

Pharmacy Operations & Workflow

ActionADE - Connecting Care to Save Lives

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Adverse drug events (ADEs) are a major source of preventable patient harm, yet limited interoperability among electronic medical records often leaves clinicians unaware of prior ADEs, increasing the risk of repeated incidents. ActionADE is an interoperable electronic ADE reporting platform that integrates with British Columbia's PharmaNet database, providing real-time alerts linked to culprit medications to support clinical decision-making and prevent re-exposures. Real-world data demonstrate that ActionADE improves communication across care settings, enables pharmacists and physicians to intervene more effectively, and reduces repeat ADEs. Implementation lessons highlight the importance of workflow integration, local champions, and scalability for broader adoption. These findings suggest that ActionADE is a practical, pharmacist-driven intervention to improve medication safety and optimize outcomes in acute care environments.

Different electronic medical records (EMRs) lack interoperability across critical domains, limiting information exchange between healthcare settings and affecting patient care.¹ This creates critical information gaps, particularly in drug safety, leaving clinicians unaware of patient-specific life-threatening adverse drug events (ADEs), which are undesirable outcomes of drug use including adverse drug reactions and drug misuse.² The global ADE-related mortality rate increased by 3.3 fold from 2001 to 2019, and ADEs are considered the third leading cause of death in the United States.^{3,4} In Canada, at least 22,000 deaths each year are attributed to potentially preventable adverse events.^{5,6} Inadequate documentation and poor EMR interoperability are key contributors to repeat ADEs.^{7,8} These issues place the burden on patients and families, making them the primary means of communicating ADEs across care settings, leading to other gaps and risks.⁹ A 12-week prospective study found 12% of emergency department (ED) visits were ADE-related and 68% were preventable.¹⁰ Analyses of three multicentre studies suggested that 33% of ADE-related ED visits were recurrent, of which 75% were preventable.¹¹ Moreover, 27% of culprit medications were re-prescribed after an ADE-related admission.¹² Given these risks of repeat ADEs, new solutions are needed to strengthen communication across care settings. One such innovation is ActionADE, a free web-based application funded by government authorities and research organizations.

PURPOSE AND VISION OF ACTIONADE

ActionADE is a user-friendly, interoperable ADE reporting platform co-developed with patient partners, clinicians,

and researchers using participatory design methods.^{13,14} It integrates with PharmaNet, British Columbia's (BC) central medication dispensation database, to ensure ADE information flows across healthcare settings.¹⁵ Reports are tagged to culprit drugs and generate real-time alerts that prompt clinicians to stop harmful re-dispensations, adjust doses, switch medications, increase monitoring, or provide patient counselling to prevent repeat harm.

Beyond supporting daily clinical care, ActionADE also advances national pharmacovigilance efforts. It fulfills Canada's federal pharmacovigilance mandate under the Protecting Canadians from Unsafe Drugs Act, similar to BC Patient Safety and Learning System (BCPSLS).¹⁵⁻¹⁸ Unlike BCPSLS, ActionADE enables practitioners to update or refute previous ADEs, fostering collaborative discussions and decisions and preventing inappropriate avoidance of specific medications or entire drug classes.^{14,15} With a reporting time under two minutes, ActionADE is associated with a 60-fold increase in ADE reporting compared to BCPSLS.¹⁴ Its streamlined process reduces barriers to reporting and triggers clinical interventions, addressing the limitations of the current EMR landscape.¹⁹ These system-level strengths are supported by real-world data.

From 2020 to 2022, 74% of ADEs reported to ActionADE were adverse drug reactions and 57% of ADEs resulted in serious outcomes, including permanent disability, life-threatening events, or death.¹⁵ Reports shared with community pharmacists led to 33% of culprit medications being discontinued and 10% being changed.¹⁵ For every ten ADEs reported into ActionADE and transmitted to PharmaNet, pharmacists prevented one re-exposure to a harmful drug.¹⁵ ActionADE alerts helped community pharmacists

identify potential risks and take actions, including contacting physicians to stop or adjust a refill.

These findings show ActionADE improves communication across care settings, supporting safer clinical decisions, preventing repeat harm, and reducing healthcare burden. Without ActionADE alerts, many harmful medications would likely be continued unknowingly, increasing risk and costs. Preventing ADE-related rehospitalizations could yield significant cost savings, as ADEs account for 700,000 hospital admissions and over \$1 billion in annual healthcare expenditures.^{10,18,20} These findings highlight how ActionADE improves communication and changes practice across different groups of clinicians.

PHARMACISTS' AND PHYSICIANS' EXPERIENCES AND PERSPECTIVES

Physicians face diagnostic challenges when incomplete or inconsistent EMR data obscure ADE history. ActionADE provides standardized, patient-specific information that improves diagnostic accuracy and prescribing safety. These timely alerts serve as a vital safeguard, prompting physicians to reconsider previous therapies, avoid re-prescribing harmful drugs, and tailor treatment plans based on a more comprehensive understanding of the patient's medication history.

Hospital pharmacists faced significant challenges in communicating patient-specific drug safety information to external care providers, as ADEs documented in the hospital's EMR rarely reached those outside the system and incorporated into patient files, often compromising patient safety.^{1,7} ActionADE addresses this challenge by automatically transmitting data to external care providers and triggering alerts when an attempt to re-dispense culprit drug or class of drug is made.¹⁸ This facilitates effective communication between clinicians and the dissemination of safety information.

Community pharmacists, often unaware of patients' hospital visits or prior ADEs, may unintentionally refill culprit medications that have previously led to serious or life-threatening ADEs. Evaluation of ActionADE data indicated that 34% of patients with ADEs attempted to have the culprit drug re-dispensed, with 45% of these cases occurring within two weeks of the ADE report.¹⁵ ActionADE alerts helped support community pharmacists, who often saw patients post-discharge, to make informed and safer care decisions as it prompted reassessment of prescribed medications. These reassessments led to important and necessary discussions with prescribers, potential changes to the drug or dosage, or a decision to override alerts which was done thoughtfully after weighing risks and benefits, and emphasizing appropriate monitoring during patient counselling.¹⁵ By providing timely alerts and accessible ADE information, ActionADE empowers community pharmacists to actively participate in clinical decision-making, facilitating necessary discussions with prescribers to optimize medication safety.

ActionADE has meaningfully improved clinicians' access to critical, patient-specific information and facilitated bet-

ter information exchange across care transitions. By making patient-specific ADE information more accessible, ActionADE reduces the time clinicians spend searching for these critical details and minimizes the risk of them being overlooked. This supports safer prescribing and dispensing and may improve patient outcomes. The impact is not limited to providers, but also patients themselves feel the consequences of communication gaps.

A PATIENT PERSPECTIVE

In 2023, a patient presented to the ED for a third time with metformin-associated acidosis. This time, it was life-threatening. Since the patient had been under regular specialist care and had taken metformin for years, the possibility of the medication being the cause was overlooked. Without accessible records from previous emergency visits or documentation of a prior ADE, treatment was delayed. The same medication had been continued simply because the re-prescribing physicians were unaware of the prior harm, while the patient anticipated that the clinicians were informed of this critical information.

For this real patient case, a tool like ActionADE could have made all the difference. If earlier ADEs had been clearly documented and shared across healthcare settings, the harm might have been avoided altogether. This case underscores the stakes of communication gaps, where missing safety information leads to repeated harm, delayed treatment, and preventable suffering. It is a reminder that effective communication and information exchange are not just system issues, but also a patient safety one. To prevent such cases at scale, careful attention to implementation is needed.

IMPLEMENTATION AND EXPANSION

ActionADE was embedded into hospital workflows and EMRs in 2020, in alignment with PharmaNet to automatically transmit reports in BC.¹⁵ Early uptake was supported by pharmacist champions, who promoted engagement and workflow alignment.²¹ Facilities with strong leadership and consistent support achieved higher reporting, while barriers included inconsistent reporting infrastructure, limited two-way PharmaNet integration, and variable clinician involvement. Nonetheless, front-line providers, particularly hospital pharmacists, found ActionADE to be intuitive, practical, and valuable in improving clinical assessments and decision-making.^{15,21}

Though ActionADE has demonstrated early success, its use is currently limited to select BC hospital sites, with reporting primarily conducted by hospital pharmacists in inpatient and ED settings. These reports then inform and support community pharmacists through PharmaNet alerts during medication re-dispensation. Although the system is free for hospital users, broader adoption has been constrained by the lack of integration with community clinics and retail pharmacies, the need for technical infrastructure, and variable awareness and training among providers outside participating hospitals. Early engagement from phar-

macists, hospital leaders, and regulatory bodies, supported by pharmacist champions, suggests potential for expansion.^{15,21} Broader expansion across provider types, regions, and EMR platforms is needed to fully realize its impact. Differences in adoption between pharmacists and physicians highlight the importance of tailored engagement strategies and continued workflow optimization. A key learning from the rollout is the necessity of strong local champions and site-specific support. Moving forward, improving system interoperability, expanding integration into outpatient care, and enabling more comprehensive data sharing will be essential, along with ongoing outreach and demonstration of clinical impact to sustain stakeholder engagement. Early use of ActionADE has shown promise in preventing repeat medication-related harm and enhancing clinical decision-making, reinforcing its value as a tool to support safer prescribing and dispensing across transitions of care. Such lessons provide a foundation for expanding ActionADE beyond BC, with careful and phased implementation tailored to provincial systems and stakeholder engagement to support broader adoption.

CONCLUSION

Interoperable ADE reporting systems, like ActionADE, close communication gaps and improve continuity of care. Despite being freely available and government-supported, adoption of such systems requires attention to integration, training, and workflow adaptation to realize their full potential across all healthcare settings. By providing accurate, patient-specific data, they enable timely interventions, reduce medication errors, and prevent repeat ADEs. ActionADE demonstrates how streamlined reporting can translate into meaningful safety improvements.

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DATA AVAILABILITY STATEMENT

All data generated or analyzed are included in this published article.

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