reconciliation How-to Guide www.ihl.org/IHI/Programs/Campaign/ADEsMedReconciliation.htm
- The Joint Commission www.jointcommission.org
- The Joint Commission Resources Medication Reconciliation Consulting Services www.jcrinc.com/Consulting/Medication-Reconciliation-Consulting-Services/1537/
- Joint Commission Resources www.ccfpatientsafety.org
- Pathways for Medication Safety www.medpathways.info

*This is not a comprehensive list

Continuing Education Self-Assessment Questions

- According to the Institute for Healthcare Improvement (IHI), poor communication of medical information at transition points "of care accounts for ___ percent of medication errors?
a. 10 b. 20 c. 50 d. 75
- During the reconciliation of home medications, all of the following medication-related errors are usually being assessed, with the exception of:
a. medication omission.
b. medication adverse effects.
c. drug interaction.
d. medication duplication.
- All of the following are typically components of the medication reconciliation process except which of the following:
a. Reconcile the medication administration record and discharge medication list
b. Provide patient counseling on medication adherence
c. Provide medication list to the patient
d. Provide medication list to next provider
- Which of the following is the intent of Joint Commission's National Safety Goal 8?
a. To accurately and completely reconcile medications across the continuum of care
b. To accurately and completely reconcile medications in the inpatient setting
c. For pharmacists to reconcile medications across the continuum of care
d. For nurses to accurately and completely reconcile medications in the inpatient setting
- An analysis of preventable adverse drug events (PADEs) found that ___ percent of errors occurred while obtaining the pre-admission medication history.
a. 60 b. 65 c. 70 d. 72
- Which of the following medications should be reconciled when collecting a medication history?
a. Over-the-counter medications
b. Immunizations
c. Herbal Medications
d. Vitamin Supplements
e. All of the above
- Which health care provider has been shown to collect the most accurate medication history?
a. Physicians b. Nurses
c. Pharmacists d. Dieticians
- A tool that consistently helps with medication reconciliation is:
a. electronic medication records.
b. paper charts.
c. patient's own medication list.
d. previous discharge medication list.
- According to The Joint Commission, when should medication reconciliation be conducted?
a. Across all transitions in care
b. Whenever a medication therapy change occurs
c. At hospital discharge
d. Whenever physician coverage changes
- Which of the following is a way to overcome barriers to medication reconciliation?
a. Become a champion for medication reconciliation
b. Form a medication reconciliation team
c. Educate staff on the importance and safety potential of medication reconciliation
d. All of the above

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3. How useful will the content of this article be in your practice?
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4. To what degree did the article meet the stated objectives?
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