Analysis of a State Controlled Substance Prescription Registry: Lessons Learned

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Introduction

Recent reports have detailed the increase in fatal prescription drug poisonings. We studied the relationship between apparently legitimate prescribing captured in the state controlled substance registry and fatal drug poisonings. The Utah Controlled Substances Database contains information about all filled prescriptions for scheduled drugs in non-inpatient settings. Clinicians use the data, and the Division of Occupational and Professional Licensing uses it to identify potential cases of drug over-utilization, misuse, and over-prescribing. Our study at the Utah Department of Health was the first analysis of the database for research purposes.

We report lessons learned by adapting a database intended for enforcement to research.

Materials and Methods

- Utah Controlled Substances Database (CSDB) includes information on every Schedule II-V prescription filled in Utah
  - Established in 1995 by legislative mandate
  - Data collection began in 1997
  - Data for patient, provider, pharmacy, drug name, NDC, quantity and days supply
  - Pharmacies submit data electronically, and minimal quality checks occur (for missing data) before records are included.
  - No unique patient identifier
  - Each prescription is a separate record–no longitudinal patient history
  - Clinicians use database to evaluate patient controlled substance history
  - Division of Occupational and Professional Licensing uses it to identify potential cases of drug over-utilization, misuse, and over-prescribing

Challenges & Suggestions

Data transmitted directly from pharmacies to database. Minimal data quality checks applied to data before inclusion in database. Non-missing but invalid values in key fields such as patient name, drug code, or provider DEA number compromise individual-level analysis.	This level of scrutiny has been identified as appropriate for the enforcement mandate, but stricter evaluation would improve research utility.
No primary key for customer identification number. Customer information is entered each time a controlled substance is dispensed, allowing errors and inconsistencies.	Creation of a Master Patient Index would improve input consistency and tracking of longitudinal patient histories, which is now only with probabilistic linking techniques.
No patient- or provider-level summary data.	Addition of patient-level summary variables such as cumulative and concurrent numbers of prescriptions and providers may help to detect fraud or risky use.
Variability exists in coding for categorical variables, e.g. M, F, Male, Female,1, 2. Many DEA numbers are not valid, e.g., 00000000 and 999999999. Variability exists in patient name fields. For example, designations such as Jr. or III appear sometimes in first name and sometimes in last name field.	When possible, legal values and internal validity checks should be included in the database design. For example, records with prescription fill date before patient date of birth should be flagged for review or rejected. The DEA number field could accept only values that follow the correct pattern of letters and numbers. Records that fail to match to the DEA reference table should be flagged for review or rejected.
Veterinary prescriptions are included in the data and indistinguishable from human prescriptions.	A separate indicator field for prescriptions to non-human animals would help eliminate that problem.
The contents of the customer identification field are not well-defined. The identifier varies among Social Security Number ,driver's license number, and non-numerical strings. May be the identification of person picking up the prescription rather than the patient.	Standardize the values allowed in this field. Include an indicator for prescription picked up by someone other than the patient. May help to detect fraud as well as provide valuable information for possibly linking to other data sources.
Time lag of up to 40 days between prescription fill and inclusion in the database.	Establishment of more real-time data transfer between pharmacies and database.

Future Possibilities

Real-time data transfer: help providers, including emergency department, know recent patient history and inform treatment choices.

Automated triggers for investigations: Data-based thresholds for review of individual patients, providers, or pharmacies based on cumulative or concurrent prescription history or changes in established patterns.

Feedback to providers and pharmacists: Potentially high-risk combinations of drugs based on studies of linked controlled substance and health outcomes databases (e.g. vital statistics, emergency department)

Conclusions

Jurisdictions creating a controlled substance prescription registry *de novo* should consider using legal values for data entry fields, including indicator variables for non-human animal prescriptions and prescriptions picked up by proxy, and standardization of acceptable values within name fields.

Research using prescription registries may help improve their surveillance and enforcement functions by identifying risk factors for adverse events and indicators of possible fraud or inappropriate prescribing. This project was part of the Utah Center of Excellence in Public Health Informatics.

Acknowledgements

Erin Johnson, MPH

Controlled Substances Database: Utah Division of Occupational and Professional Licensing

Utah Center of Excellence in Public Health Informatics

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