**ONLINE SUPPLEMENT**

## Identifying and engaging patients in general medical settings

Screening and brief intervention in general medical settings has been found to reduce alcohol use and hospital utilization (1), injuries (2), driving under the influence of alcohol (3), and mortality (4). However, the efficacy of screening and brief intervention has not been consistent across research studies. Outcomes vary by substance used, setting, severity, population, and patient readiness to change (5).

Many experimental studies have found that alcohol screening and brief intervention in primary care (6), emergency medicine departments (7, 8) and trauma centers (2, 3) reduce alcohol use among adults with unhealthy alcohol use (9). Studies in non-medical settings, including educational (10), social service (11), and criminal justice settings (11), have also found alcohol screening and brief intervention reduce alcohol use and related consequences. However, screening and brief intervention in inpatient hospital settings have yielded mixed results (6, 12), and a systematic review of randomized control trials (RCTs) of alcohol screening and brief intervention found that it was not efficacious for adult patients with very heavy use or dependence (13). A systematic review of seven RCTs of adolescent alcohol screening and brief intervention in acute care settings was inconclusive (14).

Drug use screening and brief intervention have not been endorsed widely. Early evidence suggested that screening for drug use may have efficacy in reducing drug use for adults and adolescents (15-19), but recent more robust data from two RCTs on drug screening and brief intervention in primary care found no effect on unhealthy drug use (20, 21).

Further, screening and brief intervention has not been consistently found to be effective after implementation in clinical practice (22). This may be because implementation is impacted by practice issues such as organizational climate (23). Referrals to specialty care are also challenging because general medical providers may be unaware of specialty addiction services and unable to communicate with specialty addiction providers due to the common separation of addiction and general medical care services and privacy regulations.

Emerging technologies, like computer-delivered brief interventions and smartphones (24-27), and integrated delivery settings like the medical home, present opportunities to improve identification of particular patient populations, patient engagement, and the delivery of substance use disorder interventions. Medications for opioid and alcohol use disorders have been recommended in general medical settings (28, 29) and, in the case of opioid pharmacotherapy, can facilitate treatment initiation and engagement in general medical (30) and specialty care settings (31, 32).

## Future of chronic disease management

Researchers and clinicians are increasingly recognizing that treatment of substance use disorders requires ongoing, patient-centered, and coordinated care (33-36). Chronic disease management of substance use disorders is based on the chronic care model (37) and has many theoretical advantages. The model recognizes the full range of substance use disorders, takes into account patient preference, integrates evidence-based practices, and uses clinical information systems to coordinate care. It has been effective for other chronic conditions such as diabetes (38, 39) and depression (40, 41).

Successful implementation of chronic disease management for substance use disorders requires innovations, advances, and reorganization, many of which are already underway (35, 36, 42). However, barriers that limit patient access and participation in addiction treatment still exist (43).

The chronic care model for substance use disorders has not been broadly tested. Only one RCT has implemented all six elements outlined in the chronic care model (44, 45). This study found that chronic care management was no more effective than standard primary care and referral in helping

patients reduce alcohol and drug use, although the chronic care model approach increased treatment utilization (45). However, patients who received care that was most consistent with the principles of chronic disease management in either the chronic care management condition or the standard primary care condition were more likely to be abstinent from drugs and heavy drinking and to have lower addiction severity (44). An RCT among homeless women with alcohol use problems also found chronic disease management was no more effective than treatment as usual, although women who received chronic care were more likely to utilize treatment services (46).

In contrast, many of the individual components of chronic disease management for substance use disorders have research support, such as co-location of services, use of evidence based practices, and care integration (35, 47). Integration of outpatient general medical care and specialty addiction services has been shown to increase abstinence and treatment utilization among patients with substance abuse-related general medical conditions (48), increase abstinence among alcohol dependent men (49), and reduce heavy drinking days (50).

Most physicians have not received adequate addiction medicine training, and this training gap must be addressed. Many physicians need, and some want, training in prescribing pharmacological treatments for substance use disorders (51). The effectiveness and cost-effectiveness of pharmacological treatment for alcohol and opioid use disorders is compelling (52-56); therefore, increasing prescribing in primary care is an important goal and was in fact achieved with the adoption of a chronic care model (57). Widespread implementation is possible (58) but will require training, shifts in attitudes, and institutional support (59-61).

Given that chronic disease management for substance use disorders is an emerging approach from which benefits are not uniform (unlike other chronic diseases), much remains to be learned. Patients receiving chronic disease management consistently took part in addiction treatment while control groups rarely utilized resources such as treatment referrals (45, 48, 50). This model might be effective but will require implementation utilizing the most beneficial dimensions of care and follow-up assessment to verify its value (38, 39, 41).

## Including patient and family perspectives in care coordination

The concepts of patient-centered care and shared decision making are fundamental to improving the quality of care for substance use disorders (62-65). Currently, the tenets of patient-centered care are rarely embodied in the management of alcohol or drug use disorders. After a substance use disorder is diagnosed in a general medical setting, a referral often would be made to a single type of treatment, without consideration of alternative evidence-based options or patient preferences. This treatment is frequently a specialty addiction rehabilitation program that is group-based, abstinence-oriented, and often guided by 12 Step recovery principles. Typically, these programs generally do not routinely offer evidence-based psychosocial treatment or effective medications available for alcohol and opioid use disorders (29, 61, 66, 67). Although many patients benefit from such treatment, most do not accept referral and few receive specialty addiction treatment (68).

Many effective psychosocial and pharmacological interventions for the spectrum of substance use disorders exist beyond specialty addiction treatment. The most consistently recommended evidence-based practices include contingency management, cognitive-behavioral therapy, motivational enhancement therapy, structured family therapies, and medications for alcohol and opioid use disorders (55, 56, 66, 69-72). Further, no single treatment is superior to all others (71, 73, 74). Given the context of addiction treatment—namely that no clear treatment approach is best for all patients, treatment goals and preferences can vary for different patients, and the responsibility to carry out treatment belongs to the patient—the importance of shared decision making becomes evident (65, 75).

Shared decision making to engage both patients and providers in the management of substance use disorders is a rich area for research in the addiction treatment field (75). The general literature suggests that shared decision making and the use of patient decision aids can help patients understand the risks and benefits of relevant options and share responsibility concerning the choice of treatment (76). Providers and patients should engage in discussions about the benefits, costs, and viability of treatment options, including convenience and opportunity costs (77). Some have advocated that providers should remain neutral with regard to the patient's goals and preferences for treatment, and focus on relating options to the patient's values (65). For example, privacy concerns may be more or less important to different patients and, therefore, treatment options might include those that are not documented in the EHR, such as mutual help groups and web-based interventions. Patient preferences affect treatment engagement (78) and offering patients a menu of options might prompt patients not actively seeking treatment to subsequently engage.

## Paying for coordinated addiction and general medical care

Current payment reforms are moving away from fee-for-service (FFS) to alternative payment models that shift financial risk from payers to providers, incentivizing providers to manage patients' utilization and emphasizing efficiency and coordination between providers. While FFS encourages acceptance of higher severity patients (79), such as individuals with co-occurring substance use disorder and mental and general health problems, it can discourage coordination between providers (79).

Public financing has traditionally played a large role in the provision of addiction services, while most general medical services are paid for through private and public insurance mechanisms (80). The Affordable Care Act shifts addiction treatment payment away from public financing toward insurance reimbursement. While this shift presents challenges to the addiction treatment system, it also presents the opportunity to promote coordination and integration of addiction and general medical care. Barriers to developing and implementing alternative payment and care delivery models include billing and credentialing regulations, billing and EHR infrastructure, workforce preparedness, and inter-organizational relationships. Overcoming these barriers will require changes in financing, administrative, and regulatory policy (81, 82).

No payment system for coordinated or integrated addiction and general medical care has been empirically tested (83). In general medical settings, alternative payment models have shown promising results in promoting coordinated care. There is evidence that global payment with quality incentives reduces spending and improves quality (84) and bundled payment for diabetes care improves care coordination among providers (85). Specific to addiction treatment, empirical evidence supports the notion that alternative payment models can improve the value of care and facilitate coordination. Weisner et al. found that integrated addiction treatment and primary care in a staff-model HMO improved outcomes (48) and reduced costs by facilitating referrals between primary care and specialty care (86). Providers in staff-model HMOs are commonly paid on a salary basis, which can allow more flexibility and time to address prevention efforts than FFS payment models depending on productivity expectations.

Risk mitigation and performance measurement are strategies to motivate providers to accept patients with substance use disorders and deliver specific services. Risk adjustment is an important technique to mitigate the risk of variation in costs due to variations in patient characteristics. Risk adjustment for mental health and substance use disorders is not as developed as in general medical care (87). Performance measurement is another strategy to encourage changes in addiction care delivery (88) and might be a powerful tool to include in payment models for coordinated and integrated addiction

care. Quasi-experimental results suggest that using performance incentives in integrated general medical and behavioral health care programs can improve care delivery and health outcomes (89).

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