

Enhancing Worker Health Through Clinical Decision Support (CDS)

The November 2017 issue of the *Journal of Occupational and Environmental Medicine* contains a compilation of articles describing proposed recommendations to introduce computer-mediated clinical decision support (CDS) into health information systems for primary care practices to assist providers in the care of working patients.

This document contains the original three knowledge resource reports that are referred to in the *Journal* articles. These documents are:

1. Work-Asthma Domain Experts (WADE) Final Report
2. Using Electronic Health Records and Clinical Decision Support to Provide Guidance on Occupational Factors Which Impact Diabetes: A Final Knowledge Resource Report
3. Using Electronic Health Records and Clinical Decision Support to Provide Return-to-Work Guidance for Primary Care Practitioners for Musculoskeletal Conditions Not Caused by Work

WORK-ASTHMA DOMAIN EXPERTS (WADE) FINAL REPORT

Submitted by:

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INTRODUCTION AND OVERVIEW

Asthma is a common chronic inflammatory disease of the lungs affecting close to 19 million adults 18 years or older in the U.S. ¹. Work-related asthma (WRA) is defined as asthma caused or exacerbated by exposures in the workplace. An estimated 17% (median) of new-onset adult asthma cases are caused by workplace exposures ² and an estimated 21.5% (mean; range 13– 58%) have pre-existing or current asthma exacerbated by workplace exposures ³. WRA can have long-term adverse impacts on individuals, including increased morbidity and adverse socioeconomic impacts ^{4,5}. Early diagnosis of WRA and elimination / reduction of exposures can reduce the likelihood of permanent asthma and reduce disability ^{6,7}. Recognizing WRA in one worker can lead to better exposure controls for co-workers, a form of primary prevention. Thus primary and secondary prevention are facilitated by recognizing WRA. The relatively short latency and availability of many exposure control methods make WRA an excellent candidate for linking prevention with clinical input.

However, unfortunately work-related asthma continues to be under-recognized and under-diagnosed ^{3,6}, for multiple reasons. In a U.S survey of over 50,000 individuals with asthma, only 14.7% of ever-employed adults with current asthma communicated with a healthcare professional about the relationship of their asthma to work ⁸. Clinicians frequently do not inquire about potential occupational exposures and therefore may miss important opportunities for diagnosis and intervention ⁹. In addition, further work-up to clarify the diagnosis of asthma and/or evaluate work-relatedness may not be performed and /or the worker may leave the causative workplace ^{6,10,11}.

This report provides a suggested approach and rationale for addressing work-related asthma in the primary care setting using Clinical Decision Support (CDS). The primary objective is to improve recognition and management of work-related asthma in primary care settings for working age patients with asthma. The recommendations are meant to prompt and support clinician-patient discussion and further evaluation of possible WRA, rather than provide a specific diagnostic algorithm.

The recommendations are based on the major relevant professional organizations' statements and/or guidelines that address WRA, including: the American College of Chest Physicians (ACCP) consensus statement on WRA ⁶, the American Thoracic Society (ATS) official statement on work exacerbated asthma ³, the European Respiratory Society (ERS) taskforce guidelines for the management of work-related asthma ¹², and the British Thoracic Society (BTS) standards of care for occupational asthma ^{13,14}, and the related British Occupational Health Research Foundation (BOHRF) evidence reviews ¹⁵. As these guidelines and statements do not adequately address the more limited capabilities for evaluating and managing WRA in many primary care settings, WADE expertise also guided the development of these recommendations. The WADE working group discussed whether agent-specific (e.g. allergens, irritants) recommendations should be made and favored a more general approach. The working group felt that a list of WRA exposure agents / conditions as well as resources targeted to health care providers and patients would facilitate the recognition and management of WRA.

OVERALL CLINICAL OBJECTIVE:

The primary objective is to improve recognition and management of work-related asthma in primary care settings for working age patients with asthma ≥ 18 years old.

RECOMMENDATIONS

The committee recommends a systematic approach to identifying work-related asthma in primary care settings. The recommendation contains several components, which would be triggered in a sequential fashion, as summarized below:

Recommendation #1a: Administer 3 WRA screening questions to all working age (>18 years old) patients with new-onset or worsening asthma

IF: - Reason for visit =
- Asthma (ICD-9 493.XX; ICD-10: J45.XX, J63.3) that began within the last two years
-OR patient had one or more ED or acute clinic visits for asthma over the past two years

THEN ask:

- 1) Do / did your asthma symptoms start at your current / recent workplace?
- 2) Do / did your asthma symptoms worsen at work?
- 3) Are asthma symptoms different (e.g. better) on days off work and/or holidays?

Basis of Recommendation 1a

A meeting sponsored by NIOSH (September 2014) provided insight into the selection of recommendations to identify WRA that could be implemented in a primary care setting using CDS.

The ACCP Consensus statement concluded that work-related asthma should be considered in all adults with new-onset or worsening asthma⁶. Similarly, the ATS document states that “work-exacerbated asthma should be considered in any patient with asthma that is getting worse or who has work-related symptoms”³. Thus recommendation 1a is based on the CDS being able to identify patients with “new-onset” or “worsening” asthma. The criteria noted above to define new-onset or worsening asthma were chosen based on consensus of the committee and current understanding of CDS capabilities, recognizing that the criteria may need modification after pilot testing.

The 3 work-related questions were selected based on the literature, existing WRA documents and the expert opinion of the committee. The documents cited (including ACCP, ATS, BTS, and ERS), as well as review articles that address WRA diagnosis / surveillance^{7,16-18}, all recommend taking an occupational history and asking patients about asthma onset and the temporal relationship of their asthmatic symptoms to work. The working group attempted to identify the most discerning questions to screen for WRA in a primary care setting. Relevant questionnaires from prior statements and guidelines, the literature and professional colleagues were reviewed^{6,12,16,19-21}.

WRA questionnaires used in selected settings have shown an ability to identify workers at risk for WRA²⁰⁻²⁴. However, validation has been limited, focused largely on occupational asthma (rather than all WRA), and rarely in a primary care setting. Additionally most questionnaires are too long and time-intensive for application in primary care settings given current time constraints on providers. For example, Pralong’s Occupational Asthma Screening Questionnaire showed fair discriminative ability to identify occupational asthma and work-exacerbated asthma when used in a WRA referral center, but has not yet been evaluated in a primary care setting^{20,21}. Killorn et al evaluated a shorter WRA screening questionnaire (WRASQ) in 37 patients with asthma in a primary care asthma program, finding substantial agreement between testing and good reproducibility, including exposure questions^{19,25}. The WRASQ identified additional work-related symptoms and exposures compared to usual-practice, but the limited number of WRA cases limited further validation¹⁹.

Considering available WRA questionnaires and practical considerations, the WRASQ was considered most applicable to current needs based on: its prior implementation in a primary care setting, reproducibility, and applicability to both occupational and work-exacerbated asthma. Three questions addressing the temporal relationship of symptoms to work, questions common to most WRA questionnaires were chosen, as the 14-item questionnaire was considered too lengthy for use in a busy primary care practice.

Anticipated Benefits and Harms

The anticipated benefits of the brief questionnaire include ease of administration and targeting patients most likely to have WRA. Potential harms are minimal.

Limitations of the Recommendation

The use of a simple screening questionnaire may not identify all cases of possible WRA.

Gaps in the Recommendation

As noted above, the best screening questions to ask to identify WRA have not been determined. The specific questions chosen could be modified in the future.

Recommendation #1b: Evaluate diagnosis of asthma

IF: patient responds positively to any of the 3 screening questions

THEN: clarify the diagnosis of asthma with spirometry testing.

Spirometry showing airflow obstruction (FEV1/FVC ratio < LLN) plus a significant response to bronchodilator (defined as improvement in either FEV1 or FVC by 200 ml and a 12% improvement over baseline) supports a diagnosis of asthma.

SPIROMETRY EXPLANATION (Provided to patient if spirometry is recommended):

Spirometry is a simple breathing test to measure lung function. It provides useful information to help your clinician determine if asthma is present. For more information, click here ²⁶: <http://www.thoracic.org/patients/patient-resources/resources/pulmonary-function-tests.pdf>

Your providers should discuss the results of your spirometry testing with you, and whether the test results help show that you have asthma. You should also discuss your respiratory symptoms and their relationship to work with your provider when you review your spirometry. Like most medical tests, spirometry is not a perfect test; normal results make asthma less likely but do not rule out possible asthma. Also, patients can develop respiratory symptoms related to work even though spirometry testing does not show asthma, as work exposures can lead to other respiratory conditions. For more information, click here ²⁷: <http://www.thoracic.org/patients/patient-resources/resources/occupational-lung-disease.pdf>

Basis of Recommendation 1b

The spirometry criteria used are consistent with ATS and ERS guidelines ^{28,29} and The Global Initiative in Asthma (GINA), which defines asthma as a disease with symptoms such as wheezing, shortness of breath, chest tightness, and cough that vary over time and are associated with variable expiratory airflow obstruction due to bronchoconstriction, airway wall thickening and increased mucus. Other conditions can cause respiratory symptoms that are hard to distinguish from asthma, such as rhinitis and upper airway irritation, conditions that can also precede and/or co-exist with asthma. Spirometry testing, used to document reversible airflow obstruction, is performed in patients with asthmatic-like symptoms to help assess whether they have asthma or another

condition. While asthma in primary care practice is commonly diagnosed based on a typical clinical presentation and response to treatment, when WRA is being considered, it is important to try to document asthma, which is defined as reversible airflow obstruction in existing WRA documents 6,12,13,15

It is recognized that asthma is a variable heterogeneous condition, and patients with asthma can have negative bronchodilator testing. However, such a finding greatly reduces the likelihood of asthma. Medications used to treat asthma and removal from causative agents can improve airflow obstruction and reduce airway hyper-responsiveness, and thus should be considered in interpreting spirometry finding.

Anticipated Benefits and Harms

Clarifying the diagnosis of asthma benefits patient care by limiting use of medications with potential adverse effects to those likely to benefit. In addition, documenting that asthma is present will help clarify the patient's diagnosis, which can impact a patient's job as well as health. Making such decisions without adequately documenting asthma can lead to diagnostic uncertainty and adverse socioeconomic consequences. Spirometry is regarded as a safe test with very rare complications.

Limitations of the Recommendation

Patients in the clinical setting may not have easy access to standard high quality spirometry testing. As noted some patients with asthma can have normal spirometry, and WRA or other work-related respiratory conditions that impact the patient's health or ability to work could be missed.

Gaps in the Recommendation

The recommended approach may not identify patients who have (or had) WRA, but whose spirometry is currently normal, possibly because they have left the workplace, and/or are taking asthma medications. More detailed recommendations could include methacholine challenge testing to further clarify the diagnosis of asthma and peak flow monitoring (see below). This approach will also not identify patients with work-related rhinitis or other respiratory conditions. The literature regarding these other work-related respiratory conditions is more limited, but could be addressed in future CDS efforts.

Recommendation #1c: Provide WRA tools to clinician and patient, and encourage discussion

IF: patient responds "yes" to any of the 3 screening questions **AND** patient has asthma

THEN: Provide WRA tools to the clinician and patient

AND Document in EHR the discussion regarding the patient's work and respiratory symptoms

The WRA information tools should include 3 components:

1) Checklist of selected high-risk exposure situations:

- Adhesives/glues
- Agricultural agents (e.g. grain)
- Animal/fish materials
- Biologic agents, enzymes
- Molds, viruses
- Chemicals
- Cleaning agents
- Cold air
- Dust
- Dyes
- Food agents (e.g. flour)
- Fumes (e.g. exhaust)

- Insects/insect materials
- Isocyanates
- Natural rubber products
- Pharmaceuticals
- Plants/plant materials
- Metal working fluids
- Metals
- Smoke
- Textile fibers
- Wood dust

2. Educational materials for providers and patients, including information on diagnosis and management of WRA: Education materials are from the ATS, OSHA, and the medical literature^{27,30-32}.

3. Referral Resources: Information on local clinicians with specialized knowledge of occupational respiratory disorders (and referral instructions / forms), and additional local resources such as local state / city health departments and American Lung Association / ATS.

Basis of Recommendation 1c:

Clinicians not asking patients about their work has been identified as a major obstacle to recognizing WRA. The approach recommended here is derived from the previously cited ACCP, ATS, ERS, BTS, and BOHRF WRA documents^{3,6,12-14}, which all stress the importance of obtaining a thorough focused work and exposure history and referral to clinicians with specialized expertise in WRA.

If Recommendations #1a and b are triggered (patient responds yes to ≥ 1 of the 3 screening questions AND asthma is confirmed), the patient will be scheduled for a longer follow-up visit with his/her provider. Educational materials and resources regarding WRA, including a list of work exposures that can cause or exacerbate asthma, adapted from the WRASQ questionnaire²⁵, will be provided. The WRASQ-based list was selected as it includes the major types of work exposures reported to cause or exacerbate asthma^{3,6,18,33} and is in an easily usable format. As the WRASQ-based list is not exhaustive, the comprehensive AOEC (Association of Occupational and Environmental Clinics) web-based list of agents associated with new onset WRA³³, will be available as an online resource (<http://www.aoecdata.org/ExpCodeLookup.aspx>).

Providing user-friendly educational resources should facilitate the evaluation of WRA by enabling the clinician to obtain a relevant occupational / exposure history (including job title, tasks, changes, exposures, use personal protective equipment) in relation to asthma (onset of asthma symptoms, temporal associations of symptoms with work / work changes). Clinicians will be prompted to document information obtained in the patient's electronic medical record.

Resources to facilitate referral to a clinician with specialized knowledge related to WRA will be tailored to the specific location.

Anticipated Benefits and Harms

Potential benefits are substantial. The diagnosis of WRA can lead to appropriate exposure control, job modification, and / or compensation. Early recognition of WRA and exposure reduction improves health outcomes^{6,7,18}. Identification of a sentinel case may also lead to workplace protections for other workers, preventing other cases of WRA. Potential harms include over or under diagnosis of WRA. Patients may be subject to income or job loss if WRA is diagnosed, which can be mitigated

by accurate diagnosis, and exposure reduction. Costs related to clinician and patient time for obtaining the occupational history will be incurred.

Limitations of the Recommendation

This recommendation depends upon the commitment of patient and clinician to discuss work exposures, and the ability of the patient to provide work information. The availability of referral expertise varies substantially by geographic location. Given the limited numbers of clinicians with such expertise, additional tools could be developed in the future to inform primary care and pulmonary physicians about additional diagnostic approaches, including better exposure assessment (MSDS/SDS, industrial hygiene data, NIOSH Health Hazard Evaluations, OSHA), and peak flow monitoring. The recommended questions and educational materials are in English, but translation into other languages could be implemented with limited difficulty. The availability of specific testing such as spirometry may differ from site to site.

Gaps in the Recommendation

The diagnosis and management of WRA can be challenging, even when an occupational lung specialist evaluates a patient. Over and under-diagnosis can occur. Common misconceptions should be clarified, including: the level of diagnostic certainty for work-related conditions in the U.S. is generally more probable than not (over 50% likely), that WRA can be diagnosed without confirming a specific causative agent(s), and also that there may be multiple work triggers, as is common with work-exacerbated asthma. Patients with work-related respiratory symptoms who do not have asthma also warrant close follow-up and further evaluation, which could be addressed in another CDS.

OVERALL EVALUATION OF RECOMMENDATION SET

Sources of Recommendations / Quality of Evidence

As noted, these recommendations are based on the most recent guidelines / statements on WRA from the American College of Chest Physicians (ACCP)⁶, American College of Occupational and Environmental Medicine (ACOEM)³⁴, European Respiratory Society (ERS)^{7,12}, American Thoracic Society (ATS)³, British Occupational Health Research Foundation (BOHR) and the British Thoracic Society (BTS) Standards of Care¹³⁻¹⁵, which are all based on systematic reviews of the WRA literature. The documents acknowledge the generally low to moderate quality of the literature cited, mainly case-control and smaller cohort studies, given the lack of randomized controlled trials. The ERS and BOHR documents used the Scottish Intercollegiate Guidelines Network (SIGN), Royal College of General Practitioners (RCGP) and / or Grading of Recommendations Assessment, Development and Evaluation (GRADE) systems to evaluate the quality of the evidence and the strength of the recommendations. The ACCP and ATS documents used a consensus approach. Despite lower quality evidence and different rating systems to evaluate the literature, the recommendations regarding WRA in these different documents are remarkably similar, as noted in a quality appraisal of these WRA documents³⁵.

Strength of the Recommendations

The recommendations made here overall are considered strong recommendations based on the potential benefits significantly outweighing potential harm, assessed from the perspective of the individual patient and on a population basis. The ERS Statement, the only one that used the GRADE system, rated the strength of almost all recommendations as strong, despite being based on generally moderate quality evidence, given that the benefits outweighed harm¹².

Limitations / Gaps in the Recommendations

As noted above, there are potential limitations. For example, misdiagnosing WRA could lead to loss of a job or reassignment. The CDS components may lead to longer duration patient visits, reducing the number of patients seen by the healthcare provider. However, properly recognizing and managing WRA should improve patient outcomes and thereby attenuate the costs of health services.

NECESSARY INFORMATION & SYSTEMS

As a minimum, the system must include ICD diagnostic codes for each patient encounter. In addition, a means for delivering the WRA agent list and educational materials must be present, preferably with direct access from within the electronic health record. The recommended approach is adjustable depending upon data linkages available at the implementation site. The system can be augmented on an incremental basis as the site electronic health record system can access more complete information. (E.g. this will be useful even if initially limited to diagnostic codes, but pharmacy and prescription data can subsequently be incorporated if available). In summary, this approach is immediately implementable but can expand as the electronic health record system is further developed. Interoperability and connections among clinics, external providers, pulmonary function laboratories, and pharmacies will further improve this approach.

QUALITY MEASURE EVALUATION APPROACHES FOR CDS-EHR INTEGRATION

Systematic objective evaluation of the effectiveness of the program to incorporate occupational health clinical decision support systems (CDS) within modern electronic health record (EHR) systems should follow generally accepted evaluation principles. This section briefly summarizes recommendations from the Work Asthma Domain Expert committee. These suggestions are based upon:

- expertise of committee members as clinicians and researchers
- input from the NIOSH liaisons to the committee and special orientation arranged by NIOSH including:
 - presentations by Dr. Richard Schiffman of Yale University
 - webinar provided by The Joint Commission
- Summary report of primary care provider interviews by Dr. Joan Ash and colleagues of the Oregon Health Sciences University
- Limited Literature Review

Relevance to Occupational Health

Quality measures are applied to systems or populations rather than to individuals³⁶ to measure health care processes and outcomes. AHQR emphasizes the importance of defining “the dimensions to be measured before embarking on data collection”, and notes that the quality measure should be based upon the “specific population” and should be selected to be most useful in guiding the “health care team in improving quality of care”.

There is no single “best quality measure”. Rather, the quality measure should be selected based upon the specific population and the purpose for which the program is instituted. There are libraries of available quality measures (e.g., NHQR database, National Quality Forum¹) from which one or more appropriate measures may be chosen, or if necessary a new quality measure can be developed. The Joint Commission webinar outlined a systematic approach for developing quality measures to assure they meet the needs of all stakeholders and are reasonably implementable.

Review of the available resources identified several existing candidate measures useful for measuring quality of care for asthma. However, none of them appropriately incorporated the occupational health perspective per se. Work-related asthma measures should consider the impact upon the working life of the patient and also incorporate input from the multiple stakeholders including patients, primary care providers, employers, worker representative groups, and healthcare systems. Since work-related asthma is a Sentinel health event, a quality measure should also reflect public health surveillance needs.

The quality measure must also be feasible in the *specific setting* in which it will be implemented. The cost or burden of measurement may differ depending upon accessibility to patient specific longitudinal outcome data.

Focus: Structure, Content, or Outcome

Structure quality measures describe the facilities, resources, and structures supporting a healthcare provision for the specific problem and population.

For CDS-EHR integration, structure measures may include:

¹ <http://www.ncqa.org/tabid/59/Default.aspx>

- Does the setting meet the pre-specified goals? Is it a primary care setting? As a developmental/research effort, is this setting representative so that measures can be generalized?
- Has the computer based system been effectively incorporated within the existing EHR system?
- Are the IT and other professionals adequate to sustain the system after project specific federal funding has been exhausted?
- What proportion of the recommendations of the WADE report are implemented? (E.g., can automated capture of information from emergency department records be included?)

Process measures are objective performance measures. Traditionally, these measure actions performed by and under the control of the health care provider.³⁷ These include measures such as:

- How many patients with asthma and primary providers use the system? (This measure has been effectively utilized in the Canadian WRA EHR trial to identify remediable barriers).¹⁹
- How frequently does the CDS-EHR implementation lead to positive responses to the 3 key questions? (This process measure is very similar population surveillance).³⁸
- Does the frequency of diagnoses of work-related asthma increase after the implementation of the system? Can this be automatically captured with low measurement burden by reviewing ICD-9 or 10 diagnoses in the EHR?

Outcome measures directly measure the health outcome of interest. Outcome quality measures should be based upon the health priorities of all stakeholders.

Several measures of symptomatic status are available for asthma (e.g., measures of severity such as hospitalizations and medications, Asthma Control Test).³⁹

In addition to asthma specific measures, generic patient reported health status measures or satisfaction with care measures are available.

Suggested measures have included³⁹

- number of days of limited activity
- number of... Workdays missed due to asthma
- “percent of asthma population... advised by health professional... to change things in... work to reduce asthma triggers”

Viewing health more broadly, patient centered outcomes may also include measures such as job retention, quality of work life, and income. As positive and adverse effects of diagnosing work-related asthma have been well documented, we recommend that specific quality measures be developed, pilot tested, and implemented. These quality outcome measures should include factors such as:

- employment and income status
- implementation of appropriate accommodations
- changing work environmental conditions benefiting other workers

Project Specific Quality Measures:

The quality measures should meet the needs of this specific NIOSH project in addition to the needs of specific site where the CDS-EHR is implemented. The project is a developmental, research, and demonstration project. As such, an optimal quality measure for WRA should be capable of measurement before, during, and after implementation of the system. Further, it should be designed to identify opportunities and barriers for effective implementation.

Appropriate benchmarks against which results may be compared should be available. These may include pre-/post implementation change within the same location or regional benchmarks.⁴⁰

SUMMARY

Several asthma related quality measures are available in standard sources. They do not appear to adequately measure the long-term outcomes and occupational health dimensions. The committee therefore suggests that prior to system implementation, NIOSH systematically obtain two categories of information: (1) What objective quality measures about work/employment status can be implemented at the demonstration sites? (2) The priorities of patient/workers about which outcomes are most important should be identified. Input from healthcare providers should be complemented by input from patients, workers, employers, and worker representative groups. The Joint Commission and PCORI both provide general approaches.

In summary, process measures such as the frequency with which the system is utilized and outcome measures such as the frequency of diagnosing work-related asthma are likely to be feasible and easily incorporated in the sites selected. Concomitantly, development of appropriate work outcome measures should be encouraged. Recognizing the constraints, the committee recommends proposing the following measures for the initial implementation sites:

- Structure: Can the system triggered by emergency room of vents, and does it document responses to the 3 questions?
- Number of times the system is triggered and leads to documented answers to the 3 questions
- Number of ICD based new diagnoses of work-related asthma

REVIEW AND ASSESSMENT OF ASTHMA CLINICAL DECISION SUPPORT SYSTEMS

Gaps between evidence-based medicine and real clinical practice limit implementation of evidence-based guidelines. Incorporation of real-time clinical decision support (CDS) at the point of care may help bridge this gap. Now, with widespread use of electronic health records (EHRs), electronic interfaces pose as a resource to implement electronic-based CDS (e-CDS) at point of care. Use of e-CDS may significantly improve concordance with evidence-based guidelines in management of asthma. Work-related Asthma (WRA) bears similarities in diagnosis and management to asthma that is not work-related. However, some of the recognition tools are different, as are recommendations for management. We created a CDS tool designed to help increase recognition of WRA among primary care providers. As part of this effort, we reviewed the literature to understand what current e-CDS tools exist related to recognition, diagnosis, and treatment of occupational asthma. While currently, no publically-available CDS tools for WRA have been described, a 2014 systematic review summarized a variety of e-CDS tools for asthma and COPD in primary care.⁴¹ We focused on this comprehensive review as a summary of available literature on asthma-related CDS tools, owing to its recent yet broad time-frame for inclusion of articles (2003- 2013) of high quality, and exclusion of paper-based tools, inpatient hospital-based systems, and conference/meeting abstracts.

CDS Tools for Asthma

The Fathima review included 19 studies, out of 1044 sources initially identified. Eleven of the 19 evaluated asthma care, 5 both asthma and COPD and 3 focused on broader medical conditions that included COPD. Of the studies that included asthma, 4 were based on adults, 5 based on children, and 7 either children or adults. The CDS intervention targeted patients in four studies and practitioners in 15. Thirteen of the 19 trials were embedded in an existing EMR or computerized physician order entry (CPOE), while 6 interventions had a stand-alone system: 4 of which were internet based, and two of which the intervention was administered to practitioners by the study researchers. The CDS interventions were classified into three main categories: 1) Screening/Diagnosis (1 trial), 2) Drug therapy management (5 trials), and 3) multifaceted interventions (13 trials) to include physician management and patient advice. Of these latter 13, CDS tools ranged from simple activation of electronic alerts to identify people at risk of an asthma exacerbation, or prompts to alert the physician to modify treatment, to interventions involving a series of care suggestions on drug therapy and disease management.

Evaluation of CDS Tools for Asthma

In the Fathima review, a CDS tool was considered effective if it produced a statistically-significant improvement in the primary outcome or improvement in ≥ 50 % of multiple relevant pre-specified outcomes. Most of these primary outcomes were health care process measures, clinical outcomes, user work load and efficiency and use and implementation outcomes. Fourteen showed positive effect from the use of CDS on the primary outcome, and 9 of which showed a “significantly” positive effect. Significant improvement was found in the rate of diagnosis of asthma in children by implementation of a parent survey linked to physician prompts using CDS. Significant improvement was also found in ACQ and AQLQ using an electronic diary to record symptoms among patients. The effects sizes for the studies showing significant improvement in the primary clinical outcomes ranged from 0.24 to 0.94, with three studies showing reasonably large effect sizes. Ten trials assessed health care process measures as the primary outcome, of which four showed significant improvements. The effect size calculated for the two studies with significantly positive improvement, however, was poor. Only one of the three trials designed to target user workload and efficiency outcomes showed significant improvement in the rate of asthma documentation by ED doctors in the management of acute asthma. Four trials addressed use and implementation outcomes.

Eighty-three percent (5/6) of the studies that utilized CDS with a stand-alone design showed positive outcomes, as compared to studies testing CDS that were integrated with the HER or CPOE (38%) (5/13). One possible explanation for the lower outcome in improvement is that systems with integrated alerts could be overwhelming to the system users and ultimately ignored. The reasons postulated of this result were that the threshold for the medication alerts generated was too low and became overwhelming, which resulted in ignoring the alerts. The suggested remedy would be to reduce alerts generated and require physician to type a reason for overriding the alert. Four of the five studies that utilized CDS as a stand-alone design were internet-based interventions, which targeted the patients. Stand-alone, internet based systems that included an active self- management component outside the clinical encounter, were shown to be more effective than physician driven systems, which underscores the importance of collaborative care in clinical medicine. These interventions included feedback and monitoring along with patient education. Sixty percent of the 5 studies measuring clinical outcomes showed significantly positive impact on outcomes, compared to 40% of the 10 studies focused on improvement in health care process outcomes. Economic effects of the CDS tools could not be readily assessed based on the available data.

Comparison of Proposed Tool with Existing Asthma CDS Tools

Our CDS tool is aimed at providers, and meant to increase recognition of WRA by asking a series of screening questions. Based on the screening questions, it directs the practitioner to obtain a diagnostic test, which, if positive, triggers generation of educational materials for the patient and practitioner, and prompts the practitioner to document. Of the CDS interventions reviewed, three of the interventions had somewhat parallel structures to ours. The one bearing the most similarity was Carroll et al.'s intervention aimed to increase physicians' diagnosis of childhood asthma based on prompts by the CDS. This study had a positive effect, with a significant difference in children being diagnosed with asthma in the intervention group compared to usual care (8.6 vs. 5.8%, $p < 0.002$, with effect size of 0.24). Another CDS intervention by Taylor et al. aimed to improve the quality of asthma documentation using a decision support tool by ED physicians also had a positive effect, demonstrating significantly higher rates of documentation in 7 out of 10 variables, with an effect size of 0.78. Finally, Bell et al.'s CDS tool targeted physicians to improve health care process outcomes by evaluating adherence with the National Asthma Education Prevention Program Guidelines. In this intervention, there was a 3% increase in spirometry ($p = 0.04$) in the group receiving the intervention compared to the control group, which has relevance to efficacy for our CDS tool.

Summary

In summary, there is a paucity of literature examining the effectiveness of CDS in diagnosing asthma in any context, let alone, the specific circumstances of WRA. However, the literature demonstrates that CDS tools were found effective in the diagnosis and management of Asthma. This indicates that if correctly developed, taking care to avoid pitfalls demonstrated in previous studies, an e-CDS tool could be effective in diagnosing WRA. Specifically, developing a system that incorporates interventions by both the physician and patient will be most effective. While it was found that stand-alone e-CDS can be more effective than EHR-embedded CDS, this may be due to an inherent design flaw that generated an overwhelming number of alerts that then were easily dismissed by the provider. These points highlighted by successful CDS tools, fit well with the WRA CDS Decision Logic Flowchart, which requires both provider and patient interaction. The initial patient interaction is made via the questions "Are you working?", "Do/did your asthma symptoms start at work?", etc. which could be done online via an electronic questionnaire or in person and then uploaded into the EHR. Positive results to the initial questions would then alert a provider to interpret those responses and require a comment to override a recommendation for objective

asthma testing, rather than just generating an alert that can be easily dismissed. Finally, the WRA decision algorithm results in documentation for both the patient and provider which could be in the form of disease education and follow-up instructions.

(Wesley Boose, MD, provided assistance in the preparation of this section).

ILLUSTRATIVE CASE SCENARIO

Mr. Jones is 35 year-old male with complaint of worsening cough and wheeze over the past 6 months who comes in for evaluation. In the past month, he missed work for two “sick days” for breathing problems and went to a local emergency room where the diagnosis was asthma. He received a “breathing treatment” and was given a prescription for albuterol, which he has been using several times a day to control his cough and wheeze. He is a non-smoker with no prior history of asthma. He denies recent fever, weight loss, or sputum production.

Pertinent findings on his Physical exam included the following: Pulse: 86, Respiratory Rate: 14 Afebrile. Blood Pressure: 138/ 84. General: normal appearing fit male not in distress. HEENT: unremarkable. Heart: regular rhythm, without murmur. Lungs: breath sounds heard equally throughout lung fields, expiratory wheeze on forced expiration otherwise no rubs or crackles. Abdomen: unremarkable. Extremities: unremarkable.

CDS ACTIONS: *The integrated electronic health record system automatically initiates the WRA CDS algorithm, as the patient has a new ICD asthma diagnosis and an emergency room visit for asthma, which triggers the three screening questions. (Recommendation #1a).*

The patient completes the questionnaire electronically with a positive response to two of the three questions regarding work-associated asthma symptoms. This triggers an alert to the clinician and patient to confirm asthma by spirometry, and the clinician orders a spirometry test with bronchodilator. The testing is performed and shows mild airflow obstruction with a positive bronchodilator response, supporting the diagnosis of asthma (**Recommendation # 1b**).

CDS ACTIONS: *CDS notifies the patient (and the healthcare provider) to make an appointment for an extended visit to carefully review his occupational history with his primary provider. CDS provides the patient and provider with a list of exposures that can cause WRA and additional information on the diagnosis of WRA (Recommendation # 1c).*

Mr. Jones returns for his longer appointment. He identifies “adhesives” on the WRA agent list, and he and his primary care provider review his spirometry results, and discuss in detail his job, work exposures and associated respiratory symptoms, learning that:

Mr. Jones worked for the same company, an aircraft engine manufacturer, for the past 10 years. About 8 months ago he switched to a new job at the same manufacturer, which involves preparing engine parts for assembly. This work involves inspecting the parts for defects, cleaning them with an air-gun, and spraying an adhesive to contact surfaces prior to final assembly. He wears gloves, but no other protective gear, when he applies the adhesives. His asthmatic symptoms started about 2 months after he started his new job, worsen at work and improve on weekends. He denies ever having asthma or prior pulmonary function testing. A co-worker worker has also been diagnosed with asthma.

Mr. Jones’ primary care provider documents the discussion regarding Mr. Jones’ work history and asthmatic symptoms in his electronic medical record including: dates of employment / job changes / job title, the timing of onset of his asthma symptoms, temporal associations of his symptoms with work /away from work, and any other asthma triggers.

His primary care provider makes a diagnosis of asthma, suspect work-related, based on: his patient’s clinical presentation, work-related symptoms, spirometry results, and occupational history, including identification of exposure to “adhesives” at work, a substance on WRA agent list. He refers Mr. Jones to a local occupational pulmonary specialist for further evaluation and management

(Recommendation # 1c), and also prescribes standard asthma treatment (inhaled steroids, bronchodilator), based on NAEPP guidelines.

Mr. Jones next sees the occupational pulmonary specialist (Dr. X), who performs additional evaluation, including: review of MSDS that Mr. Jones obtained from his workplace and peak flow recordings at and away from work. MSDS for the spray adhesive documents that MDI (methylene diphenyl diisocyanate), a known potent sensitizer that can cause occupational asthma, is one of main components of the adhesive.

Based on this additional information Dr. X diagnoses Mr. Jones with WRA (new onset sensitizer occupational asthma), and makes recommendations regarding exposure reduction / elimination, medical follow-up and also instructs Mr. Jones to inquire about workers compensation. Although the clinicians informed Mr. Jones that complete elimination of exposure to MDI is preferable to exposure reduction, they agreed to a trial of significantly reducing exposure levels.

Working collaboratively with the employer, Mr. Jones initially was provided protective clothing, an appropriate respirator, and local ventilation was improved, but Mr. Jones's work-associated asthmatic symptoms persisted. The employer was unable to switch to an alternative adhesive that did not contain MDI. Subsequently the employer decided to fully enclose and automate the adhesive application process so that Mr. Jones and his co-workers could avoid exposure to the adhesive.

Mr. Jones's continues to work for the same aircraft manufacturer and sees his primary care physician on a regular basis for management of his asthma, which has improved, with less frequent use of his albuterol inhaler. He applied for workers compensation given his diagnosis of work- related asthma.

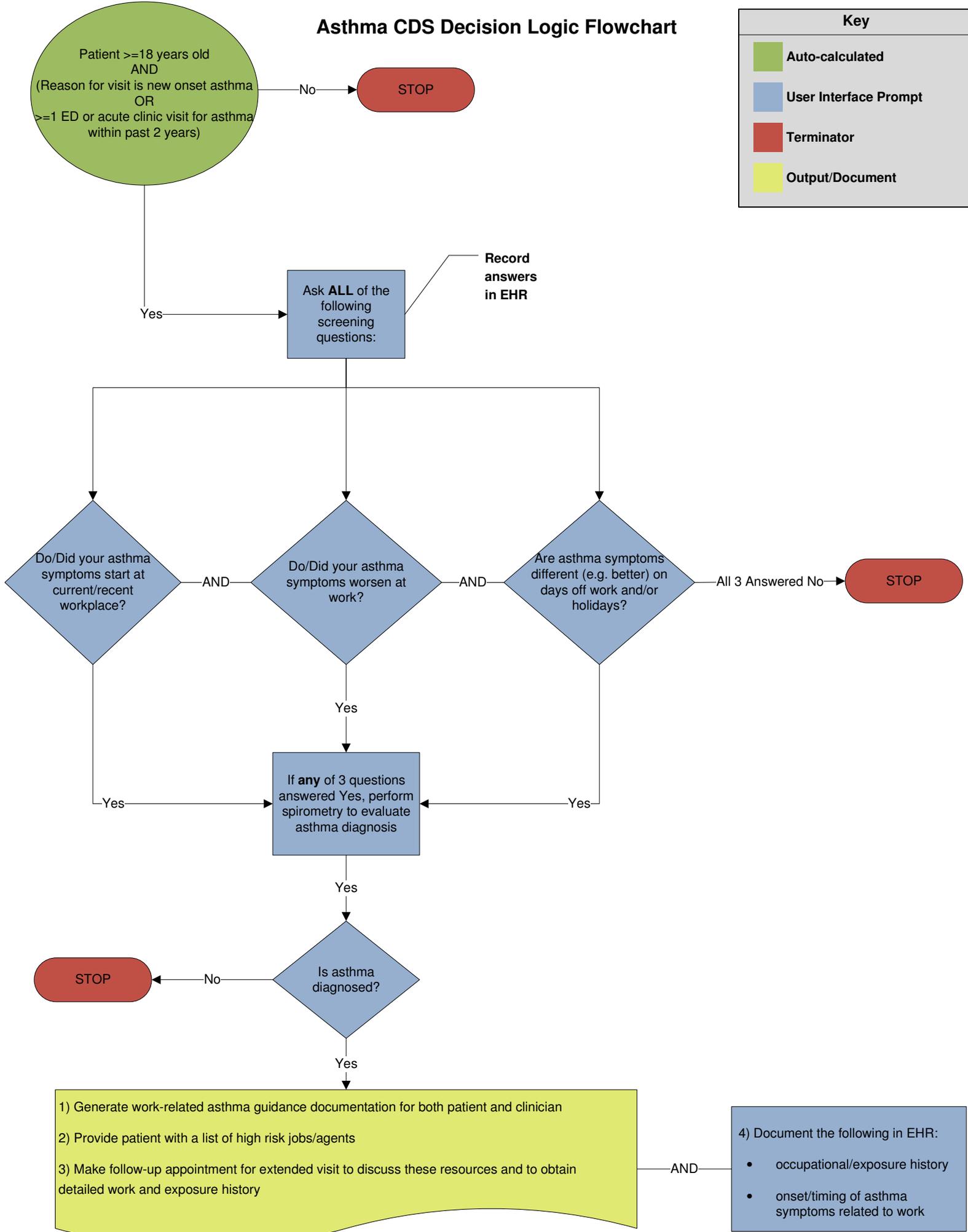
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Asthma CDS Decision Logic Flowchart

Key	
	Auto-calculated
	User Interface Prompt
	Terminator
	Output/Document



This flow diagram was developed by Stacey Marovich, MS, MHI, of NIOSH based upon the information in this report.

Using Electronic Health Records and Clinical Decision Support to Provide Guidance on Occupational Factors which Impact Diabetes: A Final Knowledge Resource Report

Revised and resubmitted December 4, 2015
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The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), the Association of Occupational and Environmental Clinics (AOEC), or the American College of Occupational and Environmental Medicine (ACOEM). Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), the Association of Occupational and Environmental

Clinics (AOEC), or the American College of Occupational and Environmental Medicine (ACOEM).

General Approach

The recommendations are consistent with recommendations of the American Diabetes Association (ADA) and the quality measures used are from the National Quality Forum (NQF). Clinical Decision Support (CDS) was recommended only for patients where the HbA1c ≥ 8 or reported episodes of hypoglycemia. While several reviewers noted that an HbA1c ≥ 8 is not the ideal, based on discussions with primary care providers (PCP) it was determined that this would enable PCP to direct their efforts to patients most in need of education. This level can be altered based on a clinic's specific needs and population.

We could not find a guideline that specifically addresses management of diabetes during shift work. In response to comments by reviewers, we acknowledge that we were unable to find any other instance of CDS like the one recommended being used in the primary care setting. The guidance provided here is based on understanding of factors that raise or lower blood sugar and that impact a person's use of insulin, such as physically demanding work, circumstances that increase cortisone output, or lack of food during periods of low blood sugar. We utilized what we know about factors present at work to provide guidance for management of a patient with diabetes working in those environments.

The overall clinical objectives:

- a. Improve the management of diabetes when a patient has workplace factors such as shift work, temperature extremes, exertion variances and time limitations (for medication and proper meals) that can affect blood sugar.
- b. Understand how impairment of physical or mental function due to hypoglycemia may impact patient or public safety.
- c. Provide what guidance exists for work restrictions for individuals with diabetes.

Our primary recommendation – in the form of a Key Action Statement:

IF:

Patient demonstrates 'not-at-target' diabetes (elevated HgbA1C ≥ 8 is recommended by the Diabetes SME's but this value may be changed by each clinic based on their experience and patient population).

OR

Patient demonstrates symptomatic or serious hypoglycemia (Seaquist, 2013), with 'serious' defined as a situation requiring help from a third party and 'symptomatic' defined as an event during which typical symptoms of hypoglycemia are accompanied by a measured plasma glucose of less than or equal to 70mg/dL.

THEN:

Clinicians should ask about relevant features of current job(s) that are recognized to impact diabetes management: shift work, ability to take breaks, exposure to heat or temperature extremes, ability to eat/drink/take medication as needed, and level of physical activity. The clinician does not have to ask the patient about each job feature individually, but could pose a comprehensive question and gather ‘yes’ responses to any given job feature. If the patient answers “yes” to any of the features, then the CDS would populate a menu of educational materials to educate/counsel concerning management based on the relevant job characteristics. The clinician could click on one or more materials to be printed for the patient.

Materials will need to be developed that meet the literacy levels of patients and inform non-occupationally trained clinicians about each of these issues without overburdening their limited time. Information on food intake and medication should be included in multiple hand-outs. It is beyond the scope of this group’s task to develop these hand-outs. However, the information needed can be found in Appendices 1 through 5.

Programming should be in place such that this CDS does not appear if the patient has been asked about these job features within the past 6 months (as with HgbA1C level, this is the recommendation of the SME’s but the time frame may be altered based on clinic experience and patient population).

Rationale for Recommendation

Although diabetes affects 17.7 million working age adults (20-65) with diabetes as of 2012 and there are another 86 million working age adults with prediabetes (Centers for Disease Control and Prevention, 2014), the influence of work schedules and work tasks on management of diabetes is not generally taken into account.

Many jobs require more than the standard 40-hour week (Saad, 2014). In the most recent data available, the Bureau of Labor Statistics (BLS) noted in 2004 that 15 million Americans work full-time irregular schedules. There has not been a repeat study by the BLS since that time but the 2010 National Health Information Survey showed that 28.7% of the working respondents were employed in alternative shifts (Alterman, 2013). The concern about shift work and diabetes has been mentioned in the literature since the 1970s (Winget, 1978). Principles of diabetes control are well discussed in the literature with a recent emphasis on the role of shift work contributing to diabetes development and control. At least 25 articles were published and listed in PubMed from 2013-2014; for example Gan, Y, et al 2014; Kalsbeek, A, et al, 2014; Schiavo-Cardozo, D, et al, 2014. A decision logic has been developed to formalize this concept. (Appendix 1)

Persons with diabetes who aim for tight control or those who use insulin need to be able to regulate their food intake, have a ready supply of water to drink, have a place to store insulin and a place to monitor blood sugars as needed. Not all workplaces are set up to accommodate these needs, not all employers are aware that laws require reasonable accommodation, and not all medical providers enquire about the impact of work on these factors. For example, construction work entails high physical exertion on an irregular schedule, and not all construction sites have running water. A social worker who drives from one client’s home to the next may not have an

easy way to keep insulin at a temperature below 86 degrees. A machine operator may only be given a ten-minute break every four hours with no opportunity to check his blood sugar as needed. Practical information on the Americans with Disabilities Act (ADA) can assist primary care providers in counseling their patients, and therefore improve care of diabetes among the workers in these various jobs. (Appendix 2: <http://www.eeoc.gov/laws/types/diabetes.cfm>)

For some jobs, a worker with impairment of cognition due to low blood sugar could be at risk for injury to himself or to others. If the primary care provider is aware that the patient is in such a job, often referred to as a “safety-sensitive” job, she can adjust treatment to avoid hypoglycemia. Safety-sensitive jobs are ones in which incapacitation of the employee could place the employee or others at risk of harm (e.g., firefighters, police officers, locomotive engineers, commercial truck drivers). A fitness for duty assessment of a person who has diabetes treated with insulin or oral agents with a risk for hypoglycemia must be individualized, taking into consideration the safety-critical nature of a person’s work and the importance that the person not experience sudden incapacitation to ensure the safety of the person, co-workers and the public; the nature and severity of the employee’s medical condition; whether the person is receiving ongoing evaluation and treatment; the person’s compliance with and response to treatment; and the person’s ability to recognize symptoms of hypoglycemia and self-manage his or her diabetes.

Commercial truck drivers, airline pilots and locomotive engineers are covered under specific federal regulations; individuals with diabetes may work in these occupations but only under the specific conditions and restrictions outlined in the regulations, and these agencies authorize only certified medical providers to make employment decisions. Determination of the ability of an individual in other safety sensitive occupations may be delegated to the individual’s physician. (Appendix 3)

The ADA Assn publishes standards of care for diabetes annually (American Diabetes Care, 2014). This set of documents includes a guideline on diabetes in the workplace which explains the legal rights of an employee with diabetes under the ADA, and gives recommendations to primary care providers about workplace accommodations. It also includes guidelines for diabetes self-management.

Guideline(s) used to model the recommendation

We could not find a guideline that specifically addresses management of diabetes during shift work. The guidance provided here is based on our understanding of factors that raise or lower blood sugar and that impact a person’s use of insulin, such as physically demanding work, circumstances that increase cortisone output, or lack of food during periods of low blood sugar. This guidance prompts the primary care provider to ask about work factors that may be contributing to poor control of diabetes. This document uses what we know about factors present at work to provide guidance for management of a patient with diabetes working in those environments.

Methods used to search the literature

The range of dates used in our search was not limited. Our search is summarized by the following:

PUBMED/MEDLINE – Diabetes and shift work; Diabetes and heat stress; Diabetes and change in physical activity; Hypoglycemia and work; Hypoglycemia and occupation; Sleep disturbance and diabetes. There were no date limitations for any of the search queries.

We used results to find reviews and then looked for citations to key articles cited in reviews, using PubMed.

The authors used the aggregate evidence quality tool developed by Yale University to assign the grade for the level of scientific evidence/quality.

<http://medicine.yale.edu/cmi/glides/index.aspx>

Quality Measures

The Diabetes SME's reviewed the sources for quality measures as recommended by NIOSH staff and by a webinar to the SME's by the Joint Commission held on July 30, 2015. We determined that we needed to make sure that any measure that we reference targets an improvement in health, is precisely defined and specific, is interpretable, is under provider control, and does not result in unintended consequences. Clear determination of numerator and denominator needed to be defined and inclusion/exclusion criteria needed to be clear. Practicality for an outpatient setting needed to be considered as well. For these reasons we chose the composite measure of diabetes care from the NQF. That measure is #0729 Optimal Diabetes Care (Composite Measure).

http://www.qualityforum.org/Measures_Reports_Tools.aspx

Each clinic could decide whether they want to see if the measure improves in all their diabetic patients or only in the ones for whom the intervention was implemented - the latter is in our opinion the most practical. Therefore the EHR needs to somehow identify patients for whom the intervention was implemented (see Process Measures below). However, as our SME group has discussed, our relatively simple intervention - increasing awareness by the provider of work factors that may affect diabetes - may not make a big difference in this measure.

Process Measures

Process measurement is simpler and also needs to be tailored to the specific EHR - it is good to measure process by using standard fields that can be easily evaluated with a system generated report rather than some process measure that requires individual review of medical records. Clinics could decide to do that as part of an overall quality improvement around diabetes for which they were doing chart review for other indicators as well. But for this specific intervention, if we were to recommend something that required staff time we doubt it would be done.

Alternative suggestions for process measures are:

- How many times was CDS prompted?
- Did PCP access the CDS when prompted?
- Did PCP download materials for patient?
- Are actions documented in the chart?

There are not standardized measures used for process measurement and the process will depend on the nature of structured fields in each EHR.

One common way to measure quality improvement is through a process called PDSA - plan, do, study, act. For our CDS the plan/do would be to add the content to the EHR, and the study would be to evaluate if the providers review the content and provide materials to the patient. Act would be to change the process somehow if it's not working - discussing it at a team huddle, providing video to the providers on the value, or something else that would increase visibility for this particular action. How the specific PDSA is accomplished would need to be tailored for each EHR.

Evaluation of Recommendation

Level of scientific evidence/quality of evidence

Aggregate Evidence Quality: B

Diabetes self-management is supported by a Grade "B" recommendation from the ADA Assn. A Grade B recommendation from the ADA Assn is based on:

- Supportive evidence from well-conducted cohort studies
- Evidence from a well-conducted prospective cohort study or registry
- Evidence from a well-conducted meta-analysis of cohort studies
- Supportive evidence from a well-conducted case-control study

What scale/criteria were used for determining strength of the Recommendation?

Strength of the recommendation:

B based on ADA Assn criteria above.

Benefits and Harms

The benefits of this recommendation are the identification of workplace factors that can contribute to improved diabetes self-management. As noted by reviewers, the harms to using the recommendation are the possibility of causing uncertainty about job security, especially with hypoglycemia/safety sensitive issues or if there are requests for accommodation.

Limitation(s) of the Recommendation

The recommendation does not cover all aspects of workplaces that could interfere with diabetes management. The recommendation also does not cover other complex factors that often occur with diabetes (hypertension, depression, sleep disorders) and that could be influenced by workplace conditions. As noted by reviewers, we did not get into the details of various state and federal requirements, e.g., medical exams under the Federal Motor Carrier Safety Administration (FMSCA) must be performed by a certified examiner, and therefore we don't feel there is a need for the PCP to understand the regulations.

Gaps in the Recommendation

The recommendation cannot cover all work scenarios (works two jobs that are shift work, works full time and then a part-time job, summer work only).

A sample of illustrations/scenarios is included in this report (Attachment 1).

Attachment 1
Illustrations/Scenarios

The following are illustrations of how the recommendation might apply using clinical scenarios with common occupations that a PCP might encounter in a patient population relevant to the recommendation.

Scenario 1 – Uncontrolled Diabetes:

Check in

Patient updates contact information which ideally includes occupation and job duties in the EHR.

Nursing

Vitals, Medication update, Chief complaint updated in EHR

Provider

If there is a coordinator for patients with diabetes, then the coordinator can check the labs, which should be imported into the EHR from the lab, and gather information on work duties and, if trained, discuss work factors and diabetes following the CDS template and referencing the Provider Information (Appendix 4).

If there is no coordinator then the physician would continue through the CDS, which is presented by the EHR because of Hb A1c ≥ 8 OR history of symptomatic hypoglycemia. Mr. Sweet, a 35-year-old man with a history of diabetes, hypertension and hyperlipidemia, presents for reevaluation. He brings in his blood glucose readings. He has not had any low blood glucose readings or signs or symptoms of hypoglycemia. He works at the local chemical plant as a process engineer. This is his first visit with the new EHR.

	breakfast	2hr	lunch	2hr	dinner	2 hr	bedtime	Notes
Mon	163			209			182	
Tues								
Wed	105			124	146		137	
Thurs								
Fri	99		129	122			129	
Sat								
Sun	101	130			141		180	Starts 11 pm – 7am.
Mon	7p 235	11p 257						
Tues					7a 294			
Wed			5a 261					
Thurs		11p 263					10a 271	
Fri								
Sat	172		185				178	
Sun								
Mon	158							
Tues							123	

Wed	102				132			
Thurs								
Fri	96							
Sat								
Sun								

The following is clinical information related to his visit – this information is available in the EHR.

Vitals: BP 130/80 Pulse 88 R 16 Pox 98% BMI 37

*Labs: **HgA1c, 3 months ago: 9.6, last week: 9.0***. Basic metabolic panel is normal. Cholesterol well controlled on medication. Normal liver function tests.*

Medications: Metformin 850 mg two times a day, Glipizide 5mg twice a day, Lisinopril 10 mg once a day, Atorvastatin 10mg at night

*The HgA1c ≥ 8 will trigger the CDS – the CDS will lead the provider to ask the patient if he is working, what his job is, whether his job involves shift work, temperature extremes, or heavy physical activity, and whether his job causes difficulties in allowing him to eat and take medications regularly. In this case, the patient indicates that his job does involved shift work - he alternates between day shift and night shift and finds it difficult to adjust his medication during night shifts. He sometimes skips medication while on night shift because he forgets to take it and is not sure when to take it. He is unable to attend the gym regularly as it is only open during the day.

Based on the information (above) provided during the visit, the CDS will generate the following type of Information Sheet (see Appendix 5 for types of modules/sections that would make up an Information Sheet).

The information sheet is either recorded in the EHR as documentation or a tag is generated in the electronic note indicating the information was reviewed.

The provider is able to view the guidance document.

DIABETES INFORMATION SHEET – Scenario 1:

Schedules that vary from a regular day/night sleep cycle (circadian rhythm) can increase difficulty in blood sugar (glucose) management. Many systems in the body are influenced by the day/night cycle including blood sugar (glucose) regulation. Shift work can complicate medication, diet, and exercise regimens due to the lack of availability of exercise venues, food resources, and uncertainty of medication usage at non-standard hours.

Steps that can be taken to assist in diabetes control include:

- Planning dietary needs in advance so that appropriate food options can be transported to work
- Adjusting medication doses or types to correspond with current wake cycle
- If working a set non-standard shift, maintain the same schedule even when not at work.
- Exercising before or after work depending on the schedule (before work if working the 3-11 shift, after work if working 11-7 for example)

Further reading for physicians

<http://www.cdc.gov/niosh/docs/2004-143/pdfs/2004-143.pdf>

<http://www.diabetes.ca/diabetes-and-you/healthy-living-resources/general-tips/diabetes-shift-work>

Further reading for patients:

<http://www.diabetes.ca/diabetes-and-you/healthy-living-resources/general-tips/diabetes-shift-work>

Diabetes is more easily managed when exercise, medications and food intake is consistent.

Establish a routine

Plan meals ahead of time

Keep healthy snacks available.

Take medications as prescribed.

Further reading for physicians:

<http://www.cdc.gov/niosh/docs/2004-143/pdfs/2004-143.pdf>

<http://www.eatright.org/Public/content.aspx?id=6813>

Further reading for patients

<http://www.eatright.org/Public/content.aspx?id=6813>

AMERICAN WITH DISABILITIES ACT

<http://www.diabetes.org/living-with-diabetes/know-your-rights/discrimination/employment-discrimination/reasonable-accommodations-in-the-workplace/common-reasonable-accommodations.html>

AMERICAN DIABETES ASSOCIATION

<http://www.diabetes.org/living-with-diabetes/>

<http://www.diabetes.org/diabetes-basics/>

Scenario 2 – Symptomatic Hypoglycemia:

Your patient is a 42-year-old man with Type II diabetes who you recently started on insulin because his HbA1c remained at 7.9 despite maximum doses of metformin and glipizide. You ask him to keep detailed records of fasting and random blood sugars along with a diet log for 3 months. On his 3 month visit his HbA1C has improved to 7.2 but he reports he has had symptomatic hypoglycemia on two occasions.

You review results from his glucometer and his diet log, and discuss with him the benefits of tight control and the risk of hypoglycemia. In reviewing his social history you recall that he works as a telephone lineman. Does treatment of his diabetes change because he is in a job with risk for serious falls?

You use the information in the CDS to look at work schedule, physical demand of the job, and other factors presented.

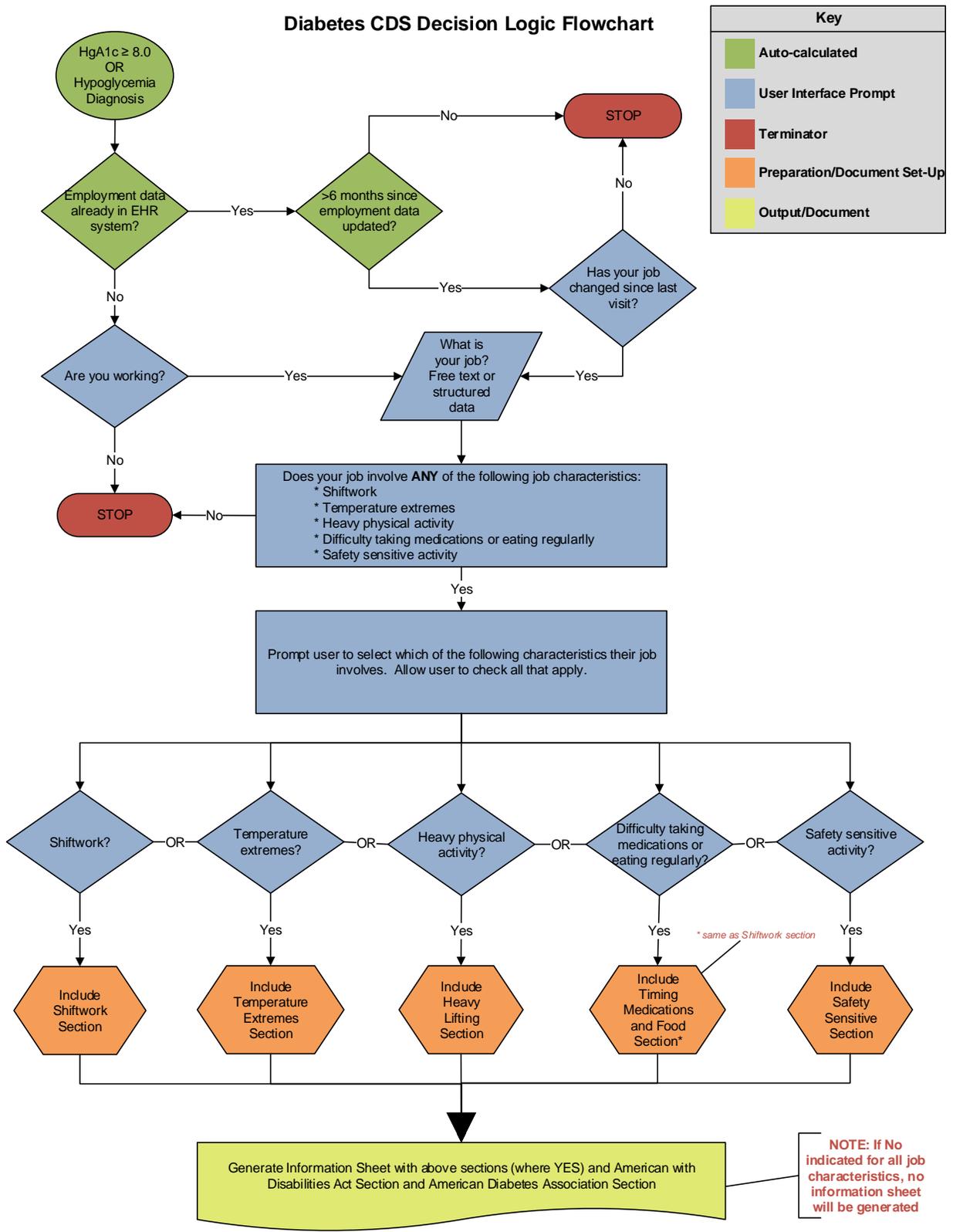
The CDS would also generate an information sheet on work restrictions and information about ADA.

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Appendix 1 – Decision Logic

Diabetes CDS Decision Logic Flowchart



Key	
	Auto-calculated
	User Interface Prompt
	Terminator
	Preparation/Document Set-Up
	Output/Document

Appendix 2: EEOC Information

(Taken from <http://www.eeoc.gov/laws/types/diabetes.cfm>)

Questions & Answers about Diabetes in the Workplace and the Americans with Disabilities Act (ADA)¹

OBTAINING, USING, AND DISCLOSING MEDICAL INFORMATION

Title I of the ADA limits an employer's ability to ask questions related to diabetes and other disabilities and to conduct medical examinations at three stages: pre-offer, post-offer, and during employment.

Job Applicants

Before an Offer of Employment Is Made

1. May an employer ask a job applicant whether she has or had diabetes or about her treatment related to diabetes before making a job offer?

No. An employer may not ask questions about an applicant's medical condition¹² or require an applicant to have a medical examination before it makes a conditional job offer. This means that an employer cannot legally ask an applicant questions such as:

- whether she has diabetes or has been diagnosed with diabetes (for example, gestational diabetes) in the past;
- whether she uses insulin or other prescription drugs or has ever done so in the past; or,
- whether she ever has taken leave for medical treatment, or how much sick leave she has taken in the past year.

Of course, an employer may ask questions pertaining to the qualifications for, or performance of, the job, such as whether the applicant has a commercial driver's license or whether she can work rotating shifts.

2. Does the ADA require an applicant to disclose that she has or had diabetes or some other disability before accepting a job offer?

No. The ADA does not require applicants to voluntarily disclose that they have or had diabetes or another disability unless they will need a reasonable accommodation for the application process (for example, a break to eat a snack or monitor their glucose levels). Some individuals with diabetes, however, choose to disclose their condition because they want their co-workers or supervisors to know what to do if they faint or experience other symptoms of hypoglycemia (low blood sugar), such as weakness, shakiness, or confusion.¹³

Sometimes, the decision to disclose depends on whether an individual will need a reasonable accommodation to perform the job (for example, breaks to take medication or a place to rest until blood sugar levels become normal). A person with diabetes, however, may request an accommodation after becoming an employee even if she did not do so when applying for the job or after receiving the job offer.

3. May an employer ask any follow-up questions if an applicant voluntarily reveals that she has or had diabetes?

¹ EEOC accessed 9/8/14 <http://www.eeoc.gov/laws/types/diabetes.cfm>

No. An employer generally may not ask an applicant who has voluntarily disclosed that she has diabetes any questions about her diabetes, its treatment, or its prognosis. However, if an applicant voluntarily discloses that she has diabetes **and the employer reasonably believes that she will require an accommodation to perform the job because of her diabetes or treatment**, the employer may ask whether the applicant will need an accommodation and what type. The employer must keep any information an applicant discloses about her medical condition confidential. (See "Keeping Medical Information Confidential.")

Example 1: An individual applying for a cashier's position at a grocery store voluntarily discloses that she has diabetes and periodically needs to administer insulin and monitor her blood sugar levels. The employer explains that cashiers typically get two 15-minute breaks and 30 minutes for lunch during an eight-hour shift and asks whether she needs an accommodation (for example, more frequent breaks or a longer lunch period). Before an offer of employment is made, the employer may not ask any questions about the condition itself, such as how long the applicant has had diabetes, how much medication she takes, or whether anyone else in her family has diabetes.¹⁴

After an Offer of Employment Is Made

After making a job offer, an employer may ask questions about the applicant's health (including questions about the applicant's disability) and may require a medical examination, as long as all applicants for the same type of job are treated equally (that is, all applicants are asked the same questions and are required to take the same examination). After an employer has obtained basic medical information from all individuals who have received job offers, it may ask specific individuals for more medical information if it is medically related to the previously obtained medical information. For example, if an employer asks all applicants post-offer about their general physical and mental health, it can ask individuals who disclose a particular illness, disease, or impairment for more medical information or require them to have a medical examination related to the condition disclosed.

4. What may an employer do when it learns that an applicant has or had diabetes after she has been offered a job but before she starts working?

When an applicant discloses after receiving a conditional job offer that she has diabetes, an employer may ask the applicant additional questions such as how long she has had diabetes; whether she uses insulin or oral medication; whether and how often she experiences hypoglycemic episodes; and/or whether she will need assistance if her blood sugar level drops while at work. The employer also may send the applicant for a follow-up medical examination or ask her to submit documentation from her doctor answering questions specifically designed to assess her ability to perform the job's functions safely. Permissible follow-up questions at this stage differ from those at the pre-offer stage when an employer only may ask an applicant who voluntarily discloses a disability whether she needs an accommodation to perform the job and what type.

An employer may not withdraw an offer from an applicant with diabetes if the applicant is able to perform the essential functions of the job, with or without reasonable accommodation, without posing a direct threat (that is, a significant risk of substantial harm) to the health or safety of himself or others that cannot be eliminated or reduced through reasonable accommodation. ("Reasonable accommodation" is discussed at Questions 10 through 15. "Direct threat" is discussed at Questions 6 and 16 through 18.)

Example 2: A qualified candidate for a police officer's position is required to have a medical exam after he has been extended a job offer. During the exam, he reveals that he has had diabetes for five years. He also tells the doctor that since he started using an insulin pump two years ago, his blood sugar levels have been stable. The candidate also mentions that in his six years as a police officer for another department, he never had an incident related to his diabetes. Because the candidate can perform the job's essential functions without posing a direct threat, it would be unlawful for the employer to withdraw the job offer.

Employees

The ADA strictly limits the circumstances under which an employer may ask questions about an employee's medical condition or require the employee to have a medical examination. Once an employee is on the job, her actual performance is the best measure of ability to do the job.

5. When may an employer ask an employee whether diabetes, or some other medical condition, may be causing her performance problems?

Generally, an employer may ask disability-related questions or require an employee to have a medical examination when it knows about a particular employee's medical condition, has observed performance problems, and reasonably believes that the problems are related to a medical condition. At other times, an employer may ask for medical information when it has observed symptoms, such as extreme fatigue or irritability, or has received reliable information from someone else (for example, a family member or co-worker) indicating that the employee may have a medical condition that is causing performance problems. Often, however, poor job performance is unrelated to a medical condition and generally should be handled in accordance with an employer's existing policies concerning performance.¹⁵

Example 3: Several times a day for the past month, a receptionist has missed numerous phone calls and has not been at her desk to greet clients. The supervisor overhears the receptionist tell a co-worker that she feels tired much of the time, is always thirsty, and constantly has to go to the bathroom. The supervisor may ask the receptionist whether she has diabetes or send her for a medical examination because he has a reason to believe that diabetes may be affecting the receptionist's ability to perform one of her essential duties - sitting at the front desk for long periods of time.

Example 4: A normally reliable secretary with diabetes has been coming to work late and missing deadlines. The supervisor observed these changes soon after the secretary started going to law school in the evenings. The supervisor can ask the secretary why his performance has declined but may not ask him about his diabetes unless there is objective evidence that his poor performance is related to his medical condition.

6. May an employer require an employee on leave because of diabetes to provide documentation or have a medical examination before allowing her to return to work?

Yes. If the employer has a reasonable belief that the employee may be unable to perform her job or may pose a direct threat to herself or others, the employer may ask for medical information. However, the employer may obtain only the information needed to make an assessment of the employee's present ability to perform her job and to do so safely.

Example 5: A newspaper reporter, who has been on leave for two months because of complications stemming from her diabetes, notifies her employer that she will be able to return to work in two weeks but will need a flexible schedule. Because the reporter's job frequently requires her to meet short deadlines, the employer may ask her to provide a doctor's note or other documentation indicating whether there are any limits on how many hours a day she can work.

7. Are there any other instances when an employer may ask an employee with diabetes about his condition?

Yes. An employer also may ask an employee about diabetes when it has a reasonable belief that the employee will be unable to safely perform the essential functions of his job because of diabetes. In addition, an employer may ask an employee about his diabetes to the extent the information is necessary:

- to support the employee's request for a reasonable accommodation needed because of his diabetes;
- to verify the employee's use of sick leave related to his diabetes if the employer requires all employees to submit a doctor's note to justify their use of sick leave;¹⁶ or
- to enable the employee to participate in a voluntary wellness program.¹⁷

Keeping Medical Information Confidential

With limited exceptions, an employer must keep confidential any medical information it learns about an applicant or employee. Under the following circumstances, however, an employer may disclose that an employee has diabetes:

- to supervisors and managers in order to provide a reasonable accommodation or to meet an employee's work restrictions;
- to first aid and safety personnel if an employee may need emergency treatment or require some other assistance because, for example, her blood sugar level is too low;
- to individuals investigating compliance with the ADA and similar state and local laws; and
- where needed for workers' compensation or insurance purposes (for example, to process a claim).

8. May an employer tell employees who ask why their co-worker is allowed to do something that generally is not permitted (such as eat at his desk or take more breaks) that she is receiving a reasonable accommodation?

No. Telling co-workers that an employee is receiving a reasonable accommodation amounts to a disclosure that the employee has a disability. Rather than disclosing that the employee is receiving a reasonable accommodation, the employer should focus on the importance of maintaining the privacy of all employees and emphasize that its policy is to refrain from discussing the work situation of any employee with co-workers. Employers may be able to avoid many of these kinds of questions by training all employees on the requirements of equal employment opportunity laws, including the ADA.

Additionally, an employer will benefit from providing information about reasonable accommodations to all of its employees. This can be done in a number of ways, such as through written reasonable accommodation procedures, employee handbooks, staff meetings, and

periodic training. This kind of proactive approach may lead to fewer questions from employees who misperceive co-worker accommodations as "special treatment."

9. If an employee experiences a hypoglycemic reaction at work (see definition on page 1), may an employer explain to other employees or managers that the employee has diabetes?

No. Although the employee's co-workers and others in the workplace who witness the reaction naturally may be concerned, an employer may not reveal that the employee has diabetes. Rather, the employer should assure everyone present that the situation is under control. An employee, however, may voluntarily choose to tell her co-workers that she has diabetes and provide them with helpful information, such as how to recognize when her blood sugar may be low, what to do if she faints or seems shaky or confused (for example, offer a piece of candy or gum), or where to find her glucose monitoring kit. However, even when an employee voluntarily discloses that she has diabetes, the employer must keep this information confidential consistent with the ADA. An employer also may not explain to other employees why an employee with diabetes has been absent from work if the absence is related to her diabetes or another disability.

ACCOMMODATING EMPLOYEES WITH DIABETES

The ADA requires employers to provide adjustments or modifications -- called reasonable accommodations -- to enable applicants and employees with disabilities to enjoy equal employment opportunities unless doing so would be an undue hardship (that is, a significant difficulty or expense). Accommodations vary depending on the needs of the individual with a disability. Not all employees with diabetes will need an accommodation or require the same accommodations, and most of the accommodations a person with diabetes might need will involve little or no cost. An employer must provide a reasonable accommodation that is needed because of the diabetes itself, the effects of medication, or both. For example, an employer may have to accommodate an employee who is unable to work while learning to manage her diabetes or adjusting to medication. An employer, however, has no obligation to monitor an employee to make sure that she is regularly checking her blood sugar levels, eating, or taking medication as prescribed.

10. What other types of reasonable accommodations may employees with diabetes need?

Some employees may need one or more of the following accommodations:

- a private area to test their blood sugar levels or to administer insulin injections
- a place to rest until their blood sugar levels become normal
- breaks to eat or drink, take medication, or test blood sugar levels

Example 6: A manufacturing plant requires employees to work an eight-hour shift with just a one-hour break for lunch. An employee with diabetes needs to eat several times a day to keep his blood sugar levels from dropping too low. Absent undue hardship, the employer could accommodate the employee by allowing him to take two 15-minute breaks each day and letting him make up the time by coming to work 15 minutes earlier and staying 15 minutes later.

- leave for treatment, recuperation, or training on managing diabetes¹⁸
- modified work schedule or shift change

Example 7: A nurse with diabetes rotated from working the 6:00 a.m. to 2:00 p.m. shift to the midnight to 8:00 a.m. shift. Her doctor wrote a note indicating that interferences in the nurse's

sleep, eating routine, and schedule of insulin shots were making it difficult for her to manage her diabetes. Her employer eliminated her midnight rotation.

- allowing a person with diabetic neuropathy¹⁹ that makes it difficult to stand for long periods of time to use a stool
- reallocation or redistribution of marginal tasks to another employee

Example 8: A janitor, who had a leg amputated because of complications from diabetes, can perform all of his essential job functions without accommodation but has difficulty climbing into the attic to occasionally change the building's air filter. The employer likely can reallocate this marginal function to one of the other janitors.

- reassignment to a vacant position when the employee is no longer able to perform his current job

Example 9: Following complications from neuropathy that resulted in a toe amputation, a hotel housekeeper requests to be reassigned to a laundress position because the job would require less walking. Although the employer does not have to "bump" another employee to create a vacancy, it should determine whether the housekeeper is qualified for the new position and whether it would be an undue hardship to reassign her. The vacant position must be equivalent in terms of pay and status to the original job, or as close as possible if no equivalent position exists. The position need not be a promotion, although the employee should be able to compete for any promotion for which she is eligible.

Although these are some examples of the types of accommodations commonly requested by employees with diabetes, other employees may need different changes or adjustments.

Employers should ask the particular employee requesting an accommodation what he needs that will help him do his job. There also are extensive public and private resources to help employers identify reasonable accommodations. For example, the website for the Job Accommodation Network (JAN) (<http://askjan.org/media/Diabetes.html>) provides information about many types of accommodations for employees with diabetes.

11. How does an employee with diabetes request a reasonable accommodation?

There are no "magic words" that a person has to use when requesting a reasonable accommodation. A person simply has to tell the employer that she needs an adjustment or change at work because of her diabetes. A request for a reasonable accommodation also can come from a family member, friend, health professional, or other representative on behalf of a person with diabetes.

Example 10: A custodian tells his supervisor that he was recently diagnosed with diabetes and needs a week off to attend a class on how to manage the condition. If leave for this length of time and/or for this reason would not be allowed under an existing leave policy, the employee's request for leave is a request for reasonable accommodation (for example, an exception to or modification of the leave policy).

12. May an employer request documentation when an employee who has diabetes requests a reasonable accommodation?

Yes. An employer may request reasonable documentation where a disability or the need for reasonable accommodation is not known or obvious. An employer, however, is entitled only to

documentation sufficient to establish that the employee has diabetes and to explain why an accommodation is needed. A request for an employee's entire medical record, for example, would be inappropriate as it likely would include information about conditions other than the employee's diabetes.²⁰

Example 11: When an employee asks for one week of unpaid leave to attend a class on how to manage his recently diagnosed diabetes, his employer asks for a letter from the employee's doctor. The employee submits a letter from his endocrinologist stating that the employee has been diagnosed with Type 2 diabetes and that the one-week class will teach him how to monitor his blood glucose levels, administer insulin injections, and plan his meals. The doctor's letter is sufficient to demonstrate that the employee has a disability and needs the requested reasonable accommodation. If the employee makes a subsequent accommodation request related to his diabetes (for example, asks for a shift change) and the need for accommodation is not obvious, the employer may ask for documentation explaining why the new accommodation is needed but may not ask for documentation concerning his diabetes diagnosis.

13. Does an employer have to grant every request for a reasonable accommodation?

No. An employer does not have to provide an accommodation if doing so will be an undue hardship. Undue hardship means that providing the reasonable accommodation will result in significant difficulty or expense. An employer also does not have to eliminate an essential function of a job as a reasonable accommodation, tolerate performance that does not meet its standards, or excuse violations of conduct rules that are job-related and consistent with business necessity and that the employer applies consistently to all employees (such as rules prohibiting violence, threatening behavior, theft, or destruction of property).

If more than one accommodation will be effective, the employee's preference should be given primary consideration, although the employer is not required to provide the employee's first choice of reasonable accommodation. If a requested accommodation is too difficult or expensive, an employer may choose to provide an easier or less costly accommodation as long as it is effective in meeting the employee's needs.

14. May an employer be required to provide more than one accommodation for the same employee with diabetes?

Yes. The duty to provide a reasonable accommodation is an ongoing one. Although some employees with diabetes may require only one reasonable accommodation, others may need more than one. For example, an employee with diabetes may require leave to attend a class on how to administer insulin injections and later may request a part-time or modified schedule to better control his glucose levels. An employer must consider each request for a reasonable accommodation and determine whether it would be effective and whether providing it would pose an undue hardship.

15. May an employer automatically deny a request for leave from someone with diabetes because the employee cannot specify an exact date of return?

No. Granting leave to an employee who is unable to provide a fixed date of return may be a reasonable accommodation. Although diabetes can be successfully treated, some individuals experience serious complications that may be unpredictable and do not permit exact timetables. An employee requesting leave because of diabetes or resulting complications (for example, a

foot or toe amputation), therefore, may be able to provide only an approximate date of return (e.g., "in six to eight weeks," "in about three months"). In such situations, or in situations in which a return date must be postponed because of unforeseen medical developments, employees should stay in regular communication with their employers to inform them of their progress and discuss the need for continued leave beyond what originally was granted. The employer also has the right to require that the employee provide periodic updates on his condition and possible date of return. After receiving these updates, the employer may reevaluate whether continued leave constitutes an undue hardship.

CONCERNS ABOUT SAFETY

When it comes to safety concerns, an employer should be careful not to act on the basis of myths, fears, or stereotypes about diabetes. Instead, the employer should evaluate each individual on her skills, knowledge, experience and how having diabetes affects her.

16. When may an employer refuse to hire, terminate, or temporarily restrict the duties of a person who has diabetes because of safety concerns?

An employer only may exclude an individual with diabetes from a job for safety reasons when the individual poses a direct threat. A "direct threat" is a significant risk of substantial harm to the individual or others that cannot be eliminated or reduced through reasonable accommodation.²¹ This determination must be based on objective, factual evidence, including the best recent medical evidence and advances in the treatment of diabetes.

In making a direct threat assessment, the employer must evaluate the individual's present ability to safely perform the job. The employer also must consider:

1. the duration of the risk;
2. the nature and severity of the potential harm;
3. the likelihood that the potential harm will occur; and
4. the imminence of the potential harm.²²

The harm must be serious and likely to occur, not remote or speculative. Finally, the employer must determine whether any reasonable accommodation (for example, temporarily limiting an employee's duties, temporarily reassigning an employee, or placing an employee on leave) would reduce or eliminate the risk.²³

Example 12: At his post-offer medical examination, an applicant for a machine operator position admitted that because he often does not take his insulin as prescribed or monitor what he eats, he sometimes feels confused when his glucose levels drop too low. Based on the applicant's admitted history of noncompliance, the high temperatures in the plant, and the fact that the applicant would have to climb tall ladders and operate dangerous machinery, the doctor concluded that the applicant could seriously injure himself if his unregulated diabetes made him lose consciousness or become disoriented. Relying on the doctor's assessment that the applicant would pose a significant risk of substantial harm, the employer lawfully rescinded the conditional job offer.

Example 13: When an actor forgets his lines and stumbles during several recent play rehearsals, he explains that the fluctuating rehearsal times are interfering with when he eats and takes his insulin. Because there is no reason to believe that the actor poses a direct threat, the director cannot terminate the actor or replace him with an understudy; rather, the director should consider

whether rehearsals can be held at a set time and/or whether the actor can take a break when needed to eat, monitor his glucose, or administer his insulin

17. May an employer require an employee who has had an insulin reaction (hypoglycemia) at work to submit periodic notes from his doctor indicating that his diabetes is under control?

Yes, but only if the employer has a reasonable belief that the employee will pose a direct threat if he does not regularly see his doctor. In determining whether to require periodic documentation, the employer should consider the safety risks associated with the position the employee holds, the consequences of the employee's inability or impaired ability to perform his job, how long the employee has had diabetes, and how many insulin reactions the employee has had on the job.

Example 14: Four times in the past two months, a telephone repair technician had a hypoglycemic reaction right before climbing a pole and was unable to do his job. The repair technician explained that he was using a new type of insulin and that his blood sugar levels occasionally dropped too low. Given the safety risks associated with the repair technician's job, his change in medication, and recurrent hypoglycemic reactions, the employer could ask for periodic documentation to make sure that the repair technician does not pose a direct threat to himself or others.

Example 15: The owner of a daycare center knows that one of her teachers has diabetes and that she once had an insulin reaction (hypoglycemic reaction) at work when she skipped lunch. When the owner sees the teacher eat a piece of cake at a child's birthday party, she becomes concerned that the teacher may have an insulin reaction. Although many people believe that individuals with diabetes should never eat sugar or sweets, this is a myth. The owner, therefore, cannot require the teacher to submit periodic notes from her doctor indicating that her diabetes is under control because she does not have a reasonable belief, based on objective evidence, that the teacher will pose a direct threat to the safety of herself or others.

18. What should an employer do when another federal law prohibits it from hiring anyone who uses insulin?

If a federal law prohibits an employer from hiring a person who uses insulin, the employer is not liable under the ADA. The employer should be certain, however, that compliance with the law actually is required, not voluntary. The employer also should be sure that the law does not contain any exceptions or waivers. For example, the Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA) issues exemptions to certain individuals with diabetes who wish to drive commercial motor vehicles (CMVs).²⁴

Footnotes

¹ See 42 U.S.C. §12102(2); 29 C.F.R. §1630.2(g).

² For example, disability laws in California, Pennsylvania, New Jersey, and New York apply to employers with fewer than 15 employees.

³ See "The Question and Answer Series" under "Available Resources" on EEOC's website at www.eeoc.gov/laws/types/disability.cfm.

⁴ See Diabetes Basics, www.diabetes.org/diabetes-basics (last visited January 10, 2013); see also www.diabetes.org/diabetes-basics/gestational/

⁵ Id.; see also information on diabetes from the National Institutes of Health, www.nlm.nih.gov/medlineplus/diabetes.html.

⁶ Diabetes Basics, *supra* note 4.

⁷ According to the Centers for Disease Control and Prevention (CDC), about 1.9 million people aged 20 or older were newly diagnosed with diabetes in the United States in 2010. See National Diabetes Fact Sheet (2011), <http://www.cdc.gov/diabetes/pubs/factsheet11.htm> (last visited January 10, 2013); see also Endocrine Diseases, www.nlm.nih.gov/medlineplus/endocrinediseases.html#cat1.

⁸ See 2011 National Diabetes Fact Sheet (released January 26, 2011), www.diabetes.org/diabetes-basics/diabetes-statistics (last visited January 13, 2013).

⁹ See 29 C.F.R. §1630.2(j)(3)(iii).

¹⁰ Id. at §1630.2(k).

¹¹ Id. at §1630.2(l).

¹² Federal contractors are required under 41 C.F.R. § 60-741.42, a regulation issued by the Office of Federal Contract Compliance Programs (OFCCP), to invite applicants to voluntarily self-identify as persons with disabilities for affirmative action purposes. The ADA prohibition on asking applicants about medical conditions at the pre-offer stage does not prevent federal contractors from complying with the OFCCP's regulation. See Letter from Peggy R. Mastroianni, EEOC Legal Counsel, to Patricia A. Shiu, Director of OFCCP, www.dol.gov/ofccp/regs/compliance/section503.htm#bottom.

¹³ Insulin and some oral medications can sometimes cause a person's blood sugar levels to drop too low. A person experiencing hypoglycemia (low blood sugar) may feel weak, shaky, confused, or faint. Most people with diabetes, however, recognize these symptoms and will immediately drink or eat something sweet. Many individuals with diabetes also carry a blood glucose monitoring kit with them at all times and test their blood sugar levels as soon as they feel minor symptoms such as shaking or sweating. Often, a person's blood sugar returns to normal within 15 minutes of eating or drinking something sweet. See generally information from the American Association of Diabetes, www.diabetes.org.

¹⁴ Asking an applicant or employee about family medical history also violates Title II of the Genetic Information Nondiscrimination Act (GINA), 42 U.S.C. 2000ff et seq., which prohibits employers from requesting, requiring, or purchasing genetic information (including family medical history) about applicants or employees. 29 C.F.R. §1635.8(a).

¹⁵ An employer also may ask an employee about his diabetes or send the employee for a medical examination when it reasonably believes the employee may pose a direct threat because of his diabetes. See "Concerns About Safety."

¹⁶ An employer also may ask an employee for periodic updates on his condition if the employee has taken leave and has not provided an exact or fairly specific date of return or has requested leave in addition to that already granted. See also Q&A 15. Of course, an employer may call employees on extended leave to check on their progress or to express concern for their health without violating the ADA.

¹⁷ The ADA allows employers to conduct voluntary medical examinations and activities, including obtaining voluntary medical histories, which are part of an employee wellness program (such as a smoking cessation or diabetes detection screening and management program), as long as any medical records (including, for example, the results any diagnostic tests) acquired as part of the program are kept confidential. See Q&A 22 in EEOC Enforcement Guidance on

Disability-Related Inquiries and Medical Examinations of Employees under the ADA, <http://www.eeoc.gov/policy/docs/guidance-inquiries.html>.

¹⁸ An employee with diabetes who needs continuing or intermittent leave, or a part-time or modified schedule, as a reasonable accommodation also may be entitled to leave under the Family and Medical Leave Act (FMLA). For a discussion of how employers should treat situations in which an employee may be covered both by the FMLA and the ADA, see Questions 21 and 23 in the EEOC Enforcement Guidance on Reasonable Accommodation and Undue Hardship Under the Americans with Disabilities Act (rev. Oct. 17, 2002) at www.eeoc.gov/policy/docs/accommodation.html.

¹⁹ Diabetic neuropathy is a common complication of diabetes in which nerves are damaged as a result of high blood sugar levels (hyperglycemia). See National Center for Biotechnology Information, U.S. National Library of Medicine, www.ncbi.nlm.nih.gov.

²⁰ Requests for documentation to support a request for accommodation may violate Title II of GINA where they are likely to result in the acquisition of genetic information, including family medical history. 29 C.F.R. §1635.8(a). For this reason employers may want to include a warning in the request for documentation that the employee or the employee's doctor should not provide genetic information. *Id.* at §1635.8(b)(1)(i)(B).

²¹ See 29 C.F.R. §1630.2(r).

²² *Id.*

²³ *Id.*

²⁴ Under FMCSA's Diabetes Exemption Program, an individual who intends to operate a CMV in interstate commerce may apply for an exemption from the diabetes standard if he or she meets all medical standards and guidelines, other than diabetes, in accordance with 49 CFR §391.41 (b) (1-13).

Appendix 3: Fitness for Duty

The standard of care for diabetes recommend a reduction of average plasma glucose to near normal levels to prevent or slow serious complications of diabetes, but treatment to this target can result in hypoglycemia. Hypoglycemia that results in physical or cognitive function may put an individual at risk of injury in certain jobs, and so HCPs should be aware of whether or not their patients with diabetes work in such positions and of relevant guidelines and/or laws that may be applicable.

Employment decisions are generally governed by the Americans with Disabilities. The ADA limits an employer's ability to obtain information on medical conditions before offering a job to an individual, and post-offer requires reasonable accommodation of any disability present. The ADA is a federal law that prohibits discrimination against qualified individuals with disabilities, and diabetes is a qualifying disability. These provisions of the ADA cover employment by private employers with 15 or more employees as well as state and local government employers, and are enforced by the U.S. Equal Employment Opportunity Commission (EEOC). The EEOC provides information regarding:

- when an employer may ask an applicant or employee questions about her diabetes and how it should treat voluntary disclosures;
- what types of reasonable accommodations employees with diabetes may need;
- how an employer should handle safety concerns about applicants and employees with diabetes; and
- how an employer can ensure that no employee is harassed because of diabetes or any other disability.

Safety sensitive occupations: Safety-sensitive jobs are ones in which incapacitation of the employee could place the employee or others at risk of harm (e.g., firefighters, police officers, locomotive engineers, commercial truck drivers). Medical inquiry and medical standards that would violate the ADA for other occupations are permissible for safety-sensitive jobs.

The standard of care for diabetes recommends a reduction of average plasma glucose to near normal levels to prevent or slow serious complications of diabetes; treatment to this target can result in hypoglycemia. The main focus of fitness for duty in persons with diabetes in a safety-sensitive position is the risk he/she will experience during a hypoglycemic event that interferes with cognitive or physical functioning while working; hyperglycemia is unlikely to cause sudden incapacitation. Hypoglycemia is common among individuals using insulin and oral hypoglycemic, but hypoglycemia severe enough to cause incapacitation is much less common.

Commercial truck drivers, airline pilots [and locomotive engineers] are covered under specific federal regulations; individuals with diabetes may work in these occupations but only under the specific conditions and restrictions outlined in the regulations, and these agencies authorize only certified medical providers to make employment decisions. Determination of the ability of an individual in other safety sensitive occupations may be delegated to the individual's physician.

A fitness for duty assessment of a person who has diabetes treated with insulin or oral agents with a risk for hypoglycemia must be individualized, taking into consideration the safety-critical

nature of a person's work and the importance that the person not experience sudden incapacitation to ensure the safety of the person, co-workers and the public; the nature and severity of the employee's medical condition; whether the person is receiving ongoing evaluation and treatment; the person's compliance with and response to treatment; and the person's ability to recognize symptoms of hypoglycemia and self-manage his or her diabetes.

To make this assessment the medical provider should:

- Ensure the patient uses regular glucose measurements and knows how and when to treat hypoglycemia
- Review records of those measurements of blood glucose with the patient
- Obtain a history of all episodes of severe hypoglycemic events, identify the cause and change treatment as needed
- Ensure the patient has a source of glucose available at all times during a work shift, and is able to access and use it when needed.

Further reading:

Americans Diabetes Association: <http://www.diabetes.org/living-with-diabetes/know-your-rights/discrimination/employment-discrimination/>

Americans Diabetes Association position statement –

http://care.diabetesjournals.org/content/37/Supplement_1/S112.full.pdf+html?sid=9b467bce-e745-4e9a-b706-afa5b3fbd85f

Equal Employment Opportunity Commission (EEOC) Q+A:

<http://www.eeoc.gov/laws/types/diabetes.cfm>

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Appendix 4 – Provider Information on Diabetes and the Workplace

Diabetes and Work

1. Diabetes and Work Schedules

A. Shift Work

Concern about the health effects of shift work on diabetes management and contribution to diabetes has been discussed since the 1970's (Winget, 1978). Shift work can be defined in many ways: irregular work hours, set work hours outside of a 'standard' work day (7 am -5 pm), rotating schedules that require varying the time of day or night worked. This section (Section 1.A) of this Appendix examines issues related to set work hours outside of a standard work day and rotating shifts. Detailed information related to irregular work hours is limited, as noted in Section C below ("Multiple Jobs or Irregular Work Schedules"). The meta-analysis of the literature by Gan (2014) indicates there is correlation between diabetes and shift work with the most marked effects in men and those working rotating shifts.

Physiologic changes

Sleep patterns influence metabolic functioning in inflammation responses, hormones that control hunger, lipid metabolism, and glucose metabolism. The suprachiasmatic nucleus in the hypothalamus is the central clock with signals that vary on a 24 hour cycle.

Studies have shown that insulin resistance increased, glucose levels are higher, cortisol levels peak during the beginning of the sleep cycle, and leptin decreases (Scheer, 2009). Ghrelin increased after sleep restriction (Spiegel, 2004). There is also tendency towards increased adipose deposition and poorer eating habits (Schiavo, 2013) which can cause difficulty with diabetes control and possible progression of the disease.

Long term set shift work may allow for adjustment, but many people are unable to maintain the set shift once away from work (Roden, 1993). Organ systems in knock out models adapt at various rates to sleep wake cycle changes (Kalsbeek, 2014), so rotating shift work would be more difficult on the body than a set work shift.

Lifestyle

Shift work causes alteration in diet, exercise, and socialization patterns that can contribute to difficulty with glucose management and weight management. This can lead to progression of diabetes. (Atkinson, 2008)

B. Overtime

The main challenges with overtime are the variation in meal, activity, and sleep patterns that were discussed in the shift work section. Overtime and shift work have not been studied in the context of diabetes but two complicated work situations are likely to cause further difficulty with diabetes control (and prevention).

C. Multiple Jobs or Irregular Work Schedules

Again, lack of regular activity, meals, and sleep will complicate diabetes management. No specific studies available at this time.

2. Diabetes and Work Conditions

The response of people with diabetes to environmental conditions may be blunted due to the side effects of the disease or disease treatment. Standard treatment for new onset type 2

diabetes includes metformin, ACE inhibitor and a statin, all of which have their own side effects. Also the progression of diabetes which includes nephropathy, retinopathy, autonomic dysfunction, cardiovascular disease, and neuropathy can cause difficulty in some work environments.

A. Dehydration

Early in the disease, dehydration is less likely to cause severe metabolic issues. However as disease progresses, dehydration can exacerbate kidney disease and heart disease and heat stress. Also poor control of diabetes causes an increased need for water intake and can increase the risk of dehydration.

B. Temperature Extremes

Diabetes (Type 1 and 2) is associated with decreased vasodilator response and sweat response. This can be exacerbated by obesity and medications use to treat diabetes and its complications. Medications can cause increased heat production or decreased heat loss. (Yardley, 2013; Heimhalt-ElHamriti, 2013)

Comorbid heart disease can be exacerbated by temperature extremes and medications that interfere with thermoregulation and orthostasis. Aging also blunts the ability to thermoregulate efficiently.

C. Lighting

Progression of vision problems could cause difficulty in activities that require activities in varied lighting conditions. Retinopathy and cataracts interfere with night vision, whereas cataracts can cause visual issues in high glare conditions.

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Appendix 5: Diabetes Information Sheet (patient)

Shiftwork

Schedules that vary from a regular day/night sleep cycle (circadian rhythm) can increase difficulty in blood sugar (glucose) management. Many systems in the body are influenced by the day/night cycle including blood sugar (glucose) regulation. Shiftwork can complicate medication, diet and exercise regimens due to the lack of availability of exercise venues, food resources and uncertainty of medication usage at non-standard hours.

Steps that can be taken to assist in diabetes control include:

- Planning dietary needs in advance so that appropriate food options can be transported to work
- Adjusting medication doses to correspond with current wake cycle.
- If working a set non-standard shift, maintain the same schedule even when not at work.
- Exercising before or after work depending on the schedule (before work if working the 3-11 shift, after work if working 11-7 for example)

Further reading:

<http://www.cdc.gov/niosh/docs/2004-143/pdfs/2004-143.pdf>

<http://www.diabetes.ca/diabetes-and-you/healthy-living-resources/general-tips/diabetes-shift-work>

Patient Guidance

Diabetes is more easily managed when exercise, medications and food intake is consistent.

Establish a routine

Plan meals ahead of time

Keep healthy snacks available.

Take medications as prescribed.

Temperature Extremes

Diabetes can interfere with the body's ability to regulate body temperature. The medications used to treat the both the disease and its complications can also cause difficulty tolerating temperature extremes, both hot and cold.

In hot weather, diabetes can decrease the awareness of the effect of heat. Body temperature may increase more before being noticed. Also the ability to sweat can be impaired by diabetes and medications for high blood pressure (hypertension). Some medications increase the risk of dehydration.

In cold weather, the body is not able to respond as efficiently to the cold weather to maintain circulation to the extremities. With more severe diabetes, the ability to sense the warning signs of frostbite, such as pain from prolonged cold exposure, are decreased.

Further reading:

<http://www.cdc.gov/features/DiabetesHeatTravel/>

<http://www.cdc.gov/niosh/docs/2011-174/pdfs/2011-174.pdf>

Patient Guidance

Keep plenty of water with you and drink water regularly. A general assessment of hydration is that your urine should be clear or light yellow in color.

Know where cool areas or shade are available should you feel overheated.

If possible, gradually increase your exposure to heat so you can adjust to your body's needs.

In colder conditions, be aware of your fingers and toes as they are most likely to show signs of frostnip or frostbite first.

Stay warm and dry while working in cold conditions.

Do regular foot checks at home while working in cold conditions.

Physical Activity

Physical activity is encouraged for those with diabetes, however abrupt changes in activity can cause abrupt drop in blood sugar (glucose). This can be managed with increasing the amount of calories or carbohydrates consumed or adjusting medication usage (decreasing dose or change in timing). Caution should be taken when adjusting medications especially if working a hazardous job where sudden incapacitation could cause harm to yourself or others.

Further reading:

<http://www.cdc.gov/features/DiabetesHeatTravel/>

<http://www.cdc.gov/diabetes/living/beactive.html>

<http://www.eatright.org/Public/content.aspx?id=6442477633>

Patient Guidance

If possible, increase activities gradually so you can adjust to your body's needs.

Perform regular glucose measurements and know how and when to treat hypoglycemia (low blood glucose).

Consult with your physician if you have hypoglycemic (low blood glucose) readings or feel that your blood glucose is too low to determine if your regimen needs adjusted.

Ensure you have a source of glucose available.

Establish a routine.

Plan meals ahead of time.

Keep healthy snacks available.

Take medications as prescribed.

Hypoglycemia and Safety Sensitive Jobs

Hypoglycemia (low blood glucose) is common among individuals using insulin and oral hypoglycemic, but hypoglycemia severe enough to cause incapacitation is much less common. Safety-sensitive jobs are ones in which incapacitation of the employee could place the employee or others at risk of harm (e.g., firefighters, police officers, locomotive engineers, commercial truck drivers). The main issue with diabetes in a safety sensitive position is the risk he/she will experience a hypoglycemic (low blood glucose) event that interferes with mental or physical functioning while working; hyperglycemia (elevated blood glucose) is unlikely to cause sudden incapacitation.

Patient Guidance

- Perform regular glucose measurements and know how and when to treat hypoglycemia (low blood glucose)
- Consult with your physician if you have hypoglycemic (low blood glucose) readings or feel that your blood glucose is too low to determine if your regimen needs adjusted
- Ensure you have a source of glucose available
- Establish a routine
- Plan meals ahead of time
- Keep healthy snacks available.
- Take medications as prescribed.

AMERICAN WITH DISABILITIES ACT

<http://www.diabetes.org/living-with-diabetes/know-your-rights/discrimination/employment-discrimination/reasonable-accommodations-in-the-workplace/common-reasonable-accommodations.html>

AMERICAN DIABETES ASSOCIATION

<http://www.diabetes.org/living-with-diabetes/>
<http://www.diabetes.org/diabetes-basics/>

***Using Electronic Health Records and Clinical Decision Support to Provide
Return-to-Work Guidance for Primary Care Practitioners for Musculoskeletal
Conditions Not Caused by Work***

NIOSH RTW Subject Matter Expert Panel

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FINAL KNOWLEDGE RESOURCE REPORT

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The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), or the American College of Occupational and Environmental Medicine (ACOEM). Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC), or the American College of Occupational and Environmental Medicine (ACOEM).

INTRODUCTION/PROJECT BACKGROUND

The Subject Matter Expert Panel (the Panel), charged with identifying return-to-work (RTW)/stay-at-work (SAW) support for a non-work-related musculoskeletal condition commonly seen by primary care providers (PCPs) is focusing on **non-specific acute low back pain (LBP), with or without leg pain, and excluding red flag conditions such as fracture or progressive neurological deficit (see Appendix A for list of red flags)**. However, it is the intent of the Panel that this clinical decision support (CDS) tool for in electronic medical recordkeeping (EMR) systems could be later expanded to include chronic LBP and other conditions. The focus is also non-work-related LBP per the direction of the National Institute for Occupational Safety and Health (NIOSH) because this avoids the complications introduced with treatment under the workers' compensation system.

The intended audience includes PCPs and other clinicians who are asked to provide activity restrictions for a work or activity "prescription." A work or activity prescription usually requires a licensed health care provider's signature, particularly when requested by employers and disability payers. Also, the activity prescription can have an impact on the course of treatment. As such, it is appropriate that the CDS tool is aimed primarily at the PCP, who will likely be responsible for the prescription. However, the CDS tool may be useful to other clinicians.

SCOPE OF PROJECT/CLINICAL OBJECTIVE

The project team chose to focus on acute LBP because it is one of the most frequent problems seen by PCPs,^{1,2,3} and has a wide range of acuity and severity. An estimated 60-80% of the general population will experience an episode of LBP during their lifetime that is significant enough to disrupt daily activities.⁴ Also, LBP represents one of the most common conditions which interferes with activities in and out of work.

Evidence shows that disability is detrimental to a patients' mental, physical, social, and financial well-being.^{4,5,6,7} Authors of a recent systematic review and meta-analysis concluded that unemployment has a hazard ratio of 1.6 for premature mortality.⁸ Thus, acute LBP that results in intolerance of work can lessen the quality and duration of life of a person's life.

PCPs are expected to write activity prescriptions for patients, and patients with acute LBP often seek specific recommendations from clinicians for activities that they should perform or avoid to facilitate recovery.⁹ Systematic reviews show that staying active is beneficial to health; thus, encouraging patients to continue normal activities is good care.¹⁰ Therefore, PCPs should understand the importance of RTW/SAW measures in helping their patients recover and return to activity.

We chose the term "activity prescription" rather than "work activity prescription" or "work prescription" because:

- activity prescription is a broader term that connotes that the provider's prescription is relevant for both in and out of work situations; and
- an activity prescription is more likely to become a routine part of quality care if it is not perceived as being limited to employment.

GOALS/PURPOSE

Goals/purpose of providing a clinical decision support tool/activity prescription are to:

- assist primary care providers prevent medically unnecessary disability;
- improve the quality of medical care by addressing a key aspect of the patient's quality of life (physical and mental health status, economic, social), functional status;
- make a normal provider task easier by facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP;
- reduce the economic burden of disability on society; and
- stimulate consideration for the role of occupation and occupational demands on patients and strive to increase clinicians' interest in capturing occupational health data in their electronic health records (EHRs).

These goals are measurable in a variety of ways (also see Appendix N for more details). Some examples of outcomes that can be measured and are amenable to experiment comparing practices/providers using vs. not using the tool are as follows:

- **Assist** primary care providers prevent medically unnecessary disability;
 - **Measure: days out of work prescribed by providers.**
 - **Measure: prescribed incidence and duration of disability within 30 days.**
 - **Measure: follow trends of total disability days available from state data warehouses.**
- **Improve** the quality of medical care by addressing a key aspect of the patient’s quality of life (physical and mental health status, economic, social), functional status using patient-reported outcomes;
 - **Measure: There are many brief questionnaires that assess quality of life and function, e.g., the PROMIS 10; Oswestry Disability Index.**
- **Make** a normal provider task easier by facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP;
 - **Measure: time for providers to complete forms using the CDS tool vs. standard paperwork; audit of time from receipt of patient/3rd party request for activity prescription to completion by provider; count of requests for providers using CDS tool vs. standard paperwork.**
 - **Measure: survey provider experience with tool.**
- **Reduce** the economic burden of disability on society;
 - **Measure: number of disability days times average wage.**
- **Stimulate** PCPs to begin to think about the role of occupation and its demands on their patients and thereby increase their interest in capturing occupational health data in their electronic health records (EHRs).
 - **Measure: survey of providers using the CDS regarding attitudes about utility of occupational health data.**

The CDS also dissuades the clinician from promoting unnecessary disability resulting from simply taking the patient out of work, which may be the easiest, but often is the least desirable approach to provision of an activity prescription; total disability, will require justification in the CDS. Additionally, to reduce prolonged disability as the CDS will:

- provide a date in the report when the patient should be at full duty; and
- contain a field that lists the last date worked and the number of days off work upon return.

“KEY ACTION STATEMENT”

To focus implementation of Panel recommendations, NIOSH administrators asked that the Panel provide a “key action statement,” that spells out under WHAT circumstances, WHO (intended audience) OUGHT (level of obligation) TO DO exactly what, and for WHOM the recommendation should be implemented. Additionally, the key action statement should imply the strength of the recommendation using directive words such as “must” (strong directive), “should,” and “may” (weak directive), and must also include a discussion of HOW to do it and WHY it is a good idea. The Panel’s key action statement is contained in Box 1.

Box 1 – Key Action Statement

IF a patient presents with acute LBP with or without leg pain AND without red flags (potentially serious disorders that include acute fractures, acute dislocations, infection, tumor, progressive neurologic deficit, or *cauda equina* syndrome – see **Appendix A** for a list of red flags) AND has functional limitations AND the patient requests or requires an activity note or instructions about activity;

THEN the treating **primary care provider** SHOULD:

- **discuss the impact of the functional limitations** on the patient’s work and other activities AND
- **write an activity prescription for the patient** AND
- **transmit the activity prescription to other stakeholders** who legitimately request the prescription AND **accompany the prescription with a printed education brochure** regarding the value of return to work and/or maintaining and increasing activity during recovery.

See **Appendix B** for the complete Key Action Statement Profile.

Red Flags

The Panel proposes to structure an EMR CDS tool to include an information control (such as a button or hover-activated link) that would provide a summary of red flags in back pain taken from the ACOEM *Occupational Medicine Practice Guidelines* LBP Chapter (see Appendix A). The Panel decided not to require, as part of the CDS tool, that the PCP screen for red flags. This is in order to minimize intrusion of the tool. This approach is also justified as patients presenting with acute LBP and red flags are rare, and screening for red flags is not likely to have an impact on outcome.¹¹⁻¹⁴

Functional Limitations – We restricted this recommendation to patients who have functional limitations or activity intolerance AND ask for an activity prescription. The PCP is unlikely to need to generate an activity prescription if the patient neither has functional limitations nor requests such a note, except in the case when a third party requests an activity prescription.

A preferred option for a practice is to collect some functional limitation information on every patient who presents with acute back pain. However, a second option for a practice is to postpone any discussion of functional limitations to the point when a patient or other stakeholder requests an activity note. Ideally, all information should be entered by the patient with an interface directly into the medical record. However, considerations for those who do not have fluency in English, or are functionally illiterate, must be made as in some communities this will represent a substantial portion of the population.

There are 2 options, based on practice preference, for collecting this information:

- **Option 1:** Collect this information by paper questionnaire or by tablet in the waiting room. Collection could be executed by a patient service representative with simple question, such as: “Does your back pain currently limit your normal home or work activities?” (See Appendix C for sample questionnaires.) Ideally, this information would be imported into the EMR. This is easy in an EMR such as Epic. Alternatively, a medical assistant or administrative assistant could input into a template in the record as part of the initial note.
- **Option 2:** Postpone any discussion of functional limitations until a patient or other stakeholder requests an activity prescription.

For the PCP who is not familiar with the term “functional limitations,” we suggest provision of a table activated by the user through a link or hover-over option in the EMR. This table would provide examples of common limitations such as difficulty bending, kneeling, climbing, or lifting that can be discussed with the patient. (See Appendix D – Functional Limitations: Return-to-Work Restrictions for Patients with Acute Low Back Pain.)

We chose not to be too specific with the types of functional limitations given that the activity prescription is meant to be useful not only for occupational restrictions but also for non-occupational scenarios such as participation in sports or self-directed activities at home or in the community. Whether it will be necessary to provide PCPs with domains for discussion, e.g., work, play, hobbies, activities of daily living, etc., remains to be seen after the tool is tested. Our thought was that the patient would, without too much prompting, indicate those areas of her/his life that are affected by the pain. However, to assist the PCP in discussing the issue of impact with the patient, the CDS tool could include an information control (such as a button or hover-activated link) with advice that the PCP, if so inclined, could provide the patient on his/her first visit:

Advice for Patients with Acute Back Pain:*

Most episodes of back pain resolve by themselves within weeks, sometimes within days. X-rays and other diagnostic studies usually are unrevealing and do not change the treatment approach. In most cases, even when diagnostic studies are performed, there is no reliable diagnosis to explain back pain. The best treatment includes you (the patient) maintaining your normal activities as well as you can; avoiding bed rest, which only weakens you and makes you stiffer; and taking non-steroidal anti-inflammatory drugs (like ibuprofen). Lightweight activity is better for the back than no activity. Applying warm or cold packs may be helpful. For those employed, also see the *Patient Education Brochure: Benefits of Returning to Work As Soon As Possible* for more information.*

***This advice incorporates the SME groups' expertise on the important elements that should be provided to the patient.**

ACTIVITY PRESCRIPTION

When an activity prescription is requested, the CDS supports the clinician in easily generating the prescription using a standard format. When activity prescriptions are not required, but the provider SHOULD write the activity prescription as the patient, an employer, or another stakeholder requests it, the CDS tool will allow timely provision of an activity prescription and support material. The CDS will improve the experiences of the provider, patient, and other stakeholders by allowing a well-considered prescription supported by the best available evidence, and structured in a concise form to be generated in a timely fashion. Failure to generate an activity prescription in a timely fashion may degrade the patient experience, displease stakeholders, impact patient benefits or employment, or in iatrogenic disability or attempts by the patient to perform activity beyond his or her abilities.

RATIONALE

Condition – The rationale for focusing on acute non-work-related LBP with or without leg pain and without red flags is, as previously noted, because LBP is a highly prevalent condition associated with significant disability. It is also, as seen in Box 2, costly.

Box 2 – Impact of Back Pain

Low back pain:

- is common worldwide;¹⁵
- may be experienced by 17% of U.S. adults in any three-month period;¹⁶
- is responsible for approximately 15 million office visits to health care providers annually;¹⁷
- is the fourth most-common discreet complaint or diagnosis for which patients see health care providers;¹⁸
- the second most common cause of disability in U.S. adults;¹⁹
- a common reason for lost work;^{20,21} and
- cost \$100 and \$200 billion annually, two-thirds from lost wages and productivity.²⁰

The Panel also restricted its focus to acute LBP without red flags because LBP guidelines⁴ have different algorithms for LBP with and without red flags, and the presence of red flags may introduce potential safety risks that create medical contra-indications to work. For example, some spinal fractures may create instability that would risk spinal cord injury during activities that apply great force to the back; and spinal cord impingement syndrome, such as *cauda equina* syndrome, may require absence from work for emergent surgery. Additionally, besides a non-work-related problem being specified by NIOSH for this project, a focus on non-work related LBP avoids the complications introduced with treatment under the workers' compensation system. However, the principles of early activity management are identical regardless of whether the problem is or is not deemed work-related.

CDS TOOL – THE ACTIVITY PRESCRIPTION

In the Panel's CDS design, when the **activity prescription tool** is activated, a report specifying permitted activities will be generated using actuarial data and expert consensus consistent with the *Dictionary of Occupational Titles'* job physical demands classifications.²²

The CDS tool will provide a specific date for elimination of activity restrictions that will limit medically unnecessary restrictions and its associated promotion of disability, or trigger more contact with the provider if the patient wants to extend restrictions and disability beyond CDS date for return to full duty. The CDS tool will include a box that the provider can check to indicate that the activity limitation is permanent, thereby eliminating the need to recreate the activity prescription.

The CDS tool does not *require* the provider to collect occupational health data before generating the activity prescription because:

- job demand information is unlikely to be present in the chart;
- collecting occupational data adds to the provider burden without improving care; and
- discussing the activity prescription (see below) with the patient will probably result in a discussion of whether the prescription will restrict the patient from performing their regular duties and thereby elicit enough information to adjust the activity prescription accordingly.

The CDS tool will include in the activity prescription a closing direction that will state: “Over the next four (4) weeks,* the patient may gradually increase their activity as tolerated to usual activities. If the patient is unable to tolerate the activities as written above, or has not returned to usual activities within four weeks, the employer, insurer, or patient should contact the provider for further guidance.”

*The Panel is not recommending an automatic 4 weeks of disability. The CDS is based on evidence that the majority of people with acute back pain return to full function in 4 weeks or less. For simplicity, it relies on the fact that *most* people want to return to full activity as soon as they feel able to do so. The prescription does not proscribe full activity before 4 weeks; rather it prompts further investigation if the patient has not returned to work by that time. While it *is possible* that some patients will have more disability, by capping disability at 4 weeks and encouraging a graduated increase in activity during that time frame, the CDS will help prevent prolonged disability.

In fact, according to data provided in the Reed Group’s *MDGuidelines* (MDG), in the situation of non-work-related degenerative disc condition, the maximum disability is 28 days – and over 75% of patients actually have more days off – thus a cap of 4 weeks is not only reasonable, but it will trigger additional investigation (follow-up visit).²³

The PCP will not need to select an “out of work” option as the “starting” point is 0 days and the cap is 4 weeks. (See Appendix E for discussion/references regarding disability duration.)

The Panel decided not to automatically specify return visits to the PCP for the purpose of revising the activity prescription because:

- return visits add to the cost of care and patients without insurance or with high deductibles are unlikely to want to return for revisions unless the revisions are required by an employer or insurer; and
- the vast majority of patients with LBP with or without leg pain will naturally resume normal activities within four weeks of evaluation.²⁴⁻⁴²

Patients who do not recover by the date specified for elimination of activity restrictions by the CDS LBP tool should be reassessed.

The CDS tool will have the capability to copy the data from the most recent, previous activity prescription into the activity prescription from a current encounter, and the activity prescription from the current encounter can be edited. This feature should ease the PCPs task of writing activity prescriptions.

Discussion of the Activity Prescription with the Patient – The Panel recommends that the clinician discuss the activity prescription with the patient to assure that the patient:

- understands the prescription; and

- has an opportunity request modification of the prescription to accommodate the patient’s circumstances.

The Panel recommends that the activity prescription generated by the CDS be used as the standard response to any request or form given to providers requesting an activity prescription. The CDS activity prescription can be attached to other forms, which should be signed along with a comment on the form to “see attached.”

EVIDENCE THAT FORMS THE BASIS OF THE CLINICAL DECISION SUPPORT TOOL

Methods used to collect evidence to support this recommendation included MedLine/PubMed and Google searches information and articles containing the terms:

- disability (prevention OR treat* OR manage*)
- primary care
- musculoskeletal
- return to work and
- risk assessment.

When searches yielded more than 250 articles, the results were limited to studies of humans and studies published in the English language. The search for disability (prevention OR treat* OR manage*) was further limited to systematic reviews or meta-analyses. Material used to form the Panel’s conclusions were published in peer-reviewed journals, government documents (similar to those published by the U.S. Centers for Disease Control and Prevention), or from American Medical Association or ACOEM publications. Grading criteria was based on the methodology used to develop the ACOEM *Practice Guidelines*, which is based on the GRADE standards for guideline development. The COOG and the American Academy of Pediatrics Steering Committee on Quality Improvement and Management tools were used for CDS development and classifying recommendations for clinical practice guidelines (see Appendix F – Guideline Quality Appraisal).

There is strong “administrative” (observational) evidence – not amenable to be captured through a randomized controlled trial (RCT) – that the longer patients are disabled or encounter prolonged absence from activities of daily living, including work, the less their potential for successful return to activities of daily living and work based on:

- prima facie evidence indicates that activity prescriptions are required – they are an administrative “fact” of practice⁴³;
- strong scientific evidence has found that disability is toxic to a patient’s health and promoting activity is rehabilitative (Evidence Level B);
- actuarial data is available regarding the mean and range of disability durations associated with low back pain (U.S. Bureau of Labor Statistics data) – however, there is little good evidence beyond expert opinion regarding the appropriate level of default restrictions; and
- expert consensus when there is no published evidence beyond expert opinion to support the value of a default activity prescription in EMR systems to reduce disability. However, there is moderate evidence that setting an expectation for patient and provider allows most patients with LBP to recover within 4 weeks.^{44,45}

The Panel believes the Evidence Quality is B as it is supported by “trials or diagnostic studies with minor limitations and is consistent with findings from multiple observational studies. With this evidence quality rating and a balance of benefits over harms, and the Recommendation Strength is Moderate (see Appendix B).

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APPENDICES FOR THE FINAL KNOWLEDGE RESOURCE REPORT FOR THE CLINICAL DECISION SUPPORT TOOL FOR LOW BACK PAIN*

Attached to this RTW Knowledge-Resource Report are the following documents:

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***Note: With the addition of the appendices, this report is more than 50 pages. However, the length of the report does not reflect, and is separate from, the length of the CDS tool which is intended to be short and concise.**

**Appendix A – Red Flags for Potentially Serious Low Back Disorders
from the American College of Occupational and Environmental Medicine
Practice Guidelines Chapter on Low Back Disorders**

Red Flags

Potentially serious disorders are referred to as “red flags.” These include acute fractures, acute dislocations (e.g., spondylolisthesis), infection, tumor, progressive neurologic deficit, or *cauda equina* syndrome.

The Panel proposes to structure an EMR CDS tool to include an information control (such as a button or hover-activated link) that would provide the PCP with this summary of red flags in back pain taken from the ACOEM *Occupational Medicine Practice Guidelines* LBP Chapter.

Disorder	Medical History	Physical Examination/Diagnostic Testing
SPINAL DISORDERS		
Fracture	Major trauma, such as vehicular accident or fall from height Minor trauma or strenuous lifting in older or potentially osteoporotic patients	Percussion tenderness over specific spinous processes Careful neurological examination for signs of neurological compromise
Tumor and Neoplasia	Severe localized pain over specific spinal processes History of cancer Age >50 years Constitutional symptoms, such as recent unexplained weight loss or fatigue Pain that worsens when patient is supine Pain at night or at rest	Pallor, reduced blood pressure, diffuse weakness Tenderness over spinous process and percussion tenderness Decreased range of motion due to protective muscle spasm History of sciatica for detection of cancer [†] <ul style="list-style-type: none"> ▪ Sciatica sensitivity = 58 to 93% ▪ Sciatica specificity = 78% History of paresthesia for detection of cancer [†] <ul style="list-style-type: none"> ▪ Paresthesia sensitivity = 58% Plain radiography for detection of cancer [‡] <ul style="list-style-type: none"> ▪ Radiography sensitivity = 60% ▪ Radiography specificity = 90 to 99.5% Magnetic resonance imaging (MRI) for detection of cancer [‡] <ul style="list-style-type: none"> ▪ MRI sensitivity = 83 to 93% ▪ MRI specificity = 90 to 97% Radionuclide scanning for detection of cancer [‡] <ul style="list-style-type: none"> ▪ Planer imaging sensitivity = 74 to 98% ▪ Planer imaging specificity = 64 to 81% ▪ SPECT sensitivity = 87 to 93% ▪ SPECT specificity = 91 to 93%
Infection	Risk factors for spinal infection: recent bacterial infection (e.g., urinary tract infection); IV drug abuse; diabetes mellitus; or immune suppression (due to corticosteroids, transplant, or HIV) Constitutional symptoms, such as recent fever, chills, or unexplained weight loss	Tenderness over spinous processes Decreased range of motion Vital signs consistent with systemic infection (late): <ul style="list-style-type: none"> ▪ Tachycardia ▪ Tachypnea ▪ Hypotension ▪ Elevated temperature, high white blood cell count ▪ Pelvic or abdominal mass or tenderness Plain radiography for detection of infection [‡] <ul style="list-style-type: none"> ▪ Radiography sensitivity = 82%

		<ul style="list-style-type: none"> ▪ Radiography specificity = 57% <p>Magnetic resonance imaging (MRI) for detection of infection[‡]</p> <ul style="list-style-type: none"> ▪ MRI sensitivity = 96% ▪ MRI specificity = 92% <p>Radionuclide scanning for detection of infection[‡]</p> <ul style="list-style-type: none"> ▪ Radionuclide scanning sensitivity = 90% ▪ Radionuclide scanning specificity = 78%
Cauda Equina Syndrome/ Saddle Anesthesia	<p>Direct blow or fall with axial loading</p> <p>Perianal/perineal sensory loss</p> <p>Recent onset of bladder dysfunction, such as urinary retention, increased frequency, or overflow incontinence</p> <p>Bowel dysfunction or incontinence</p> <p>Severe or progressive neurologic deficit in lower extremities, usually involving multiple myotomes and dermatomes</p>	<p>Unexpected laxity of bladder* or anal sphincter</p> <p>Major motor weakness in hamstrings (knee flexion weakness); ankle plantar flexors, evertors, and dorsiflexors (foot drop). May have more proximal myotomal weakness if higher cord level(s) affected</p> <p>Spastic (thoracic) or flaccid (lumbar) paraparesis</p> <p>Increased (thoracic) or decreased (lumbar) reflexes</p>
Progressive Neurologic Deficit	<p>Severe low back pain</p> <p>Progressive numbness or weakness</p>	<p>Significant and progressive myotomal motor weakness</p> <p>Significant and increased sensory loss – in anatomical distribution</p> <p>Radicular signs</p>
EXTRASPINAL DISORDERS		
Dissecting Abdominal Aortic Aneurysm	<p>Excruciating low back pain</p> <p>History of atherosclerotic disease or multiple cardiovascular risk factors</p> <p>History of hypertension</p>	<p>Pulsatile midline abdominal mass</p> <p>Absent or variable pulses</p> <p>Asymmetric blood pressure</p> <p>Bruits</p>
Renal Colic	<p>Excruciating pain from costovertebral angle to groin, testis, or labia</p> <p>History of urolithiasis</p> <p>Hematuria</p>	<p>Possible tenderness at costovertebral angle</p>
Retrocecal Appendicitis	<p>Right lower quadrant abdominal pain and/or right low back pain</p> <p>Constipation</p> <p>Subacute onset without inciting event</p> <p>Nausea and vomiting variably present</p>	<p>Low-grade fever</p> <p>May have tender right lower quadrant</p> <p>Pain on rectal examination in right lower quadrant</p>
Pelvic Inflammatory Disease	<p>Vaginal discharge</p> <p>Pelvic pain</p> <p>Prior episode</p>	<p>Uterine tenderness</p> <p>Tender over right and/or left lower quadrants</p> <p>Cervical discharge</p>
Urinary Tract Infection	<p>Dysuria</p> <p>History of urinary tract infections</p>	<p>Fever</p> <p>Suprapubic tenderness</p> <p>Smelly or cloudy urine</p>

Adapted from: [†]van den Hoogen HM, et al(26); [‡]Jarvik JG, Deyo RA(27);*Bigos S, et al.(28)
SPECT = single-photon emission computed tomography

Appendix B – Key Action Statement Profile

Date: October 23, 2014

Key Action Statement:

Condition

IF a patient presents with LBP with or without leg pain AND without red flags AND has functional limitations AND the patient requests or requires an activity note or instructions about activity;

Action

THEN the treating **primary care provider** SHOULD:

- **discuss the impact of the functional limitations** on the patient's work and other activities AND
- **write an activity prescription** AND
- **discuss the activity prescription with the patient** AND
- give the activity prescription **to the patient** AND
- **transmit the activity prescription to other stakeholders** who legitimately request the prescription AND **accompany the prescription with a printed education brochure** regarding the value of return to work and maintaining and increasing activity during recovery.

Aggregate Evidence Quality: B

Level of Confidence in Evidence: Moderate

Benefits:

- encourages continuation of or quick return to a patient's normal activities
- improves quality of care – patient gets better medically and functionally faster
- improves clinician workflow
- eases burden on provider
- more ethical as it promotes equal treatment of patients
- reduces both direct and indirect costs to employer and society
- maintains patient's financial status (no loss of salary), thereby preventing the adverse health effects of declining income
- prevents maladaptive behavior which may lead to permanent disability
- protects/improves patient's emotional state

Risk, Harm, Cost:

- May inadvertently create more disability because we may end up giving more people restrictions
- Might displease some patients as they would prefer stricter work restrictions or more time off work
- Comes with implementation costs
- May result in duplication of work for provider (another form to complete if requesting stakeholder does not accept this automatically generated activity prescription)

Benefit-Harm Assessment: Preponderance of Benefit

Who: treating primary care physician/health care provider

Value Judgments:

Intentional Vagueness:

Role of Patient Preferences:

Exclusions:

Policy Level:

Differences of Opinion:

Notes:

Information button to include the Red Flag Table (Table 5 from ACOEM *Occupational Medicine Practice Guidelines* chapter on Low Back Disorders).

Patient education brochure added regarding the value of progressive activity.

What's the scientific evidence to back up the specific recommendation? In this field, there is strong "administrative" evidence not amenable to be captured by an RCT. However, there is strong evidence that the longer patients are kept out of work, the potential for their successful return to work diminishes in the long term.

Recommendation has 4 parts with different levels of evidence –

1. prima facie evidence that activity prescriptions are required – administrative "fact" of practice.ⁱ
2. strong scientific evidence that disability is toxic to a patient's health and promoting activity is rehabilitative (Evidence Level B).
3. Although actuarial data regarding the mean and range of disability durations associated with low back pain are available, there is little good evidence beyond expert opinion regarding the appropriate level of default restrictions.
4. There is no published evidence beyond expert opinion to support the value of a default activity prescription in an electronic health record to reduce disability. However, there is moderate evidence that setting expectation for patient and provider that most patients with LBP recover within 4 weeks.^{ii,iii}

ⁱMerrill RN, Pransky G, Hathaway J, Scott D. Illness and the workplace: a study of physicians and employers. *J Fam Pract.* 1990;31(1):55-8.

ⁱⁱKapoor S, Shaw WS, Pransky G, Patterson W. Initial patient and clinician expectations of return to work after acute onset of work-related low back pain. *J Occup Environ Med.* 2006;48(11):1173-80. Available at: www.ncbi.nlm.nih.gov/pubmed/17099454. Accessed October 30, 2014.

ⁱⁱⁱCoste J, Lefrançois G, Guillemin F, Pouchot J; French Study Group for Quality of Life in Rheumatology. Prognosis and quality of life in patients with acute low back pain: insights from a comprehensive inception cohort study. *Arthritis Rheum.* 2004;51(2):168-76. Available at: <http://onlinelibrary.wiley.com/doi/10.1002/art.20235/pdf>. Accessed October 30, 2014.

Appendix C – Sample Patient Functional Limitations Questionnaires

Sample #1

1. Are you restricted in your ability to meet typical physical requirements of your job or usual line of work, social obligations (housework, family life)? If so, specifically, how do your symptoms limit your ability to function? Are you unable to:
 - lift or carry objects required.
 - sustain continuous or prolonged repetitive movement of your arms, hands, or fingers.
 - sustain a continuous or prolonged standing or sitting position.
 - sustain consistent physical work effort.
 - bend or walk up/down stairs?
2. Are you restricted in your ability to tolerate typical psychological stresses in the work environment?
3. Are you unable to tolerate the common environmental conditions found at work?
4. Are you unable to sustain a consistent mental work effort?
5. Are you unable to complete tasks at a pace comparable to other employees doing your work or the expected pace of other activities at home or in the community?
6. Are you unable to drive?
7. Other functional limitations?
8. Do you want or need a note for work, school, sports, or a disability insurer about your ability to continue or return to normal activities?

Appendix C – Sample Functional Limitations Questionnaires, continued

Sample #2

<p>Question #1 Are you restricted in your ability to meet typical physical requirements of your job or usual line of work, social obligations (housework, family life)?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p><i>If yes</i>, specifically, how do your symptoms limit your ability to function?</p> <p>Are you able to:</p> <ul style="list-style-type: none"> ▪ Lift or carry objects required <input type="checkbox"/> Yes <input type="checkbox"/> No ▪ Sustain continuous or prolonged repetitive movement of your arms, hands, or fingers <input type="checkbox"/> Yes <input type="checkbox"/> No ▪ Sustain a continuous or prolonged standing or sitting position. <input type="checkbox"/> Yes <input type="checkbox"/> No ▪ Sustain consistent physical work effort. <input type="checkbox"/> Yes <input type="checkbox"/> No ▪ Bend or walk up/down stairs? <input type="checkbox"/> Yes <input type="checkbox"/> No
<p>Question #2 Are you restricted in your ability to tolerate typical psychological stresses in the work environment?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #3 Are you unable to tolerate the common environmental conditions found at work?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #4 Are you unable to sustain a consistent mental work effort?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #5 Are you unable to complete tasks at a pace comparable to other employees doing your work or the expected pace of other activities at home or in the community?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #6 Are you unable to drive?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #7 Do you have other functional limitations?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>If yes, please specify:</p>
<p>Question #8 Do you want or need a note for work, school, sports, or a disability insurer about your ability to continue or return to normal activities?</p>	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Appendix D – Functional Limitations: Return-to-Work Restrictions for Patients with Acute Low Back Pain

For the PCP who is not familiar with the term “functional limitations,” the following table which can be activated by the user through a link in the EMR or as a hover over option, provides examples of common limitations such as difficulty bending, kneeling, climbing, or lifting and modified activity duration times for individuals with new onset regional low back pain.

Activity Level	Restrictions	Job Categories	Modified Activity Duration
Sedentary	No lifting, pushing, or pulling over 10 pounds No twisting of the spine/torso, climbing ladders, or work at heights No more than occasional (less than 25% of the time) bending over at the waist, walking, or standing	Example: worker sits most of the time and only walks or stands for brief periods. TYPICAL JOB: OFFICE WORK	1 day
Light	No lifting, pushing, or pulling over 20 pounds No climbing of ladders or work at heights No more than occasional (less than 25% of the time) bending over at the waist or twisting of the spine/torso No more than intermittent (less than 50% of the time) walking or standing	Example: walking or standing to a significant degree, or sitting constantly but with arm and/or leg controls with exertion of force greater than sedentary. TYPICAL JOB: OFFICE NURSING, LIGHT ASSEMBLY	1-3 days
Light-Medium	No lifting, pushing, or pulling over 30 pounds No more than intermittent (less than 50% of the time) bending over at the waist or twisting of the spine/torso No more than frequent (less than 75% of the time) walking or standing	TYPICAL JOB: HOUSEKEEPER	4-7 days
Medium	No lifting, pushing, or pulling over 50 pounds No more than frequent (less than 75% of the time) bending over at the waist or twisting of the spine/torso	TYPICAL JOB: RETAIL SALES ASSOCIATES	8-14 days
Heavy	No lifting, pushing, or pulling over 75 pounds	TYPICAL JOB: MATERIAL HANDLING; SHIPPING AND RECEIVING	14-30 days*
Very Heavy	No lifting, pushing, or pulling over 100 pounds	TYPICAL JOB: CONSTRUCTION, LABORER	30-60 days*

*With the caveat that the number of days are not based on evidence, the Panel recommends these durations as the risk of re-injury could be very high with this level of physical demand.

Appendix E – Disability Duration Discussion/References

According to the ReedGroup's *MDGuidelines*, 5-12 weeks is the median length of disability from low back disorders*; therefore, 4 weeks is a conservative length of disability for acute low back pain. Four weeks encompasses only the acute phase of low back pain (ACOEM Practice Guidelines). Screening approaches for delayed recovery in low back pain may not be helpful when applied or are not evaluated in the acute phase of low back pain (see references below).

*Low back pain – Mean disability days = 62; median disability days = 39 (see <http://www.mdguidelines.com/low-back-pain>; accessed June 21, 2015)

Displacement, lumbar intervertebral discomfort without myelopathy – Mean disability days = 88; median disability days = 66 (see <http://www.mdguidelines.com/displacement-lumbar-intervertebral-disc-without-myelopathy>; accessed June 21, 2015)

Degeneration, lumbar intervertebral disc – Mean disability days = 122; median disability days = 84 (see <http://www.mdguidelines.com/degeneration-lumbar-intervertebral-disc>; accessed June 21, 2015)

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Appendix F– Guidelines Quality Appraisal (GLIA)

As Applied by the Return-to-Work/Stay-at-Work Panel for Clinical Decision Support in Low Back Pain

	<p>Describe the primary disease/condition and intervention/service/technology that the guideline addresses. Indicate any alternative preventive, diagnostic or therapeutic interventions that were considered during development.</p> <p>No-specific low back pain with or without leg pain but without red flags. Presentation non-complicated, date of onset/exacerbation very recent; no more than a week lost time from work</p>
	<p>Describe the goal that following the guideline is expected to achieve, including the rationale for development of a guideline on this topic.</p> <p>Goals and recommendation are to:</p> <ul style="list-style-type: none"> ▪ assist primary care providers prevent medically unnecessary disability; ▪ improve the quality of medical care by addressing a key aspect of the patient’s quality of life (physical and mental health status, economic, social), functional status; ▪ make a common provider task easier by informing and facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP; ▪ reduce the economic burden of disability on society; and ▪ stimulate PCPs to begin to think about the role of occupation and its demands on their patients and thereby increase their interest in capturing occupational health data in their electronic health records. <p>We are focusing on non-work-related low back pain with or without leg pain and without red flags because as already noted it is a highly prevalent condition seen by primary care providers (PCPs) and is associated with significant disability in the general population. We also chose to restrict our focus to back pain without red flags because low back pain guidelines (cite ACOEM, others) have created different algorithms for LBP with red flags. Also, the presence of certain red flags may introduce potential safety risks that create medical contra-indications to work – for example, some spinal fractures may create instability that would risk spinal cord injury, while other red flags require absence from work because they require emergency surgery – e.g., cauda equina or dissecting abdominal aortic aneurysm.</p> <p>We decided to present an information button that would supply Table 5 – Red Flags from ACOEM’s Low Back Chapter for the PCP who wants to be reminded about the range of red flags and their associated signs and symptoms. However, we decided not to prompt the PCP to screen for these red flags earlier in the visit to minimize the burden of the clinical decision support. In addition, patients presenting with red flags are rare.</p>
	<p>Describe the intended users of the guideline (e.g., provider types, patients) and the settings in which the guideline is intended to be used.</p> <p>Primary care physicians (PCPs) in the clinical setting</p>
	<p>Describe the patient population eligible for guideline recommendations and list any exclusion criteria.</p> <p>Patients with non-specific low back pain (with or without leg pain). Initial presentation of acute, non-complicated low back pain without red flags; date of onset very recent with no more than a week out of work; low self-efficacy.</p>
	<p>Identify the organization(s) responsible for guideline development and the names/credentials/potential conflicts of interest of individuals involved in the guideline’s development.</p> <p>ACOEM</p>
Funding source/sponsor	<p>Identify the funding source/sponsor and describe its role in developing, and/or reporting the guideline. Disclose potential conflict of interest.</p>
Source of Funding	<p>NIOSH grant/contract #212-2014 -M-59014.</p>

Conflict of Interest	None
	Describe the methods used to search the scientific literature, including the range of dates and databases searched, and criteria applied to filter the retrieved evidence.
	MedLine/PubMed search: disability (prevention OR treat* OR manage*) "primary care," musculoskeletal, return to work, risk assessment. Filters: Humans, English. Limited the search further to systematic reviews or meta-analyses reported in articles with abstracts. Range of dates – June 2008 to August 22, 2014.
Recommendation Grading Criteria	Describe the criteria used to rate the quality of evidence that supports the recommendations and the system for describing the strength of the recommendations. Recommendation strength communicates the importance of adherence to a recommendation and is based on both the quality of the evidence and the magnitude of anticipated benefits or harms.
Recommendation Grading Criteria	ACOEM Practice Guidelines Methodology; The GRADE (Grading of Recommendations Assessment, Development and Evaluation) standards for guideline development, which are used by many guideline developers; COGS; AAP.
Evidence Quality Rating Scheme	Schiffman RN, Dixon J, Brandt C, et al. The GuideLine Implementability Appraisal (GLIA): development of an instrument to identify obstacles to guideline implementation. BMC Med Informatics Decision Making. 2005;5:23. GLIA v.2.0 see www.cdc.gov/od/science/quality/docs/GLIA_v2.pdf ; AAP's scheme -- American Academy of Pediatrics Steering Committee on Quality Improvement and Management. Classifying recommendations for clinical practice guidelines. Pediatrics. 2004;114(3):874–877
Recommendation Strength Rating Scheme	IBID
	Describe how evidence was used to create recommendations, e.g., evidence tables, meta-analysis, decision analysis.
	IBID
Pre-release review	Describe how the guideline developer reviewed and/or tested the guidelines prior to release.
External Review	X
Pilot testing	X
Formal Appraisal	X
	State whether or not there is a plan to update the guideline and, if applicable, an expiration date for this version of the guideline.
	X
	Describe the role of patient preferences when a recommendation involves a substantial element of personal choice or values.
	X

Appendix G – Primary Care Scenarios for Cases Involving Activity Prescriptions for Patients with Acute Low Back Pain

CASE #1 – A 46-year-old female presents with gradual onset increasing low back pain after 2 days of extended driving; she just returned to New Hampshire from Florida by car. **HISTORY:** Patient has pain in her right lower back, radiating to the lateral right leg. The pain is increased with prolonged sitting and bending forward, and she has difficulty finding a comfortable position. She also has difficulty walking, lifting, and sitting, although she feels okay standing for a short period of time. Lying down seems to be most comfortable. She is uncomfortable driving for more than a short distance. She denies numbness or tingling, weakness, bowel or bladder problems. She has had several prior episodes of low back pain, the last one about 5 years ago, with similar symptoms. Past medical history is significant for mild obesity, hypertension treated by hydrochlorothiazide; review of systems is otherwise negative. **PHYSICAL EXAMINATION:** Physical examination shows pain on palpation in the right lateral lumbosacral area, increased by bending forward. Patient has decreased range of motion of her lower back, limited by pain. Her sensory and motor examination is normal, and SLR is negative. (Physician “clicks” on Red Flag Information Tab to view list and to eliminate any potential serious disorders.) No red flags found. Patient notes that she is an insurance underwriter and her work involves being seated at a computer workstation for 8 hours per day. Patient indicates to the PCP that she is not sure how she can do her job in her current state as prolonged sitting is painful, **and requests a sick leave note/activity prescription (ACTIVITY PRESCRIPTION TRIGGER)**. PCP inquires about functional limitations, completes history and physical and now proceeds to completing the order set. If desired, PCP may access “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting. Patient indicates she has functional limitations which affect her work, which involves being seated at a computer workstation for 8 hours per day. Order set includes an Activity Prescription tab which opens into the activity. (Or PCP’s program has a separate Activity Prescription tab.)

Step	Process/Work Flow	Action/Outcome
1	Patient presents with low back pain (LBP) with or without leg pain	Patient could complete a questionnaire at check-in which asks how condition that is the reason for the visit is affecting her activities of daily life (functional limitations).
2	PCP takes detailed history to evaluate LBP, including previous episodes and/or injuries	Enter patient history and chief complaint (back pain) into EMR.
3	PCP conducts physical examination: Rules out red flags Option #1: Notes functional limitations if any based on questionnaire and patient complaints (Step 1) and may enter into EMR	Enter findings into EMR. PCP accesses information (e.g., button/hover-activated link) that provides summary of red flags in back pain PCP accesses “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting. Discusses with patient now or in Step 7 (Option #2).
4	PCP completes history/exam and proceeds to completing order set	Opens order set
Activity Prescription Trigger		
5	Patient asks for Activity Prescription/note for employer.	Order set includes an Activity Prescription tab which opens into activity or PCP activates Activity Prescription Tool tab NOW.
Activity Prescription		
6	Generate Activity Prescription	Activity Prescription report auto-populates with permitted activities and provides a specific date for elimination of activity restrictions that will limit medically unnecessary restrictions or trigger more contact with the provider if patient wants to extend restrictions and disability beyond CDS date for return to full duty.

		Activity prescription includes closing direction that states: "Over the next four (4) weeks, the patient may gradually increase their activity as tolerated to usual activities. If the patient is unable to tolerate the activities as written above, or has not returned to usual activities within four weeks, the employer, insurer, or patient should contact the provider for further guidance."
7	Discussion of Activity Rx	<p>During discussion, PCP may overwrite machine recommended restrictions based on review of functional limitations with patient by interview with or without (Option #2) the use of a Functional Limitations questionnaire as per Step 1. CDS tool also includes a box that PCP can check to indicate that the activity limitation is permanent, thereby eliminating the need to recreate the activity prescription.</p> <p>PCP discuss Activity Prescription with patient to assure that patient:</p> <ul style="list-style-type: none"> • understands the prescription; and • has an opportunity request modification of prescription to accommodate his/her circumstances. <p>In addition to generating a detailed Activity Prescription for the patient (which can be shared with the employer or other stakeholder), the CDS tool generates a patient education brochure which discussed the value of returning to work and/or maintaining/increasing activity during recovery (see Appendix L).</p>
	Transmit Activity Prescription to stakeholders	In this case, providing to patient may be sufficient. She can then copy and provide to any other requesting stakeholders.

CASE #2 – A 22-year-old male presents to a primary care physician on Monday morning for acute onset severe midline low back pain yesterday, after moving a large stone at home while building a stone wall. Now, he is very uncomfortable sitting, bending over, or twisting. **HISTORY:** As a new patient, he is asked to complete a questionnaire to screen for red flags or to assess how low back pain is affecting his life at home and at work. Patient has never had significant back pain in the past, and has a negative past medical history. He has some numbness in his right lateral leg, but no bowel or bladder problems. He thinks he might have some weakness in his right leg, but is not sure. His review of systems is otherwise negative. **PHYSICAL EXAMINATION:** On physical examination, patient is uncomfortable and stands, without sitting. He has lumbosacral midline back pain which increases significantly if he bends forward a few degrees, and is unable to flex more than 40°. He feels slightly better if he bends backwards. He has difficulty bending from side to side without increasing his pain. His distal motor and sensory examination is normal, and SLR is negative. No red flags for fracture, etc., found. **TREATMENT:** PCP prescribes medication which may impair function. Physician discusses drug dosage, side effects, which include functional impairment, and contra-indications with patient. **ACTIVITY PRESCRIPTION TRIGGER:** Impairing med Rx triggers functional limitation discussion – how will this medication impact your activities such as driving or operating dangerous and **triggers Activity Prescription tab as part of order set.** In discussing the effects of the medication, the patient is concerned about his work, as he is a general laborer for a construction firm and this involves moving lumber, bags of concrete, and other heavy materials, and operating heavy machinery. Patient thinks that his company occasionally allows light duty, **but he has spoken to his supervisor and that person has requested the patient provide a note (Activity Prescription) from his doctor explaining what work activities the patient can and cannot do with this condition and while on this medication and for how long.**

Step	Process/Work Flow	Action/Outcome
1	Patient presents with low back pain (LBP) with or without leg pain	Patient could complete a questionnaire at check-in which asks how condition that is the reason for the visit is affecting his activities of daily life. Alternatively, the practice could decide to leave this assessment until after the activity prescription is triggered (see comment on prior scenario)
2	PCP takes detailed history to evaluate LBP, including previous episodes and/or injuries	Enter patient history and chief complaint into EMR.
3	Conduct physical examination: Rule out red flags Note functional limitations if any and enter into EMR	Enter findings into EMR. PCP accesses information (e.g., button/hover-activated link) that provides summary of red flags in back pain PCP accesses “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting.
4	PCP completes history/exam and proceeds to completing order set	Opens order set
Activity Prescription Trigger		
5	Prescribe Treatment Plan/Write Order Set Discussion of medication side effects leads to patient and/or employer requesting activity prescription	Activity Prescription activated as part of the order set. PCP prescribes treatment – e.g., medication prescription activates Activity Prescription Tool NOW to generate Activity Prescription report.
Activity Prescription		
6	Generate Activity Prescription	<p>Activity Prescription report specifies permitted activities and provides a specific date for elimination of activity restrictions that will limit medically unnecessary restrictions or trigger more contact with the provider if the patient wants to extend restrictions and disability beyond CDS date for return to full duty.</p> <p>Activity prescription includes closing direction that states: “Over the next four (4) weeks, the patient may gradually increase their activity as tolerated to usual activities. If the patient is unable to tolerate the activities as written above, or has not returned to usual activities within four weeks, the employer, insurer, or patient should contact the provider for further guidance.”</p> <p>CDS tool also includes a box that PCP can check to indicate that the activity limitation is permanent, thereby eliminating the need to recreate the activity prescription.</p>
7	Discuss Activity Prescription with Patient Patient reports that he has spoken to his supervisor and that person has requested the patient provide a note (Activity Prescription) from his doctor explaining what work activities the patient can and cannot do with this	<p>Reviewing the Activity Prescription with patient ought to result in a discussion of whether the prescription will restrict the patient from performing regular duties and elicit enough information to adjust the Activity Prescription accordingly.</p> <p>PCP discuss Activity Prescription with patient to assure that patient:</p> <ul style="list-style-type: none"> • understands the prescription; and

	condition and while on this medication and for how long.	<ul style="list-style-type: none"> • has an opportunity request modification of prescription to accommodate his/her circumstances. • During discussion, PCP may also overwrite machine recommended restrictions based on review of functional limitations with patient by interview with or without the use of a Functional Limitations questionnaire as per Step 1. <p>In addition to generating a detailed Activity Prescription for the patient (which can be shared with the employer or other stakeholder), the CDS tool generates a patient education brochure which discussed the value of returning to work and/or maintaining/increasing activity during recovery (see Appendix I).</p>
	Transmit to requesting stakeholders	In this case, in addition to providing to patient, it is often appropriate to provide directly to requesting supervisor.

CASE #3 – A 35-year-old male was seen in the emergency room 1 week ago with acute low back and leg pain after sliding into first base at a softball game. He says that his x-ray was negative and was told that he had a back strain. Patient sent home with ibuprofen and instructions to take it easy for a week (has not been to work) and see his PCP for follow-up if necessary. **HISTORY:** Patient not much improved better, although he can sit, stand, and walk for short periods of time if he changes his position frequently. His pain increases significantly if he bends over or tries to pick anything up. He can drive short distances. Past medical history is negative. **PHYSICAL EXAMINATION:** Patient uncomfortable sitting, has limited range of motion in all directions due to pain, and has lumbosacral tenderness on palpation. Neurological exam shows slight decrease in sensation in the right lateral leg, but no weakness and reflexes are normal. Physician “clicks” on Red Flag Tab to view list and to eliminate any potential serious disorders. No red flags found. To determine if the patient’s symptoms can be considered “functional limitations,” the PCP clicks on/hovers over “Functional Limitations” tab which brings up a table providing examples of common limitations such as difficulty bending, kneeling, climbing, or lifting. (Alternatively, the PCP can identify the functional limitations later in process.) **DIAGNOSIS:** Severe lumbar strain with functional limitations. **ACTIVITY PRESCRIPTION TRIGGER:** PCP has completed history and physical and enters a diagnosis of severe lumbar strain in the EHR. **Diagnosis automatically triggers an Activity Modifications treatment template** and PCP selects level of physical restrictions based on functional limitations. Physician selects “Sedentary” and the system then auto populates a list of restrictions (Activity Prescription) and allows access to disability duration guides. Physician discusses Activity Prescription functional limitations with patient. Patient is employed as a groundskeeper at a local hospital and his job involves planting, mowing, and moving heavy bags. As he has been out of work for a week, he **requests a doctor’s note to so that he can apply for short-term disability** (presents PCP with short-term disability form for physician’s signature). **PCP identifies the functional limitations and discusses with the patient. The PCP signs form and adds note to see attached Activity Prescription.** By “clicking” on **Disability Duration, an activity prescription/disability duration letter is generated for the employer, AND the prescription is accompanied by a printed patient education brochure** regarding the value of return to work and maintaining and increasing activity during recovery.

Step	Process/Work Flow	Action/Outcome
1	Patient presents with low back pain (LBP) with or without leg pain	Patient could complete a questionnaire at check-in which asks how condition that is the reason for the visit is affecting his activities of daily life (see comments on other scenarios).
2	PCP takes detailed history to evaluate LBP, including previous episodes and/or injuries	Enter patient history and chief complaint into EMR.
3	Conduct physical examination:	Enter findings into EMR.

	<p>Rule out red flags</p> <p>Note functional limitations if any and enter into EMR either at this point in the examination or in Step 7.</p>	<p>PCP accesses information (e.g., button/hover-activated link) that provides summary of red flags in back pain</p> <p>PCP accesses “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting. Or, this assessment occurs only after patient requests a note.</p>
4	PCP completes history/exam and proceeds to completing order set	Opens order set
Activity Prescription Trigger		
5	Patient requests a note for work.	Entering Dx activates Activity Prescription Tool tab NOW.
Activity Prescription		
6	Generate Activity Prescription	<p>Activity Prescription report specifies permitted activities and provides a specific date for elimination of activity restrictions that will limit medically unnecessary restrictions or trigger more contact with the provider if the patient wants to extend restrictions and disability beyond CDS date for return to full duty.</p> <p>Activity prescription includes closing direction that states: “Over the next four (4) weeks, the patient may gradually increase their activity as tolerated to usual activities. If the patient is unable to tolerate the activities as written above, or has not returned to usual activities within four weeks, the employer, insurer, or patient should contact the provider for further guidance.”</p> <p>CDS tool also includes a box that PCP can check to indicate that the activity limitation is permanent, thereby eliminating the need to recreate the activity prescription.</p>
7	<p>Discuss Activity Prescription with Patient</p> <p>Patient requests a doctor’s note to so that he can apply for short-term disability (presents PCP with short-term disability form for physician’s signature).</p>	<p>PCP identifies/discusses functional limitations now that patient has requested the note (alternatively, see Step 3) and reviews Activity Prescription with patient to assure that patient:</p> <ul style="list-style-type: none"> • understands the prescription; and • has an opportunity request modification of prescription to accommodate his/her circumstances. <p>PCP signs disability form and adds note to “see attached Activity Prescription.” By “clicking” on Disability Duration, an activity prescription/disability duration letter is generated noting short-term disability. In addition to generating a detailed Activity Prescription for the patient (which can be shared with the employer or other stakeholder), the CDS tool generates a patient education brochure that discussed the value of returning to work and/or maintaining/increasing activity during recovery (see Appendix L).</p>
8	Transmit to stakeholders	In some cases, in addition to providing to patient, may send attached to the disability form directly to the insurer.

CASE #4 – A semi-retired self-employed 65-year-old male accountant who works out of his home was seen in the emergency room 1 week ago with acute low back and leg pain after slipping and falling at home. He says that his x-ray was negative and was told that he had a back strain. Patient sent home with ibuprofen and instructions to take it easy for a week and see his regular PCP for follow-up if necessary. **HISTORY:** Patient not much improved, although he can sit, stand, and walk for short periods of time if he changes his position frequently. His pain increases significantly if he bends over or tries to pick anything up. He can drive short distances. Past medical history is negative. **PHYSICAL EXAMINATION:** Patient uncomfortable sitting, has limited range of motion in all directions due to pain, and has lumbosacral tenderness on palpation. Neurological exam shows slight decrease in sensation in the right lateral leg, but no weakness, and reflexes are normal. No red flags found. **DIAGNOSIS:** Lumbar strain. **ACTIVITY PRESCRIPTION TRIGGER:** PCP has completed history and physical and now proceeds to completing the order set. **Patient asks about mobility limitations**, specifically if climbing stairs to second floor home office permissible. PCP discusses impact of functional limitations on patient’s activities of daily living. PCP activates Activity Prescription tab and selects an activity level and the system auto populates a list of restrictions (Activity Prescription) which are reviewed with the patient. Patient also receives education brochure on benefits of physical activity/increasing function.

Step	Process/Work Flow	Action/Outcome
1	Patient presents to his regular PCP with low back pain (LBP) with or without leg pain	Reason for “special” visit (LBP) noted in record.
2	PCP takes history of injury/LBP	Enter patient history and chief complaint into EMR.
3	Conduct physical examination: Rule out red flags Note functional limitations if any and enter into EMR	Enter findings into EMR. PCP accesses information (e.g., button/hover-activated link) that provides summary of red flags in back pain PCP accesses “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting. Or, this assessment occurs only after the patient requests a note.
4	PCP completes history/exam and proceeds to completing order set	Opens order set
Activity Prescription Trigger		
5	Patient asks about mobility limitations, specifically if climbing stairs to second floor home office is permissible. This request triggers PCP to generate activity prescription. Physician discusses impact of functional limitations on patient’s activities of daily living.	PCP activates separate Activity Prescription tab and selects an activity level and the system auto populates a list of restrictions (Activity Prescription) which are reviewed with the patient. During discussion, PCP may also overwrite machine recommended restrictions based on review of functional limitations with patient by interview with or without the use of a Functional Limitations questionnaire as per Step 1. Note: patient could complete a questionnaire at check-in which he is asked how the condition that is the reason for the visit is affecting his activities of daily life (see comments in other scenarios). Patient also receives education brochure on benefits of physical activity/increasing function.

Appendix H – GENERATING THE ACTIVITY PRESCRIPTION

ACTIVITY PRESCRIPTION

When an activity prescription is requested, the CDS tool allows the clinician to generate the prescription using a standard format. When activity prescriptions are not required, but the provider SHOULD write the activity prescription as the patient, an employer, or another stakeholder requests it, the CDS tool will allow timely provision of an activity prescription and support material. The CDS tool will improve the experiences of the provider, patient, and other stakeholders by allowing a well-considered prescription supported by the best available evidence, and structured in a concise form to be generated in a timely fashion. Failure to generate an activity prescription in a timely fashion may degrade the patient experience, displease stakeholders, impact patient benefits or employment, or in iatrogenic disability or attempts by the patient to perform activity beyond his or her abilities.

Step	Process/Work Flow	Action/Outcome
1	Patient presents with low back pain (LBP) with or without leg pain	Patient could complete a questionnaire at check-in which asks how condition that is the reason for the visit is affecting his/her activities of daily life.
2	PCP takes detailed history to evaluate LBP, including previous episodes and/or injuries	Enter patient history and chief complaint into EMR.
3	Conduct physical examination: <ul style="list-style-type: none"> a. Rule out red flags b. Note functional limitations if any and enter into EMR 	Enter findings into EMR. PCP accesses information (e.g., button/hover-activated link) that provides summary of red flags in back pain PCP accesses “functional limitations” table via link in EMR. Table provides examples of common limitations, e.g., difficulty bending, kneeling, climbing, or lifting.
Activity Prescription Triggers		
4a or	Assessment of function limitations leads to discussion of impact on work/life activities; patient asks for Activity Prescription/note for employer	PCP activates Activity Prescription Tool tab NOW. Go to Step 6 . . . <i>Or</i>
4b or	Diagnosis based on history and physical examination entered in EMR	Entering Dx activates Activity Prescription Tool tab NOW. <i>Or</i>
4c	Prescribe Treatment Plan/Write Order Set <ul style="list-style-type: none"> a. medications b. other nonsurgical treatment (e.g., exercise, heat, etc.) 	Activity Prescription activated as part of the order set. PCP prescribes treatment – e.g., medication prescription activates Activity Prescription Tool NOW to generate Activity Prescription report.
Activity Prescription		
5	Generate Activity Prescription	Activity Prescription report tab can open in one of the three scenarios discussed above in Step 4. Report specifies permitted activities and provides a specific date for elimination of activity restrictions that will limit medically unnecessary restrictions or trigger more contact with the provider if the patient wants to extend restrictions and disability beyond CDS date for return to full duty. Activity prescription includes closing direction that states: “Over the next four (4) weeks, the patient may gradually increase their activity as tolerated to usual activities. If the patient is unable to tolerate the activities as written above, or

		<p>has not returned to usual activities within four weeks, the employer, insurer, or patient should contact the provider for further guidance.”</p> <p>CDS tool also includes a box that PCP can check to indicate that the activity limitation is permanent, thereby eliminating the need to recreate the activity prescription.</p>
6	Discuss Activity Prescription with Patient (if not already done in Step 4a)	<p>Reviewing the Activity Prescription with patient ought to result in a discussion of whether the prescription will restrict the patient from performing regular duties and elicit enough information to adjust the Activity Prescription accordingly.</p> <p>PCP discuss Activity Prescription with patient to assure that patient:</p> <ul style="list-style-type: none"> • understands the prescription; and • has an opportunity request modification of prescription to accommodate his/her circumstances. <p>In addition to generating a detailed Activity Prescription for the patient (which can be shared with the employer or other stakeholder), the CDS tool generates a patient education brochure which discussed the value of returning to work and/or maintaining/increasing activity during recovery (see Appendix I).</p>
7	Follow-up	<p>The CDS tool will not to automatically specify return visits to the PCP for purpose of revising activity prescription because:</p> <ul style="list-style-type: none"> • return visits add to the cost of care and patients without insurance or with high deductibles are unlikely to want to return for revisions unless the revisions are required by an employer or insurer; and • the vast majority of patients with LBP with or without leg pain will naturally resume normal activities within 4 weeks of evaluation. <p>However, patients who do not recover by the date specified for elimination of activity restrictions by the CDS tool should be reassessed.</p>

Appendix I – Example of a CDS Tool for Generating Activity Prescriptions for LBP

The computer-aided assistance is the 4 levels of recommended activity available for the physician. This will auto populate by clicking the activity level the physician feels is most appropriate. By auto populating the form, the Work/Activity recommendations will be transferred to the Work/Activity form for the patient. The 4 levels are generic enough they will work in the majority of conditions. Editing can occur with specific conditions or exceptions.

Embedded is recommended maximal days off work.

When the diagnosis is entered into the EHR, the diagnosis is automatically uploaded to a Work/Activity Slip.

The screenshot displays a web-based form for generating activity prescriptions. On the left is a sidebar with navigation buttons: Visit Information, Work, School, Caregiver, PE Class, Sports or Exercise, Jury Duty, FMLA, Reportable Diseases, DMV Reports, and Other. Below these are buttons for 'Go to Preview, Print, & Sign' and 'Clear Data'. A note at the bottom of the sidebar states: 'Inactive buttons are not available. They will be in a future release.'

The main form area contains several sections:

- Visit Verification:** Includes a 'Workers' Comp Visit?' checkbox (checked) with 'No' and 'Yes' options. Below it is a field for 'Onset of Medical Condition/Injury' with a warning icon and a calendar icon.
- Next Appointment:** Features a row of buttons for appointment intervals: 1d, 2d, 3d, 1w, 2w, 3w, 6w, 1m, 2m, 3m, 6m. Below this is a checkbox for 'No follow-up appointment needed at this time' and a field for 'Other:' with a calendar icon.
- Department Address:** A section with a search bar and navigation icons, currently displaying a dark redacted area.
- CA EDD/SDI:** A section with two questions and 'No'/'Yes' checkboxes:
 - Question 1: 'Are you completing this form for the sole purpose of referral/recommendation to an alcoholic recovery home or drug-free residential facility as indicated by the patient in question 23?' (Yes checked)
 - Question 2: 'Would disclosure of this information to your patient be medically or psychologically detrimental?' (Yes checked)
- Additional Comments:** A large text area with a toolbar for search, undo, redo, help, add, print, and navigation.

Dx: Lumbar strain, in this case very severe.
Click sedentary work and it will auto populate the work note.

Sedentary
 Select to populate Sedentary restrictions. No lifting, pushing, or pulling over 10 pounds, twisting of the spine/torso, climbing ladders, or work at heights. No more than occasional (< 25% of the time) bending over at the waist, walking or standing.

Off Work Rx

From:

Through: AM Only PM Only

Reason:

[Disability Duration Guide](#) **MMN Off: 2 Days**

Enc Dx - Select max of 4 **F/U Dx?** **MMN Off**

LUMBAR MUSCLE STRAIN 2 Days

Mobility Needs

Cane Crutch(es) Cam walker

Walker Cast Wheelchair

Splint Sling Brace

Other Needs / Restrictions

abc ↩ ↶ ? ? +

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Modified Rx - Applies to Work and

From: 11/6/2014 **22 Days(s)**

Through: 11/27/2014

Permanent Restrictions

Sedentary
 Light
 Light-Medium
 Medium

Print full duty date: 11/28/2014
 Full work duty today

Lift/Carry/Push/Pull **Hours of Work Per Day**

Pounds: Min/Hr: Limit work to hours/workday

Modified Activities	Copy Previous Restrictions	Clear Restrictions		
Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand				
Walk				
Sit				
Drive				
Bend at the waist				
Torso/spine twist				
Squat/kneel, knee bending				
Climb stairs				
Climb ladders				
Use of scaffolds/work at height				
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

After clicking, this will be auto populated format

1d 2d 3d 1w 2w 3w 1m

Off Work Rx 1d 2d 3d 1w 2w 3w 4w

From:

Through: AM Only PM Only

Reason:

[Disability Duration Guide](#) **MMN Off: 2 Days**

Enc Dx - Select max of 4 **F/U Dx?** **MMN Off**

LUMBAR MUSCLE STRAIN 2 Days

Mobility Needs

Cane Crutch(es) Can walker
 Walker Cast Wheelchair
 Splint Sling Brace

Other Needs / Restrictions

abc

Modified Rx - Applies to Work and Home

From: 11/6/2014 **22 Day(s)**

Through: 11/27/2014

Permanent Restrictions

Lift/Carry/Push/Pull

Pounds: 10 Min/Hr:

Hours of Work Per Day

Limit work to hours/workday

Modified Activities **Copy Previous Restrictions** **Clear Restrictions**

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand	Occasionally (up			
Walk	Occasionally (up			
Sit				
Drive				
Bend at the waist	Occasionally (up			
Torso/spine twist	Not at all			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders	Not at all			
Use of scaffolds/work at height	Not at all			
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

Full Work Duty

Print full duty date: 11/28/2014

Full work duty today

This is the print out for the patient.

Encounter Date: 11/13/2014

Please see below for this health care provider's directives and information relating to this encounter.

Work Status Report

Date onset of condition:

Next Appointment Date:

DIAGNOSIS: LUMBAR MUSCLE STRAIN

Modified Activity (Applies to work and home)

This patient is placed on modified activity at work and at home from 11/6/2014 through 11/27/2014.

If modified activity is not accommodated by the employer then this patient is considered temporarily and totally disabled from their regular work for the designated time and a separate off work order is not required.

This patient's activity is modified as follows:

- Stand: Occasionally (up to 25% of shift).
- Walk: Occasionally (up to 25% of shift).
- Bend at the waist: Occasionally (up to 25% of shift).
- Torso/spine twist: Not at all.
- Climb ladders: Not at all.
- Use of scaffolds/work at height: Not at all.
- Lift/carry/push/pull no more than 10 pounds.

Full Duty:

The patient was evaluated and deemed able to return to work at full capacity on 11/28/2014

Less severe injury, light work recommended, has more activity recommendation.

Off Work Rx

From:

Through: AM Only PM Only

Reason:

[Disability Duration Guide](#)

Enc Dx - Select max of 4 F/U Dx? MMN Off

LUMBAR MUSCLE STRAIN 2 Days

Modified Rx - Applies to Work at

From: 11/13/2014

Through: 11/27/2014

Permanent Restrictions

Lift/Carry/Push/Pull

Pounds: Min/Hr:

Hours of Work Per Day

Limit work to hours/workday

Light

Select to populate Light restrictions. No lifting, pushing, or pulling over 20 pounds, ladder climbing, or work at heights. No more than occasional (< 25% of the time) bending over at the waist or twisting of the spine/torso. No more than intermittent (<50% of the time) walking or standing.

Mobility Needs

Cane Crutch(es) Can walker

Walker Cast Wheelchair

Splint Sling Brace

Modified Activities

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand	Intermittently (up			
Walk	Intermittently (up			
Sit				
Drive				
Bend at the waist	Occasionally (up			
Torso/spine twist	Occasionally (up			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders	Not at all			
Use of scaffolds/work at height	Not at all			
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

Other Needs / Restrictions

Even less restrictions recommended.

Off Work Rx

From:

Through: AM Only PM Only

Reason:

[Disability Duration Guide](#) MMN Off

Enc Dx - Select max of 4: F/U Dx? MMN Off

LUMBAR MUSCLE STRAIN 2 Days

Mobility Needs

Cane Crutch(es) Cam walker
 Walker Cast Wheelchair
 Splint Sling Brace

Other Needs / Restrictions

Modified Rx - Applies to Work and Home

From: 11/13/2014

Through: 11/27/2014

Permanent Restrictions

Lift/Carry/Push/Pull

Pounds: 30 Min/Hr:

Hours of Work Per Day

Limit work to hours/workday

Modified Activities Copy Previous Restrictions Clear Restrictions

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand	Frequently (up to 30%)			
Walk	Frequently (up to 30%)			
Sit				
Drive				
Bend at the waist	Intermittently (up to 50%)			
Torso/spine twist	Intermittently (up to 50%)			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders				
Use of scaffolds/work at height				
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

Light-Medium

Select to populate Light-Medium restrictions. No lifting, pushing, or pulling over 30 pounds. No more than intermittent (<50% of the time) bending over at the waist or twisting of the spine/torso. No more than frequent (<75% of the time) walking or standing.

Full work duty today

Less restrictive recommendations/restrictions

Off Work Rx

From:

Through: AM Only PM Only

Reason:

[Disability Duration Guide](#) MMN Off

Enc Dx - Select max of 4 F/U Dx? MMN Off

LUMBAR MUSCLE STRAIN 2 Days

Mobility Needs

Cane Crutch(es) Cam walker
 Walker Cast Wheelchair
 Splint Sling Brace

Other Needs / Restrictions

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Modified Rx - Applies to Work and Home

From: 11/13/2014 **15 D**

Through: 11/27/2014

Permanent Restrictions

Lift/Carry/Push/Pull

Pounds: 50 Min/Hr:

Hours of Work Per Day

Limit work to hours/workday

Modified Activities Copy Previous Restrictions Clear Restrictions

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand				
Walk				
Sit				
Drive				
Bend at the waist	Frequently (up to			
Torso/spine twist	Frequently (up to			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders				
Use of scaffolds/work at height				
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

Medium

Select to populate Medium restrictions. No lifting, pushing, or pulling over 50 pounds. No more than frequent (<75% of the time) bending over at the waist or twisting of the spine/torso.

Minimally Medically Necessary Guideline imbedded to return to sedentary activity – e.g., maximum total disability/time off

1d 2d 3d 1w 2w 3w 1m

Off Work Rx 1d 2d 3d 1w 2w 3w 4w **Modified Rx - Applies to Work and Home** **Full Work Duty**

From 11/13/2014 11/19/2014 8 Day(s)
 Through 11/19/2014
 Reason

MMN Off: 2 Days
 Minimum medically necessary guideline to return to sedentary activity level.

[Disability Duration Guide](#) **MMN Off: 2 Days**

Enc Dx - Select max of 4 **F/U Dx?** **MMN Off**

LUMBAR MUSCLE STRAIN 2 Days

Mobility Needs

Cane Crutch(es) Cam walker
 Walker Cast Wheelchair
 Splint Sling Brace

Other Needs / Restrictions

abc SmartPhrases

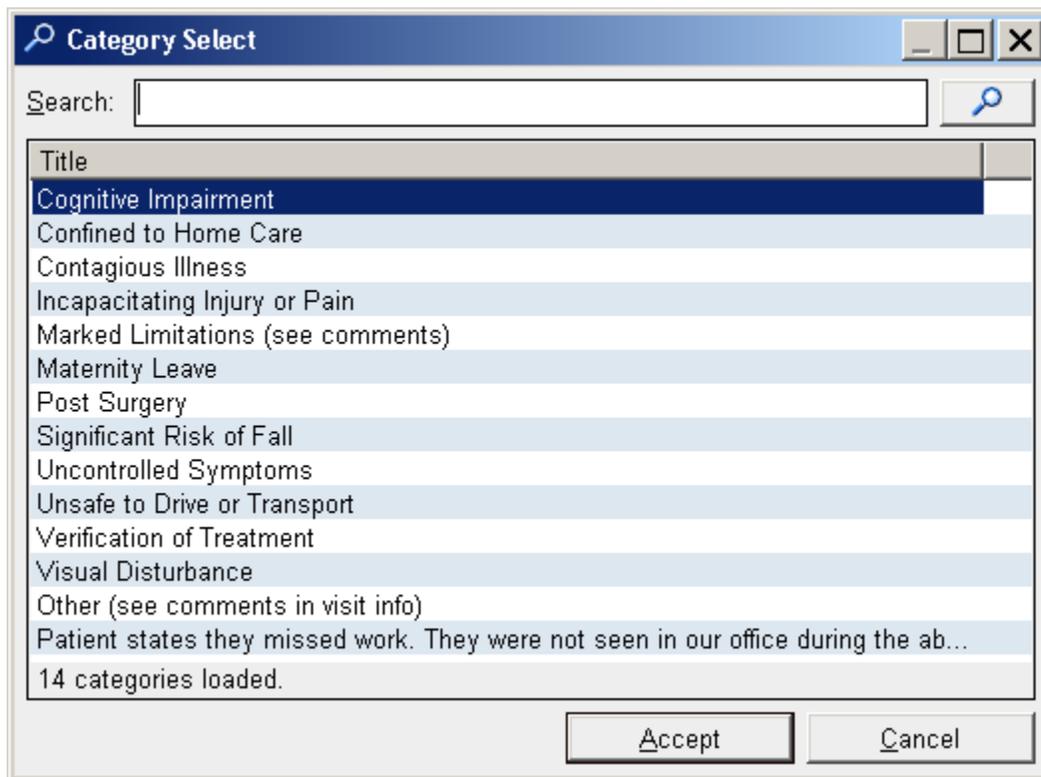
Lift/Carry/Push/Pull **Hours of Work Per Day**

Pounds: 50 Min/Hr: Limit work to hours/workday

Modified Activities **Copy Previous Restrictions** **Clear Restrictions**

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand				
Walk				
Sit				
Drive				
Bend at the waist	Frequently (up to			
Torso/spine twist	Frequently (up to			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders				
Use of scaffolds/work at height				
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

If time off recommended, forces one to select why as off work should be the exception.



The computer aided assistance is the 4 levels of recommended activity available for the physician that when used will auto-populate the Work/Activity form. The 4 levels are generic enough they will work in the majority of conditions. Editing can occur with specific conditions or exceptions. Embedded is recommended maximal days off work.

Appendix J – Kaiser-Permanente Clinical Decision Tool for Activity Prescriptions for Primary Care and Other Practice Environments with Sample Activity Prescription Sample Letters

Below are a figure with the current clinical decision support tool used in the electronic medical record system at Kaiser-Permanente for activity prescriptions for primary care and other practice environments and a sample activity prescription that uses the three-day disability duration as default.

Evidence for 3-day disability duration is based on Reed Guidelines and expert opinion/consensus panel opinion. Consensus on 3 days as per:

1. Reed Disability Duration guides
2. It is a sufficient amount of time for the vast majority of patients
3. It should accomplish the purpose of making the visit efficient for both the patient and the provider
4. Can always be downgraded to lesser duration (2, 1, or 0) if the person is willing

Electronic Medical Record Window Frame for Clinical Decision Support Tool

Activity	Frequency	Min/Hr	Hr/Day	Day/Wk
Stand	Intermittently (up			
Walk	Intermittently (up			
Sit				
Drive				
Bend at the waist	Occasionally (up			
Torso/spine twist	Occasionally (up			
Squat/kneel, knee bending				
Climb stairs				
Climb ladders	Not at all			
Use of scaffolds/work at height	Not at all			
Neck motions				
Reach above right shoulder				
Reach above left shoulder				
Keyboard/mouse use				
Repetitive right hand motions				
Repetitive left hand motions				
Gripping/grasping right hand				
Gripping/grasping left hand				

Sample Activity Prescription

This form contains your diagnosis.



Patient Name: 

Encounter Date: 9/16/2014

Please see below for this health care provider's directives and information relating to this encounter.

Work Status Report

Date onset of condition: 10/26/2014

Next Appointment Date: No follow-up appointment needed at this time

DIAGNOSIS: LUMBAR MUSCLE STRAIN

Modified Activity (Applies to work and home)

This patient is placed on modified activity at work and at home from 10/29/2014 through 11/12/2014.

If modified activity is not accommodated by the employer then this patient is considered temporarily and totally disabled from their regular work for the designated time and a separate off work order is not required.

This patient's activity is modified as follows:

- Stand: Intermittently (up to 50% of shift).
- Walk: Intermittently (up to 50% of shift).
- Bend at the waist: Occasionally (up to 25% of shift).
- Climb ladders: Not at all.
- Use of scaffolds/work at height: Not at all.
- Lift/carry/push/pull no more than 20 pounds.

Full Duty:

The patient was evaluated and deemed able to return to work at full capacity on 11/13/2014

This form has been electronically signed and authorized by  (M.D.)

This form contains your private health information that you may choose to release to another party; please review for accuracy.

Appendix K – Examples of Activity Prescriptions that Have Deficiencies

The following table contains examples of letter that are vague and have questions arising from the vagueness of the letters that may impact optimal return to or staying at work.

Letter Content	Questions Arising from Content
"John may return to work on light duty."	Problems with this letter: <ul style="list-style-type: none">• What is light duty?• When does light duty end?• On what day may John return?
"Please excuse John from work because of back pain."	Problems with this letter: <ul style="list-style-type: none">• When will John be able to return to work?• Might he be able to do alternate work while he recovers?

Appendix L – Education Brochure for Working Patients: Benefits of Returning to Work As Soon As Possible

This advice incorporates the SME groups' expertise on the important elements that should be provided to the patient.

The Benefits of Returning to Work As Soon As Possible

Considerable research has proven that for most people physical activity, including work, is central to a person's well-being and is beneficial in maintaining health. An important goal of your treatment will be to increase your ability to function so that you can fully participate in life activity as soon as possible – including work. We want to help you return to normal activities (including work) for several reasons:

- People who stay more active despite low back pain have better outcomes – regardless of pain level. Being inactive makes the problem worse, and patients also become even more unhappy and often depressed.
- Long periods away from work are associated with a 20% increased rate of mortality, and if you have been off work due to a disabling condition for more than 6 months, you have less than a 50% chance of ever getting back to work.
- Long-term disability also often leads to other aspects of health declining. At the same time, for a variety of reasons other family members' health is often detrimentally affected as well. Being off work tends to intensify, not diminish symptoms. It is generally in your best interest to stay at work or return to work as soon as possible. Avoidance of work tends to increase anxiety about the job, and risks of long-term unemployment and poverty. Time off may subject you to greater scrutiny by your employer and may jeopardize your job security.
- If your clinician documents that you can return to work with an activity restriction, it is your responsibility to share this with your employer and to participate in a good faith discussion about the accommodations that may or may not allow you to work. Ultimately, these decisions are between you and your employer.

The American Medical Association encourages physicians everywhere to advise their patients to return to work at the earliest date compatible with health and safety. The reason is that returning to work is good both for your physical, and also your mental and financial health. Therefore you are encouraged to live an active life both on and off the job.

Appendix M – Response to Reviews of Interim Knowledge Resource Report by Other SME Work Groups

RTW Panel: Formal Response to Asthma Group Critique – June 2015

A. Intro/Background

Paragraph 1 seems unnecessary.

Agreed. We will eliminate/merge into paragraph 2.

Since Kaiser already uses a very similar approach, why not save considerable effort/\$ and simply evaluate outcomes there?

Although based on an approach used by Kaiser, the RTW CDS is different in a number of important ways:

- It is not dependent on linking to a proprietary, costly disability data base.
- It is meant to provide an approach that can be scaled across the country in a short time frame.
- Generalizability is unknown.
- The Kaiser Permanente electronic system is an example of an assist device that has been implemented across a large physician community. This was meant to demonstrate that computer decision support for return-to-work issues is possible and is scalable across a network of over 10,000 physicians in all specialties. This was not meant to suggest that the program is the end product or the complete answer. Rather it was an example of what can be considered an early prototype to demonstrate the concept of return-to-work tools they can be further enhanced to assist physician's decision regarding return-to-work issues.

Also, this tool does not recreate what ACOEM has already done in its Practice Guidelines.

Should clarify throughout acute vs. chronic low back pain.

We chose acute low back pain because it is quite common and our interest was providing a tool to PREVENT disabling chronic back pain. We can edit the report to clarify – i.e., mention acute throughout, for example, in the introduction and scope, etc. “focus in non-specific ACUTE low back pain.” That said, this CDS could later be easily expanded to include chronic back pain and other conditions.

B. Scope/Objective

Should NIOSH use limited resources on this versus work-related issues no one else is devoting resources to, has expertise to address?

Because back pain is so prevalent and is associated with so much disability, from a Total Worker Health perspective, it is exactly to the point that workers bring non-work-related medical problems to work that can profoundly impact their ability to work productively unless the problem is managed well. Also, although there is a lot of research on and clinical interventions for back pain, there are few clinical interventions available to primary care providers to support the prevention and management of low back pain.

Regarding acute vs. chronic, see response above under Introduction

C. Goals/Purpose

Extremely broad (e.g., reduce economic burden, encourage PCPs to consider occupation). Therefore, not measurable.

Although these goals are broad, they are measurable in a variety of ways. In fact, these goals would seem to provide more, not fewer, opportunities, to measure process/outcomes. Some examples of outcomes that could be measured and are amenable to experiment comparing practices/providers using vs. not using the tool are as follows:

Goals/purpose of providing a clinical decision support tool/activity prescription are to:

- **Assist** primary care providers prevent medically unnecessary disability;
 - **Measure: days out of work are routinely measured**
- **Improve** the quality of medical care by addressing a key aspect of the patient’s quality of life (physical and mental health status, economic, social), functional status;
 - **Measure: There are many easily measured of quality of life and function besides disability days, for example: the PROMIS 10; Oswestry Disability Index**
- **Make** a normal provider task easier by facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP;
 - **Measure: time for providers to complete forms using the CDS tool vs standard paperwork; audit of time from receipt of patient/3rd party request for activity prescription to completion by provider**
- **Reduce** the economic burden of disability on society;
 - **Measure: number of disability days times average wage**
- **Stimulate** consideration for the role of occupation and occupational demands on patients and strive to increase clinicians’ interest in capturing occupational health data in their electronic health records (EHRs).
 - **Measure: survey of providers using the CDS re: attitude about utility of occupational health data**

D. Key Action Statement

Is the default recommendation of 4 weeks partial work disability supportable? Will this actually increase total disability days?

The CDS is based on evidence that the majority of people with acute back pain return to full function in 4 weeks or less. For simplicity, it relies on the fact that *most* people want to return to full activity as soon as they feel able. The prescription does not proscribe full activity before 4 weeks; rather it prompts further investigation if someone hasn’t returned by then. It *is possible* that patients will have more disability; this needs to be studied. Our hypothesis is that by capping disability at 4 weeks and encouraging a graduated increase in activity during that time frame, we will prevent prolonged disability.

Recommendation appendix B says to use DOL Dictionary of Job Titles as basis of activity prescriptions. I don’t think this has been updated since 1991.

The DOL DOT division of the spectrum of job demands from sedentary to very heavy remains in common use.

Should this be vetted with the EEOC to be sure that use of a default value of either four weeks or drawn from a table of average lost work days be automatically applied to the class of LBP patients?

Again, the key point is that the 4 week time frame is a disability cap that is meant to trigger additional investigation. Patients can return to full duty before that time if able to do so. Also, the activity prescription is being written by the patient’s PCP. It is the employer who is obligated to provide accommodations per the ADA.

“PCP accesses functional limitations” and generates report. How does PCP access limitations?

We answered this question in addressing a previous critique as follows:

Patient Questionnaire on Functional Limitations

Q. Will this information be recorded electronically (i.e., at registration, via a tablet, etc.).

Response:

Ideally yes, all information should be entered by the patient with an interface directly into the medical record. However, for those who are not fluent in English or who are functionally illiterate, consideration must be made as in some communities this will represent a substantial portion of the population.

There are 2 options based on practice preference:

- **Option 1:** Collect this information by paper questionnaire or by tablet in the waiting room. Ideally, this information would be imported into the EMR. This is easy in an EMR such as Epic. Alternatively, a medical assistant or administrative assistant could input into a template in the record as part of the initial note.
- **Option 2:** Postpone any discussion of functional limitations until a patient or other stakeholder requests an activity prescription. In this case, we suggest that while on the activity prescription page, the provider be able to mouse over a link to a table with examples of functional limitations that can be discussed with the patient. In this case, the activity prescription itself becomes the sole documentation of functional limitations.

Q. What are the questions that will be asked?

Response:

A list of questions regarding functional limitations is attached in different formats (see Appendices A, B, & C).

Note: patient responses to questions regarding functional limitations should **NOT** be used to autofill the activity prescription, but rather should inform the discussion between provider and patient as the provider is finalizing the prescription.

Impact of restrictions on person's job warrants more attention – if no light duty available worker could get let go – no job.

This should be part of the discussion that occurs between the PCP and patient as the PCP discusses the activity prescription with the patient. In spite of legal protections such as the FMLA and ADA, there is always a risk that a patient may lose his/her job if he/she cannot perform all duties in a standard way, but by returning a person to regular work as soon as it is tolerated, the risk of job loss is decreased.

Do primary care docs need more education re work/modified duty? Some jobs – light/modified duty not available and/or employer doesn't want to accommodate.

We are trying to be realistic; educating primary care doctors about occupational health principles and about how to take an occupational history has not been effective over many decades.

"Discuss the impact" seems a little vague. Would give the PCP specific questions that could help in "discussing the impact"?

We chose not to be too specific given that the activity prescription is meant to be useful for non-occupational scenarios such as participation in sports or self-directed activities at home or in the community. Whether it will be necessary to provide PCPs with domains for discussion, e.g., work, play, hobbies, activities of daily living, etc., remains to be seen after the tool is tested. Our thought was that the patient would, without too much prompting, indicate those areas of her/his life that are affected by the pain.

However, we will consider adding the following to the tool to assist the PCP in discussing the impact:

“Advice to Patients” (as the contents of a computer link or hover feature):

Counseling for Patients with Acute Back Pain:

Most episodes of back pain resolve by themselves within weeks, sometimes within days. X-rays and other diagnostic studies usually are unrevealing and do not change the treatment approach. In most cases, even when diagnostic studies are performed, there is no reliable diagnosis to explain back pain. The best treatment includes you (the patient) maintaining your normal activities as well as you can; avoiding bed rest, which only weakens you and makes you stiffer; and taking non-steroidal anti-inflammatory drugs (like ibuprofen). Lightweight activity is better for the back than no activity. Applying warm or cold packs may be helpful. Please see the “Patient Education Brochure: Benefits of Returning to Work As Soon As Possible” for more information.

E. Evidence

Most important recommendation that needs support/justification is the default activity prescription for a month (or less if improved). The 2 references cited refer to acute onset low back pain, one acute onset work-related low back pain. However this CDS excludes work-related back pain. (The main justification is that the vast majority of patients with LBP will resume normal activities within 4 weeks. This statement should be better referenced.

Agreed, we will supply the reference – Reed’s MDGuidelines.

Have generated reports been field tested?

Activity prescriptions have been tested and used by Kaiser.

I don’t understand what “prima facie” evidence is. “Prima facie” evidence is a legal term. Needs clarification.

The point is that it is a fact that patients and 3rd parties request activity prescriptions.

The “>250 articles” reviewed are not referenced. Did the committee grade each article?

We did not grade each article. Our effort was not meant to recreate the work done by various organizations’ guideline committees. Nor did NIOSH instruct us to conduct grading.

GENERAL QUESTIONS

RETURN TO WORK

Still a little uncertain as to how the PCP is to discuss the impact of the functional limitations

Agree that we might want to add more about how to discuss activity limitations, but am not sure what’s going to be most useful for PCP’s. See previous discussion under D – “Advice to Patients” (as the contents of a computer link or hover feature).

Lengthy

Can’t see how we could meet NIOSH’s requirements and shorten this significantly, although it does become long as a result. Document length separate for tool. Tool is concise and will make PCP’s job easier.

Appendix M – Response to Reviews of Interim Knowledge Resource Report by Other SME Work Groups

Return to Work CDS Decision Logic Response to Diabetes Panel – March 2015

Questions/Comments

1. Patient Questionnaire on Functional Limitations

Q. Will this information be recorded electronically (i.e., at registration, via a tablet, etc.).

Response:

Ideally yes, all information should be entered by the patient with an interface directly into the medical record. However considerations for those who do not have fluency in English, or are functionally illiterate, consideration must be made as in some communities this will represent a substantial portion of the population.

There are 2 options based on practice preference:

- **Option 1:** Collect this information by paper questionnaire or by tablet in the waiting room. Ideally, this information would be imported into the EMR. This is easy in an EMR such as Epic. Alternatively, a medical assistant or administrative assistant could input into a template in the record as part of the initial note.
- **Option 2:** Postpone any discussion of functional limitations until a patient or other stakeholder requests an activity prescription. In this case, we suggest that while on the activity prescription page, the provider be able to mouse over a link to a table with examples of functional limitations that can be discussed with the patient. In this case, the activity prescription itself becomes the sole documentation of functional limitations.

Q. What are the questions that will be asked?

Response:

A list of questions regarding functional limitations is attached in different formats (see Appendices A, B, & C). Note: patient responses to questions regarding functional limitations should **NOT** be used to autofill the activity prescription, but rather should inform the discussion between provider and patient as the provider is finalizing the prescription.

2. Red Flags

Q. Will any information on the red flags assessment be recorded in the system or will “no red flags” be assumed?

Response:

The EMR CDS tool need not record red flags. It is assumed that the provider will screen for red flags as part of the routine medical assessment (driven by medical history). The tool should assume “no red flags.”

The Panel proposes to structure an EMR CDS tool to include an information control (such as a button or hover-activated link) that would provide a summary of red flags in back pain taken from the ACOEM *Occupational Medicine Practice Guidelines* LBP Chapter. The Panel decided not to require, as part of the CDS tool, that the PCP screen for red flags. This is in order to minimize intrusion of the tool. This approach is also justified as patients presenting with LBP and red flags are rare, and screening for red flags is not likely to have an impact on outcome.

3. Patient Request of Activity Prescription

Q. What will be the trigger for this (i.e., how will the system and/or PCP know the patient needs an activity prescription)?

Response:

The patient or another stakeholder will request one.

Q. Could this be determined through a question on the patient questionnaire?

Response:

Yes, if the option of asking a patient to complete a functional limitations questionnaire is used. However, another stakeholder may have requested an activity prescription, verbally or by requesting a form be completed.

4. Where will onset date and last date worked be captured? Should these fields be on the patient questionnaire?

Response:

See Appendix F of the Interim Report. This form can be modified to include these data elements in the top left corner in the box currently labelled as “Off Work Rx.” For initial visits, onset date should default to today’s date of visit and last date default to the day before. However, this information can be manually adjusted as necessary on the activity prescription form.

Regarding whether these fields should be on the patient questionnaire, if the option of using a patient questionnaire is used, these fields can be captured on this form/electronic template. If captured electronically, this data can autofill the appropriate fields on the activity prescription.

5. On page 3, it states “The PCP is unlikely to need to generate an activity prescription if the patient neither has functional limitations nor requests such a note, except in the case when a third party requests an activity prescription.”

Q. Will patient permission be needed to authorize this? If so, how will this authorization be acquired and recorded?

Response:

Yes, patient permission is needed. In many cases, the activity prescription will be handed directly to the patient, who then can choose whether to provide it to another party. In other cases, such as short-term disability or workers’ compensation, the provider will require a release, though usually this release is provided by this external stakeholder or is incorporated into the form requesting this information. Authorization is through the patient. If a third party is requesting the release or generation of this information, the patient needs to submit the request. This ensures all release forms are signed, and the patient is aware of the request. If authorization is required, this form should be scanned into the EMR.

6. Follow-up/Return Visit

Q. Regarding a return visit – could the decision logic/flow be streamlined and covered through a phone call?

Response:

Maybe. Sometimes. In certain scenarios the absence is brief, or the period of modified duty is brief, and a phone call “I’m OK now” permits the doctor/provider to sign a new note that full-duty return to work is now okay. Alternatively, sometimes the employer doesn’t even need a note permitting full duty, and the chart would only document a 3 day “light duty” note was written at the first visit.

In OTHER scenarios, the employee is off work (no modified duty available with this employer) or on modified duty for a long time. Disability insurance or employer-funded time-out-of-work means money is changing hands due to the back pain, and insurance/employer forms must be completed. This many times mandates ongoing evaluations (office visits).

Appendix N – Quality Measures/Outcomes

Scope/Objective

From a Total Worker Health perspective, back pain is extremely prevalent and is associated with a huge amount of work disability. Employees bring non-job-related medical problems to work and these problems can profoundly impact their ability to function productively unless the problem is managed well. Although there is considerable research on and clinical interventions for back pain, there are few clinical interventions available to primary care providers to support the prevention and management of low back pain, and associated work disability. And, preventing work disability is important for a clinical, public health, and societal standpoint – as prolonged work disability leads to poor health, negative economic consequences, and secondary impacts of income loss on health, self-esteem and well-being (see Waddell G, Burton AK, Kendal N. *Vocation Rehabilitation: What Works, For Whom, and When? Report for the Vocational Rehabilitation Task Group*). TSO: London. 2008. Available at: <http://www.kmgph.com/assets/hwwb-vocational-rehabilitation.pdf>).

The RTW Panel chose to focus on **acute** low back pain because it is quite common, and frequently associated with work disability that is often preventable. We hope to provide a clinical decision support (CDS) tool to treat low back pain at the **acute** stage and PREVENT it from becoming disabling **chronic** back pain. That said, this CDS could later be easily expanded to include chronic back pain and other conditions.

Goals/Purpose

Goals/purpose of providing a clinical decision support tool/activity prescription are to:

- assist primary care providers to prevent medically unnecessary disability;
- improve the quality of medical care by more effectively addressing a key aspect of the patient’s quality of life (physical and mental health status, economic, social), functional status;
- make a provider task easier by facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP;
- reduce the economic burden of disability on society; and
- stimulate PCPs to begin to think more about the role of occupation and its demands on their patients’ health, and thereby increase their interest in capturing occupational health data in their electronic health records (EHRs).

These goals are measurable in a variety of ways. Some examples of outcomes that can be measured and are amenable to experiment comparing practices/providers using vs. not using the tool are as follows:

- **Assist** primary care providers’ effectiveness in preventing unnecessary work disability;

- **Measure: days out of work prescribed by providers**

- **Measure: prescribed incidence and duration of disability within 30 days**

- **Measure: follow trends of total disability days available from some state data warehouses**

We found that some states are collecting out-of-work data which potentially could be used to track trends in disability days. The following are existing systems for tracking out-of-work data:

New Jersey has mandatory state temporary work disability insurance (for all employees) available at http://lwd.dol.state.nj.us/labor/forms_pdfs/tdi/WPR-117.pdf. Temporary disability forms (available at http://lwd.dol.state.nj.us/labor/forms_pdfs/tdi/WDS1.pdf) include questions on – “What was the first day you were unable to work due to present disability: (Include Saturday, Sunday, or Holiday) Do not list future dates.” And, “If you have recovered or returned to work from this disability, list date: (Do not use dates in the future).”

New Hampshire has a mandatory reporting form for work-related injuries that all physicians must use. Somewhat similar in intent to what we are trying to accomplish, it is available at:

<http://www.nh.gov/labor/documents/medical-forms.pdf>.

Appendix N – Quality Measures/Outcomes, continued

Another source of data for a more long-term study is quarterly earnings from unemployment insurance; in many states, this data enables researchers to see long-term impact on earnings. For an example of this type of investigation, see https://www.dir.ca.gov/chswc/Reports/2014/Earnings_Losses_2014.pdf.

- **Improve** the quality of medical care by addressing a key aspect of the patient’s quality of life (physical and mental health status, economic, social), functional status using patient reported outcomes;
 - **Measure: There are many brief questionnaires that assess quality of life and function; for example, the PROMIS 10; Oswestry Disability Index.**

Functional outcomes: A search of AHRQ for back pain found that the most common tool cited is the Oswestry Disability Index (ODI), a patient-reported outcome which is a commonly used tool in research and specialty clinics for quantifying functional status of LPB. However, it would require a separate survey than those usually deployed by PCPs and would add to patient survey burden. While many PCPs are starting to incorporate patient surveys routinely into practice given the advent of EHRs with this ability, once built into the system, the survey can be triggered by the chief complaint and/or scheduler. It therefore seems feasible. The alternative might be to go with PROMIS 10 which is used widely by PCPs who are trying to measure any type of outcomes and would not require building a new questionnaire in the dictionary.

ODI – pros: it is short (10 questions) questionnaire, widely used and functionally based; **cons:** it is an additional questionnaire to be added to our tool; it does not objectively measure time out of work; it is not strongly correlated with disability.

PROMIS 10 (the Patient Reported Outcome Measurement Information System) – **pros:** NIH initiative widely used and easily accessible (www.nihpromis.org) also in Spanish and other languages; commonly used in primary care; **cons:** it does not specifically query the patient about time out of work; it adds to patient survey burden; it is patient reported.

A review of **National Quality Forum (NQF)** found that the ODI is the only non-proprietary outcome measure of functional status for patients with lumbar impairments endorsed by NQF.

Canada’s Institute for Work & Health (IHW) webinar held April 28, 2015, on “A scoping review of Clinical Decision Support tools for managing disabling MSDs” (<http://www.iwh.on.ca/plenaries/2015-apr-28>) reviewed the PRICE survey for patients with back pain which addresses red flags as does our tool. However, PRICE consists of 46-questions and takes approximately 5-10 minutes to complete – additional patient burden These support tools do not specifically provide guidance for writing work prescriptions, rather they guide clinical care.

- **Make** a normal provider task easier by facilitating the creation and communication of an activity prescription for which there is already a social, legal, and patient expectation of the PCP;
 - **Measure: time for providers to complete forms using the CDS tool vs standard paperwork; audit of time from receipt of patient/3rd party request for activity prescription to completion by provider; count of requests for providers using CDS tool vs. standard paperwork.**
 - **Measure: survey of provider/clinic staff experience with tool.**
- **Reduce** the economic burden of disability on society;
 - **Measure: number of disability days times average wage.**
- **Stimulate** PCPs to begin to think about the role of occupation and its demands on their patients and thereby increase their interest in capturing occupational health data in their electronic health records (EHRs).
 - **Measure: survey of providers using the CDS re: attitude about utility of occupational health data.**

Recommended Quality Measures

Based on conversations with NIOSH personnel, we understand that the measures chosen should not be for research purposes and/or required substantial resources. Therefore of the options we reviewed, we suggest that the following measures could be collected without significant burden to either practices, providers, staff, or patients:

- **Measure: days out of work prescribed by providers**
This should be a report that could be easily extracted from the practice electronic health record.
- **Measure: prescribed incidence and duration of recurrent disability within 30 days**
This should be a report that could be easily extracted from the practice electronic health record.
- **Measure: time for providers to complete forms using the CDS tool vs standard paperwork.**
This can be collected by survey or time/activity audit
- **Measure: audit of time from receipt of patient/3rd party request for activity prescription to completion by provider**
- **Measure: survey of provider and clinic administrative staff experience with tool regarding process improvements – number of employers/WC insurer complaints, record requests, phone calls related to activity prescription, etc.**

Appendix O – Response to the Clinic Visit Report

In reviewing the report, the RTW Panel did not find too much to respond to as many of the issues raised by the clinic visits are already discussed in the actual report (the respondents were not asked to read the report). The Panel went through the list of issues and addressed each of the main issues raised:

Don't give providers more work to do

Response: Our tool is meant to decrease the burden on providers

Work sensitivity – work is a sensitive topic

Response: This is true, but so are other medical/social issues)

Providers need help in determining functional assessments

Response: This is true, but again that is the point of the tool ... 90% of the time it should work without need for functional assessments and job descriptions)

The Panel will add to the tool (Appendix D) additional information to assist PCPs choose the correct activity level.

Alert fatigue

Response: Again, this is true, but not sure what we can do about this (per NIOSH, this doesn't apply to what we are trying to accomplish)

Patient survey burden

Response: We chose not to include a formal survey of functional limitations, other than asking the patient if his/her activities are impacted, or a quality measure, such as ODI which if used would add an additional burden. Alternatively PROMIS 10 or a similar tool already in use by many PCPs could be employed).

Return To Work CDS Decision Logic Flowchart

