The Blue Report series is also made available on the BlueCross BlueShield of Tennessee Web site at bcbst.com
Inside Tennessee’s Medicine Cabinet

Inside the Medicine Cabinet

More is not always better for health, nor is it affordable.

That’s the message for Tennesseans when it comes to their high use of prescription medications.

Consider that the Volunteer State has the highest use per capita for prescription drugs at 17.3 prescriptions and the second highest in per capita prescription drug spending at $1,192.56\(^1\); yet, is ranked 47\(^{th}\) in health status for its citizens.\(^2\)

If higher overall medical spending, which includes prescription medications, doesn’t necessarily equate to healthier populations, then what is the impact on health care outcomes? That’s the question addressed in this Blue Report on Tennessee’s high prescription drug utilization status.

According to the Institute of Medicine, drug errors injure more than 1.5 million Americans annually and just one error can add as much as $5,800 to a patient’s hospital bill.\(^3\) In addition to the problem of medication errors and adverse events, inappropriate use of prescription medications has the high potential for antibiotic resistance and medication abuse, which can lead to addictions.

Of course, appropriate prescription drug use has an enormous potential to add value and quality to life. But what is appropriate use and what are the use criteria that can provide the maximum health benefits to Tennesseans without undue increases in risks? The state’s No. 1 ranking for prescriptions and the consequences that come with that notorious title certainly set the stage for concern and scrutiny among the health care community, policy makers and patients across Tennessee.

\(^1\) Novartis, Pharmacy Benefits Report, Facts and Figures, 2006 Edition
Prescription Drug Utilization Trends

Prescription drug spending in America reached $188 billion dollars in 2004 and is forecast to reach $299.2 billion in 2010. By 2013 drug spending will double to a whopping $380 billion.\(^4\)

In Tennessee the costs are staggering as well. According to Novartis, the prescription spending for Tennessee alone was $7 billion in 2005.\(^5\)

As costs continue to rise, actual utilization has flattened at the national level and even declined in Tennessee from 18.1 prescriptions per capita in 2004 to 17.3 in 2005. However, even with the decline, Tennessee still holds on to its No. 1 ranking for prescription drug use.\(^6\)

![We Are No. 1 (Again)
Prescriptions Per Capita 2005](chart.png)

Tennessee remains the highest use per capita state for prescription drugs at 17.3 prescriptions per capita, 2.5 times the use rate in Alaska and 1.5 times the national average.

When it comes to costs, Tennessee is second highest in per capita prescription drug spending at $1,192.56 behind the District of Columbia. The national per capita prescription drug spend average is $835.08, while spending is lowest in Hawaii at $540.01 per capita.\(^7\)

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Prescription Drug Use Rates
A review of the geographic distribution of prescription drug use in Tennessee provides a dramatic look at where utilization is highest in the state.

Rate by County
The statewide average days supply per 1,000 BlueCross BlueShield of Tennessee members for all prescription drugs is 249 days. While the average number of prescriptions per member per year is 8.9. When comparing prescription drug use, the days supply of drugs, i.e. 30, 60, 90 days, can be more informative than the number of prescriptions alone.

In the map above, counties are shaded based on number of days supply of a prescription for BlueCross BlueShield of Tennessee members. The top 10 highest prescription drug use counties in descending order are:

1. Lake – 386 days supply
2. Bledsoe – 344 days supply
3. Weakley – 328 days supply
4. Campbell – 324 days supply
5. Lauderdale – 316 days supply
6. Obion – 315 days supply
7. Greene – 310 days supply
8. DeKalb – 310 days supply
9. Crockett – 302 days supply
10. Fentress – 298 days supply

Source: BCBST Commercial Population data
Rate by Region
A look at the major metropolitan areas in Tennessee reveals that Memphis leads with 13 prescriptions per resident per year—8 percent more than the state average.

<table>
<thead>
<tr>
<th>Region</th>
<th>Prescription Use Rate (Per Resident Per Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memphis</td>
<td>13.0</td>
</tr>
<tr>
<td>Tri-Cities</td>
<td>12.7</td>
</tr>
<tr>
<td>Knoxville</td>
<td>11.9</td>
</tr>
<tr>
<td>Jackson</td>
<td>11.9</td>
</tr>
<tr>
<td>Nashville</td>
<td>11.8</td>
</tr>
<tr>
<td>Chattanooga</td>
<td>11.6</td>
</tr>
<tr>
<td>Statewide</td>
<td>12.0</td>
</tr>
</tbody>
</table>

2005 BCBST Commercial Network P data

Prescription Drug Use by Volume
The top 10 most prescribed drugs in Tennessee represent 15 percent of total prescriptions dispensed across the state. The top 10 and their indicated uses are provided in the chart below.

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Common Use</th>
<th>Percent of Total Prescriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROCODONE</td>
<td>Narcotic/Pain</td>
<td>2.8%</td>
</tr>
<tr>
<td>LIPITOR®</td>
<td>Cholesterol</td>
<td>1.8%</td>
</tr>
<tr>
<td>NEXIUM®</td>
<td>GERD</td>
<td>1.6%</td>
</tr>
<tr>
<td>ALPRAZOLAM</td>
<td>Insomnia/Anxiety</td>
<td>1.5%</td>
</tr>
<tr>
<td>LEVOTHYROXINE</td>
<td>Low Thyroid</td>
<td>1.4%</td>
</tr>
<tr>
<td>LISINOPRIL</td>
<td>Blood Pressure/Heart</td>
<td>1.4%</td>
</tr>
<tr>
<td>ZYRTEC®</td>
<td>Allergy</td>
<td>1.2%</td>
</tr>
<tr>
<td>HYDROCHLOROTHIAZIDE</td>
<td>Blood Pressure/Water pill</td>
<td>1.2%</td>
</tr>
<tr>
<td>AZITHROMYCIN</td>
<td>Antibiotic</td>
<td>1.1%</td>
</tr>
<tr>
<td>METFORMIN HCL</td>
<td>Diabetes</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

2nd Quarter 2006 BCBST Commercial Population data
Prescription Drug Use Demographics

In addition to defining the geographic areas where prescription drug use is highest, it’s important to understand who is accessing what types of medications. The following charts reflect the age and gender demographics in the context of medication type.

**Rx Use and Age**

![Chart showing the relationship between age and drug use, categorized by pharmacy benefit tier.](source)

The relationship between age and drug use in the Tennessee commercially insured population is shown in the chart above by pharmacy benefit tier and in total.

**As individuals age they have the propensity to use more prescription medications.**

The relationship between gender and drug use by pharmacy benefit tier is shown in the chart below.

**Rx Use and Gender**

![Chart showing the relationship between gender and drug use, categorized by drug type.](source)

Females use more prescription drugs than males for every drug benefit tier.
Copay Influence on Prescription Use
Factors beyond demographics also play into drug utilization rates. The prescription drug copay is related to the quantity of prescriptions purchased by an individual.

The chart above shows the differences in utilization that are observed with higher copay levels. On average, an increase in the copay by $4.76 reduces generic drug use by one prescription. Yet, it takes an increase in the copay by $42 to reduce branded drug use by one prescription.

In general, the higher the copay the fewer number of prescriptions purchased.
Consequences of High Prescription Drug Use

It’s clear that Tennesseans are reliant upon prescription medications, but what do all these pill bottles and tablets add up to in terms of the state’s health? A closer look at the consequences shows that more is not always better.

During the course of a single week, four out of five U.S. adults will take a prescription drug, over-the-counter medicine, or dietary supplement. These medications can provide relief and miracle cures for many, but with those lifesaving benefits comes a myriad of hidden dangers. From medication errors and adverse side effects to antibiotic resistance and dependence, the inappropriate use of drugs can cause serious injury or death, as well as raise health care costs for everyone.

Medication Errors

The Institute of Medicine (IOM) report, “Preventing Medication Errors,” published in July 2006 cites studies indicating that more than 1.5 million Americans suffer from medication mistakes each year. Every day of a patient’s hospital stay, he is subjected to a drug administration error. The IOM further estimates that annually there are 400,000 preventable adverse drug events (ADEs) in acute inpatient care hospitals, 800,000 preventable ADEs in long-term care facilities, and 530,000 preventable ADEs among the general population.

Over 770,000 people are injured or die each year in hospitals from all (not just preventable) ADEs, which may cost up to $5.6 million each year per hospital. National direct ADE-related hospital expenses to treat patients who suffer ADEs during hospitalization are estimated at between $1.5 and $5.6 billion annually. With 7,569 hospitals nationwide (US Census Bureau), the estimated total ADE hospital cost is $42.4 billion annually.

For Tennessee with its 136 hospitals, the estimated ADE hospital cost tallies up to $761 million annually.

The cost of physician services and non-hospital costs to treat ADEs and the loss of income are not included in this estimate.

The risk of ADEs is one that extends beyond the confines of the hospital. A study in the Journal of the American Medical Association indicates that more than 700,000 patients per year were treated for ADEs in U.S. emergency rooms during 2004 and 2005. Of those visits, 1 in 6 required additional care, i.e. hospital admission.
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Adverse Effects
The U.S. Food and Drug Administration (FDA) defines an adverse drug event as “any undesirable experience associated with the use of a medical product in a patient.” The event is SERIOUS and should be reported when the patient outcome is:

1) Death
2) Life-Threatening:
   Examples: Pacemaker failure; gastrointestinal hemorrhage; bone marrow suppression; medication pump failure which permits uncontrolled free flow resulting in excessive drug dosing.
3) Hospitalization (initial or prolonged):
   Examples: Anaphylaxis; antibiotic associated colitis (pseudomembranous colitis); or bleeding which causes or prolongs hospitalization.
4) Disability:
   Examples: Stroke (Cerebrovascular accident) due to drug-induced excessive clotting (hypercoagulability); toxicity; peripheral neuropathy.
5) Congenital Anomaly:
   Examples: Vaginal cancer in female offspring from use of hormones (diethylstilbestrol) during pregnancy; malformation in the offspring caused by thalidomide.
6) Requires Intervention to Prevent Permanent Impairment or Damage:
   Examples: Acetaminophen overdose-induced liver toxicity requiring treatment with acetylcysteine to prevent permanent damage; burns from radiation equipment requiring drug therapy; breakage of a screw requiring replacement of hardware to prevent malunion of a fractured long bone.

From 1995 through 2005, post-marketing ADEs have continued to increase annually—3 times. All of the adverse events shown in the chart below are of the serious category.

Drug Safety and Quality
Post-Marketing Adverse Event Reports

Source: FDA CDER 2005 Report to the Nation

Safety Alerts and Recalls

News headlines concerning the voluntary recall of the popular drug Vioxx® grabbed the attention of millions in 2004. During that year and those following, more safety alerts and recall headlines would stun patients, leaving them questioning the safety of their medications. From Bextra® and Celebrex®, which treat arthritic conditions, to anti-depressants like Paxil®, the FDA has issued numerous warnings and recalls in recent years.

The FDA product safety alerts trend declined through 2003 but has been increasing the last two full years—2004 and 2005. The alert is based on adverse event reports submitted by health care professionals, consumers and patients.

Even with the recent increase in recalls, the FDA’s ability to monitor the safety of drugs has come into question. In October 2006, critics questioned the agency’s ability to monitor and authority to recall dangerous drugs, or even to sanction drug companies that fail to comply with required safety studies.20

Drug recalls peaked in 2005 at 502, and 401 of those were prescription medications.21

In some cases, a drug product must be recalled due to a problem occurring in the manufacture or distribution of the product that may present a significant risk to public health. These problems usually, but not always, occur in one or a small number of batches of the drug. The most common reasons for drug recalls are listed below. In other cases, a drug is determined to be unsafe for continued marketing and must be withdrawn completely.

Manufacturers or distributors usually implement voluntary recalls in order to carry out their responsibilities to protect the public health. A voluntary recall of a drug product is more efficient and effective in assuring timely consumer protection than an FDA-initiated court action or seizure of the product.

Top 10 Reasons for Drug Recalls in Fiscal Year 2004

- Deviation from current good manufacturing process
- Drug is not potent enough
- Product instability in conflict with the expiration date
- Generic drug or new drug application discrepancies
- Dissolution failure
- Label mix-ups
- Content uniformity failure
- Presence of foreign substance
- pH failures – during storage the drug or solution becomes too acidic or too basic
- Microbial contamination of non-sterile products

Source: FDA CDER 2004 Report to the Nation

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Accidental Poisoning
Another concern for patients, especially in Tennessee, is the potential for accidental poisoning. Accidental poisoning can be caused by an incorrect dosage or unintended drug interaction with another medication or substance. Most at risk are seniors over 65 years old, who according to a 2006 study by Medco Health Solutions, are at seven times greater risk for drug errors due to their multiple medications.\(^{22}\)

In just four years from 1999 through 2003, the Tennessee death rate from accidental drug poisoning by use of legal prescription and over-the-counter drugs has doubled from 4.17 deaths per 100,000 to 8.46 deaths.

Tennessee’s accidental poisoning rate stands 26 percent above the national average.\(^{23}\)

Cost estimates for poisonings in 2003 tallied $23.4 billion nationally and $593 million for Tennessee.

The estimated unit costs of a poisoning fatality include $3,586 in medical costs and $1,123,346 in productivity loss. Applying medical inflation cost factors to the medical costs and the overall inflation factor\(^*\) to the productivity loss and assuming no increase in deaths, the 2006 costs related to deaths by poisoning total $25.5 billion nationally and $649 million in Tennessee.

An editorial note to the study authored by Singleton and others noted that in some of the states studied the “misuse of prescription drugs (e.g., pain-management opioids such as oxycodone HCl with acetaminophen, hydrocodone with acetaminophen, and methadone) has contributed to the increase in deaths from unintentional poisoning.”\(^{24}\)

\(^*\) According to the Bureau of Labor Statistics, from 2000 through June 2006, medical service prices had increased 30.7 percent while the overall Consumer Price Index rose by 18 percent.


Antibiotic Resistance

The Tennessee Department of Health defines an antibiotic-resistant infection as “an infection that is difficult or impossible to cure with antibiotics.” Common areas for these infections are the throat, sinus, ears, lungs and intestines. The difficulty in treating resistant bacterial infections can lead to more severe illnesses with longer and more expensive treatments, such as hospitalization.

For example, in 1972, 2 percent of hospital acquired staphylococcus aureus (staph) infections were resistant to antibiotics. In 2004, that 2 percent rate increased to 63 percent. A rate so alarming that in October 2006, the CDC released new health care setting guidelines to prevent the spread of drug-resistant infections.

In fact, Tennessee has some of the highest rates of antibiotic resistance in the nation. A rate so high that the state is currently engaged in an “Appropriate Antibiotic Use” campaign.

The high level of antibiotic resistance is displayed in the chart below where Tennessee has the highest portion of resistant pneumococcal isolates among states studied by the CDC.

Although receiving much attention, antibiotic resistance continues to grow:

1) A 37 percent increase in resistance (Campylobacter) to the antibiotic Cipro® from 1997 to 2003
2) A 475 percent increase in resistance to Negram® for one bacteria type (Non-Typhi Salmonella)
3) A 101 percent increase in resistance for another bacteria type (Salmonella Typhi)
4) Resistance is also growing to antibiotics used on livestock where there has been a 2000 percent increase in resistance to a 3rd generation antibiotic (cephalosporin ceftiofur used in non-Typhi Salmonella).

Besides increased morbidity and even mortality, the overuse of antibiotics carries with it large health care costs which the CDC estimates at $4 billion annually.

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Prescription Abuse
Once pushed by the World Health Organization to aggressively treat severe cancer pain, opioids are now aggressively pushed by drug dealers on the streets of Tennessee.

Better known as painkillers, prescription opioids include codeine phosphate, codeine sulfate, hydromorphone, levorphanol, meperidine, methadone, morphine, oxycodone, oxycodone/acetaminophen combination, meperidine/promethazine combination and oxycodone/ aspirin combination.

According to the FDA the abuse rate for opioid analgesics (synthetic drugs possessing narcotic properties) has been steadily rising over the past five years while illicit drug abuse has remained stable. The 2004 National Household Survey on Drug Use and Health reports 31.8 million Americans used pain relievers for non-medical purposes at least once during their lifetime. That’s a 7 percent increase from 2002 figures.

And again, Tennessee is near the top, ranked among the top 5 states in opioid use.

Currently, the prescribing practice patterns of Tennessee physicians are being studied by an appointed task force charged with identifying problems and developing solutions for the abuse.

2005 Narcotic Therapeutic Class Rx’s per 1,000 Members

The chart above shows the highest use county in Tennessee (Morgan) shaded in orange and those that are significantly higher than the average in tan. The geographic variation in narcotics dispensing per prescriber is similar to the geographic variation in per capita use.

29 LH Curtis et al., “Geographic Variation in the Prescription of Schedule II Opioid Analgesics among Outpatients in the United States,” Health Services Research 41, no.3 (June 2006).
The Drug Enforcement Administration defines schedules of controlled substances. Below are the classification definitions and per capita use for prescription narcotics in Tennessee counties. On both maps the highest use county is shown in orange and those counties with statistically significant higher use are shown in tan.

**Schedule II Drugs Days Supply per 1,000 Members**

Schedule II. –
(A) The drug or other substance has a high potential for abuse.
(B) The drug or other substance has a currently accepted medical use in treatment in the United States or a currently accepted medical use with severe restrictions.
(C) Abuse of the drug or other substances may lead to severe psychological or physical dependence.

Schedule II drug use per capita as shown in the chart above has approximately the same geographic distribution as shown in the previous map.

Morgan County has the highest use at an average 4,853 days supply of schedule II drugs per 1,000 BlueCross members while the statewide average days supply per 1,000 members is 1,725.

**Schedule III Drugs Days Supply per 1,000 Members**

Schedule III. –
(A) The drug or other substance has a potential for abuse less than the drugs or other substances in schedules I and II.
(B) The drug or other substance has a currently accepted medical use in treatment in the United States.
(C) Abuse of the drug or other substance may lead to moderate or low physical dependence or high psychological dependence.

Schedule III drug use shown in the map above has a different distribution pattern than schedule II drugs.

The highest use county for schedule III drugs is Wayne County at 9,125 days supply per 1,000 BlueCross members, while the statewide average is 5,701 days supply per 1,000 members.

The abuse of opioids puts users at an increased risk for disability and death. Harmful effects can be both biochemical and behavior associated, e.g. increased risk of brain damage, cognitive impairment and suicide.

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The abuse of prescription narcotics has dangerous consequences beyond just health risks. The misuse also brings with it an array of harmful implications for addicts’ family members and their communities. Just in terms of cost, the impact is staggering. An analysis presented at the 2005 Opioid Risk Management Conference estimates the economic impact of prescription opioid analgesic abuse in America at $9.2 billion in 2001.\textsuperscript{31}

\begin{center}
\textbf{The Cost of Rx Opioid Abuse in the United States in 2001}
\end{center}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{cost_of_opioid_abuse.png}
\caption{The Cost of Rx Opioid Abuse in the United States in 2001}
\end{figure}

Total Cost = $9.2 billion

- Criminal Justice: 20.2%
- Workplace: 49.8%
- Healthcare: 30.1%

Prescription for Change
Although Tennessee leads the nation in its use of prescription medications per capita, it’s not alone in facing the issue of prescription overuse. The problem is one faced by many states. It’s also an issue that goes beyond the individual to the responsibility of an entire system, and one that requires the collaboration of many entities to have a positive impact.

In its “Preventing Medication Errors” report, the Institute of Medicine (IOM) makes several recommendations for improvement. At the top of the list is the use of health information technologies to reduce medication errors. In fact, the IOM recommends that by the year 2010 all prescriptions should be written electronically. Other recommendations include improved relationships between patients and physicians, improved prescription labeling and medication packaging, government-paid research and policy changes.

In Tennessee, changes are already underway to improve patient safety and reverse the prescription use trend:

Technology
Great strides in the advancement of Health Information Technology are taking place in both the government and private sectors. From the government side, Governor Bredesen’s eHealth Advisory Council, formed in January 2006, is working to coordinate electronic health initiatives while developing and implementing a statewide system of electronic medical records. Additionally, the e-prescribe task force is focusing attention on the importance of advancing the use of electronic prescribing. These state efforts are complementary to Bredesen’s November 2006 appointment to lead the National Governors’ Association State Alliance for e-Health.

In the private sector, numerous regional health information organizations (RHIOs) are at work sharing patient medical data. And at BlueCross BlueShield of Tennessee, its subsidiary Shared Health is impacting the care of more than 2 million residents currently enrolled in its electronic Clinical Health Record.

In addition to the Clinical Health Record, the company encourages the use of its electronic prescribing application by physicians. Shared Health ePrescribe™ allows authorized physicians to securely order safe and cost-effective medications directly from their personal computers, eliminating traditional paper prescriptions thus helping reduce the risk of medication errors and ADEs. Additionally, the application can eliminate the potential of a forged paper prescription.

Education
A more informed patient is a better patient. When consumers/patients actively engage in their health care decisions, it’s more likely their decisions will positively impact both their health and their wallets.

In Tennessee, BlueCross has promoted the use of generic drugs through its Demand Generics campaign, and the Tennessee Department of Health has engaged in an “Appropriate Antibiotic Use” campaign for the past several years. These campaigns provide information to both providers and patients about safe and cost-effective prescription treatments.

In the example of BlueCross’ Demand Generics campaign, the generic dispensing rate among BlueCross members has increased from 37.7 percent in 2001 to 56.1 percent in 2006—a 48.8 percent increase. In 2005 alone, the increased use of generics saved BlueCross members $13 million in out-of-pocket costs and saved BlueCross ASO and fully-insured employer groups $38.2 million.  

Safety Initiatives
The health care community is also focused on initiatives to reduce substance abuse and improve patient safety. Three significant efforts are currently underway in Tennessee:

- The Physician Prescribing Practice Task Force assembled by the Tennessee Department of Health is charged with studying prescribing habits of Tennessee physicians and developing initiatives and tools to reverse the drug utilization trend. Initiatives include the development of a controlled substance monitoring database, a Web-based educational program on prescribing practices and the encouragement of electronic medical records.

- The Tennessee Board of Pharmacy has launched the Tennessee Controlled Substance Database program, designed to provide doctors with specific data regarding controlled substance use—all with the purpose of eliminating prescription abuse and improving patient safety.

- The Tennessee Medical Association has developed CURB-IT, a program aimed at ultimately improving the public health. Areas under focus in the CURB-IT program are patient safety, avoiding contraindicated prescriptions; improved patient care, better medication information and improved knowledge about new protocols; and reduction of illicit drug use.

Health information technology, public education efforts and safety initiatives have the potential to not only reduce the drug utilization trend in Tennessee, but also hold the promise of transforming the health care delivery system.

All stakeholders—patients, providers and the health care community—must continue to collaboratively explore these mechanisms of change as they seek appropriate use for prescription drugs in our state. With less, Tennessee may be able to do more to improve the health of its citizens.