Increasing Drug Costs

The Search
It is easy to find articles relating to drug cost inflation in academic literature. The articles chosen are representative. Most of these articles do not explore an overall explanation for the rise in drug costs. They research many small, particular issues having an impact on drug costs. At that, we left out many even more narrowly focused articles. An online search for drug costs will discover many articles discussing topics such as the most cost-effective anesthetic drug for a particular type of surgery on a particular type of patient. The articles in this bibliography discuss a wide range of issues from a wide variety of frameworks. There is certainly no consensus. Some of these articles lament an excessive inflation in prescription costs while others claim to have found success in cost controls. Sometimes the costs “controlled” were just shifted. Others blame direct-to-patient advertising, physicians’ lack of knowledge of drug costs, high research and development costs, and drug wastage for the high costs. Some explore how the rules of pharmacy plans affect drug usage and health. Many speculate on possible Medicare pharmacy plans and their potential impact. Several lament that drug effectiveness does not play a greater role in drug success.

Overall Rate Increases and Forecasts:
Mehl’s three articles on projecting future drug cost provide an overview of the recent rise in prescription drug costs. He writes annual articles analyzing the past year’s drug costs and projecting the next. Davidoff provides an overview of drug pricing and clearly blames the big pharmaceuticals for the problem. Berndt’s and Kleinke’s are perhaps the best articles here. Each is descriptive of the entire problem and each is based in economics. Berndt discusses four reasons for increasing utilization and forecasts them. Kleinke says drugs are part of the overall technological, economic shift from labor-intensive services to technology products. Most drug utilization increases should be welcome as they improve quality of life and reduce other medical expense. Smith writes to physician groups that would take on the risk and expense of pharmacy in their capitation. He gives an overview of prescription inflation and the requirements for profitably covering pharmacy.

The Patients:
Thomas gives descriptive statistics for drug use among the elderly. Gorin also focuses on the elderly and what he finds are inadequate proposals for a Medicare benefit. Desselle is patient-focused, surveying drug plan satisfaction among insureds. Rector is also patient-focused. In a most interesting empirical study, he finds that exhaustion of the drug plan cap leads to switching plans. However, those who eventually hit the cap are less likely to switch plans before hitting the cap. Selection and anti-selection are discussed.

Research and Development:
Cockburn, DiMasi, and Gale each write about drug research and development (R&D). The high cost of R&D is one of the main drivers of drug costs. In fact, these three articles imply that the marginal cost of producing one more pill or dose of almost any drug is trivial. Cockburn is interested in how the size and scope of R&D affects performance.
DiMasi describes new drug introductions over a long period and generally finds performance is related to regulation. Gale has written perhaps the most entertaining article here. He describes the history of a drug R&D venture company and makes it appear that chance determines which drugs will reach the market.

**Cost Controls:**
Burton, Cook, and Sweet each study cost controls used by drug plans. Burton provides an interesting analysis of how the various cost controls meet ethical criteria for medicine. Cook gives an overview of the drug industry but is focussed on the controls used by different payers in different markets. His analysis leads to a discussion of which controls would work best for a Medicare benefit. Sweet is narrowly focused on the cost effectiveness of the formulary approach.

**Physician Prescription Behavior:**
Ernst and Reichert get similar results in studies of physician knowledge of drug costs. Reichert includes some history to show little change over time. Doctors express a desire to prescribe cost effective drugs but they are ignorant of prices, consistently underestimating brand prices and overestimating generic prices.

**Drug Wastage:**
Gillerman finds 40% to 70% of all drugs are wasted in a hospital unit. In contrast, Morgan finds extremely low (2.3%) waste among individuals in a retirement community. Stoupe looks at both oversupply and undersupply of drugs to the patient. In a fairly closed system, he tracks maintenance drugs purchased against those prescribed. Over and under supply each lead to more hospitalizations.

**Others:**
McDonagh will seem very narrowly focused but is typical of many articles in administration literature. A hospital established a unit to maximize savings from using drugs involved in research (which are provided free to the hospital). Mehl is a speech by a veteran of pharmacy. He discusses the history he has lived and advocates a bedside role for pharmacists. Doctors diagnose and pharmacists prescribe in his ideal world. Bell describes the growth and legal history of direct-to-consumer drug advertising. Many of the other articles mention advertising as a factor in increasing costs.

Purpose: This article describes the extremely rapid growth of direct-to-consumer (DTC) drug advertising.
Data: All 320 drug advertisements from 18 consumer magazines appearing between 1989 and 1998 were included.
Method: Two judges analyzed each ad and coded them for content. Descriptive statistics were performed. Previous similar research was of advertisements directed at physicians.
Results: Prior to 1980, all advertising was directed at physicians and appeared in medical journals. This documents the extensive use of advertising in the most popular magazines. It examines trends in the breadth of DTC, the targets of DTC, the incentives offered with DTC, and the particular appeals made. Going beyond attempts to increase desire for the drugs, the ads provide patients with arguments to present to their physician. The types of drugs for which DTC is used is documented as well as the types of diseases targeted. The most popular use of DTC is for new brand introductions.
Uses: The authors hope to inform policy discussion on DTC by providing facts on an evolving topic.
Limitations: The authors acknowledge the need for research on the effects of this advertising. Who is ultimately paying for it? What is the effect on prescription behavior, treatment choice, and competition? This research method omitted visual images in the magazines. DTC advertising is also growing in other media.


Purpose: The article describes and analyzes drug cost inflation. It describes the drivers and their recent evolution.
Data and Methods: This is not primary research but a theoretical argument based on wide-ranging healthcare macroeconomic data.
Results: Berndt says the cause of growth in drug spending shifted from the 1987-94 period to the 1994-99 period. With the same 12-13% annual increase overall, the earlier period's growth was equally due to price inflation and utilization increases, but the latter period's increases were 80% the result of utilization. Berndt gives four reasons for the utilization increase and forecasts them. (1) Drug costs were a relatively unimportant part of total medical costs. Thus cost controls were more focused on the bigger hospital and physician pieces. This won't continue as drug cost increases have gained much attention. (2) Payment for drugs became much easier both due to technological process improvement and expanded coverage. This won't continue except for the major impact that Medicare coverage will have. (3) New drug introductions are hard to predict but should continue given the enormous research budgets and somewhat relaxed approval process. (4) Technology transfer and marketing efforts will increase. Technology transfer refers to post introduction research and education that expands the indications for an already approved drug's use. Berndt has a nice explanation of search.
goods v. experience goods and their impact on advertising budgets. Search goods (such as this PC on which I type) have characteristics that allow a potential buyer who knows what (s)he wants to find products that exactly meet those wants through an information search. Experience goods are products that must be experienced to see if the need or want will be met. A restaurant meal, most services, a vacation, or a pharmaceutical drug fall in the latter category. In all industries, experience goods are more heavily advertised.

Uses: The results are useful for drug cost forecasting and policy analysis. Limitations: The author acknowledges areas that are difficult to forecast: new drug introductions and federal action on Medicare/drugs.


Purpose: The authors want to encourage ethical analysis of attempts to control healthcare costs. These should be as rigorous as the economic analysis.

Data and Methods: Without data, the authors review the different cost controls used in pharmacy benefits and compare and contrast them relative to six ethical considerations in medicine. The ethical considerations are: (1) respecting resource constraints, (2) helping the sick, (3) favoring the worst off, (4) respecting autonomy of patient and physician, (5) promoting trust, and (6) promoting inclusive decision-making. Controls are categorized as direct or indirect. Direct controls reviewed are formularies, step therapy, and prior authorization. Indirect controls are physician capitation, tiered copays, and benefit caps.

Results: Direct controls better target unnecessary or ineffective medicine while indirect controls better target expensive medicine. Thus indirect controls target the sickest patients and are detrimental to care if these are also the poorest patients. Indirect controls encourage healthy patient selection. Direct controls, however, are administratively expensive and intrusive on physician-patient autonomy. Benefit caps are described as the least ethical control. A lack of pharmacy benefits is effectively a zero-benefit cap. Thus a lack of pharmacy benefits is unethical. No cost control device is the best in all situations (but caps are the worst). The authors recommend tiered copays with the tiers set according to effectiveness and necessity rather than cost. They want physicians and patients to have some voice in designing the system. They also favor physician capitation with effective stop loss and risk adjustment.

Uses: The authors want to begin the discussion. The analysis is an interesting starting point.

Limitations: The list of ethical considerations is subject to debate. Another list might call for different conclusions.


Purpose: Previous study on the effects of scale and scope on manufacturing and on
research and development (R&D) are inconclusive but theory suggests benefits, especially in R&D. The authors wish to distinguish scale and scope in their impacts on drug company R&D.

Data: This study looks at 708 research projects in ten pharmaceutical companies that combined do 25% of all pharmaceutical research worldwide. The projects averaged five years in duration, 18 million in 1998 dollars, and fewer than 20% of them reached the market.

Methods: Projects were tracked through the development cycle. The authors use FDA approval as a measure of success because the financial impact of a drug on the company is difficult to determine and the "estimation of demand models for pharmaceutical products is at such a preliminary stage". Thus, a logit model is developed with scale and scope as independent variables and success as the dependent variable. More complex models are discussed and rejected for various reasons. The difficulty of distinguishing between scale and scope effects is acknowledged and some of the paper addresses untangling this confounding. The authors feel they have accomplished it by using project level data where most prior studies used firm level data.

Results: It finds that there are positive returns to scope but not scale for these research efforts.

Uses: The authors discuss indications for which types of mergers will achieve success. Acquisition of greater size in drug R&D is motivating most drug company mergers, according to the authors. The authors conclude that the recent wave of pharmaceutical merger activity may improve R&D performance if a merger diversifies the research within the new company but not if scale is the only achievement.

Limitations: The authors discuss attempts to untangle the effects of new drug discovery and further development. They also discuss drug development strategy: the pace and timing of investments. Both are suggested as areas needing more research.


Purpose: Using a comprehensive but concise description of current pharmacy economics, the author discusses the economic impact of possible Medicare pharmacy benefits.

Data: No primary data is obtained.

Methods: She discusses the overall economics of pharmacy from manufacturer to payer to prescriber to customer.

Results: The manufacturers, their cost structure, and their pricing and discounting methods are described. The markets are distinguished by payer: Medicare, Medicaid, HMOs, and Fee-for-Service or cash payers. The markets are also distinguished by the control of the prescription: outpatient, inpatient. The intermediaries are described: pharmacies, mail order houses, and pharmaceutical benefit management companies. Attempts by the government, HMOs, and others to control costs are described: formularies, generics, competition, and physician control. Generally, those who can steer a volume of prescriptions to a drug can get significant discounts. Odd constraints on pricing are described: prices on older drugs cannot be raised because of the impact it
would have on Medicaid reimbursements. Some data on costs is surprisingly limited. All this and the interactions are combined to generate some guidelines for any proposed Medicare prescription benefit. Links to the Medicaid best price or the Federal Supply Schedule would probably have adverse effects on those prices. Expanding Medicaid could help the poorer Medicare beneficiaries while a voucher plan could help all. Medicare HMOs would need to use formularies and mail order options. A Medicare drug benefit will probably increase overall drug prices.

Uses: Her intent is to inform the design of any Medicare benefit.
Limitations: She points to several areas where data on pharmaceutical cost is lacking. For instance, the extensive quantity discount system is largely untracked.


Purpose: The author discusses the impact of high drug cost inflation on some groups and what can be done about it.
Data and Methods: This is an editorial but it provides good research references and points to areas of interest to actuaries and possible contribution by actuaries.
Results: Davidoff discusses the pharmaceutical industry profitability and cost structure. For 1999, on revenue of 125 billion, profits were 19%, research and development (R&D)16%, promotion 11%, and manufacturing 20%-30%. [No, they don't add up.] He says the reasons offered for such high costs are R&D and further, that US R&D must provide drugs for most of the world. He then analyzes the substitution of drug treatment for surgeries. While there have been many successes, he thinks the drug industry's use of quality-adjusted life years (QALY) to demonstrate why drugs are better is suspect. Further, he says the industry uses it to justify more drugs in the US while denying its relevance in arguments about third-world pricing. He distinguishes drugs that are cost-effective from those that are cost-saving and suggest surgeries might do better in some instances. Finally, he looks at the reasons for the large R&D costs. He notes three expensive developmental technologies (combinatorial chemistry, high-throughput screening, and genomics) and questions their effectiveness. He discusses Uwe Reinhardt's suggestion that drug costs be reduced by disseminating information on effectiveness. He says the insurance industry and government should create a drug testing lab that provides this effectiveness information. His final recommendation is that a voluntary reduction in manufacturers' drug prices would benefit everyone, including the manufacturers.

Uses: The author wants to inform and add to the debate on what to do about drug cost inflation.
Limitations: This is an opinion piece or editorial.


Purpose: Patient satisfaction is increasing in importance in quality of care studies. Some studies have shown that the prescription benefit is an increasingly important coverage for consumers. Yet, most quality or satisfaction measurement indices
do not include pharmacy questions. The author attempts to discover the
determinants of patient satisfaction with pharmacy benefit plans.
Data: 504 patrons of ten random pharmacies in the Pittsburgh area were interviewed
about plan components.
Methods: GLM and multivariate regressions determined significant variables that affect
satisfaction as indicated by survey response.
Results: Consumers mostly use location to choose between pharmacies. They rate
plans based on access, convenience, and out-of-pocket costs. They were more
satisfied with their plan when they had a choice of plans or benefit options.
Demographics, even self-reported health, have a small impact on satisfaction.
HMO and PPO members were somewhat less satisfied with their plans while
PACE members were most satisfied. All were dissatisfied with information
received from their plan.
Uses: The authors encourage adding pharmacy benefits to customary plan satisfaction
surveys. The results can influence plan design in cost effective directions.
Limitations: The population and the geographic area covered are small. Satisfaction is
difficult to measure. This is an early attempt. Neither the length of time in the
plan nor experience with the plan was captured.


Purpose: The author describes the long drug development process and how it has
lengthened over time.
Data: DiMasi uses data collected by Tufts Center for the Study of Drug Development.
They have tracked potential drugs' progress through the developmental process.
They use regular surveys that began in the 1970s.
Method: The length of time each drug spends in each stage of the approval process is
recorded. Then he regresses time spent in each stage of development on
variables such as type of drug, development methods, and type of disease.
Results: DiMasi describes the development of drugs in the US over the long title period.
He mentions the current three exciting technological approaches (combinatorial
chemistry, high-throughput screening, and genomics) but says these will have
effects in the future. The past performance of drug research and development
was highly influenced by regulatory changes. Generally, the length of time each
drug spent in each of the stages of development grew from the sixties to the
early nineties. Some development process times have stabilized or slightly
decreased since then. The study begins with the passage of the 1962
amendments to the Federal Food Drug and Cosmetic Act of 1938. Development
processes slowed until the Prescription Drug User Fee Act of 1992. This
changed the funding of the Food and Drug Administration (FDA) to make it
responsive to drug company research activity. The FDA Modernization Act of
1997 addressed further issues that slow drug development, but it has not yet had
a measurable impact. Drug development time has grown from 8 years in the
sixties to 14 years in the eighties and nineties. There are some indications of
shorter times developing now.
Uses: The results can increase our understanding of the future pipeline of new drugs. It
can also inform policy regarding speeding up the drug development process or
reducing its cost.

Limitations: The companies in the study volunteer information but 77% of all new drugs are included. The definitions of stages of development have evolved.


Purpose: The study attempts to find out what physicians know about the cost of the drugs they prescribe and the cost of alternatives, their view of the importance of cost, and how they get cost information.

Data: One-hundred seventy-eight physicians in Iowa residency clinics responded to a survey. They worked from actual prescriptions back to the physicians to make sure the information tested was relevant.

Method: Physicians were asked to choose the price of 50 drugs in $10 increments. Percentage correct and price scores were calculated for each physician and drug.

Results: This article presents some very interesting statistics on prescription drug cost information. Americans average ten prescriptions per year and one third of those are paid for out of pocket. The cash paying third are a little more likely to use generics but physicians generally make that decision. The physicians underestimated the costs in 90% of attempts at branded drugs and overestimated the costs in 90% of attempts at generic drugs. Two-thirds of the physicians stated they did not receive adequate information on drug costs, and ninety-four percent said good information on drug costs would help them prescribe more cost effectively.

Uses: The article argues effectively for training physicians in the cost of drugs. It suggests that current training, coming from drug manufacturers, misleads or that physicians think all drugs cost about the same.

Limitations: The data are from a narrow population but one that should be cost aware. Managed care had not had an impact in the geographic region studied.


Purpose: This is the story of a biotech startup company intending to do development of diabetes drugs. Not all drug research goes from academia to the big pharmaceuticals directly. Here, it takes the venture capital/research park route.

Data: This is a single case study.

Results: The authors paint a picture that leaves the impression that the drugs that reach the US market are determined by luck. They point to drugs that failed regulatory approval in the US and are successfully used elsewhere in the world and drugs that conversely are approved in the US and found ineffective elsewhere. A drug’s successful circumnavigation of the regulatory process depends on very large funding at appropriate points in time. The regulatory process evolves certain hurdles that may not equate to ultimate effectiveness but still determine which drugs attract funding for the next hurdle. They state that a drug in a determined startup will go further through the regulatory process than it would in a major pharmaceutical where senior executives, concerned about association with failure, will kill it.
Uses: The authors try to demonstrate several problems in the current drug development system.
Limitations: A single case proves little but points to interesting areas for research.


Purpose: This article is narrowly focused on wastage of drugs in a hospital's anesthesia department.
Data: Accounting records determine drugs stocked in the department. Patient records determine drugs administered, the difference being waste.
The authors calculate an efficiency index for six drugs that were chosen for their high expense and because their use had been targeted by formularies, use guidelines, etc. Efficiency was the portion of drugs, weighted by cost, actually used. The research project also included a survey of the doctors and higher-level nurses. Their knowledge of costs and wastage was questioned.
Results: Efficiency ranged from 29% to 61% for the six drugs in the study. This overstates the efficiency from the medical system or patient view because, for one of the drugs, any opened vial was charged to the patient no matter what was discarded, hence, no "waste" to the department budget. The doctors' and nurses' knowledge of costs was low (and lower for the doctors). Their answers on wastage suggested that the biggest waste was drawing needles and disposing of them without use or with only partial use.
Uses: The authors wanted to demonstrate the use of a drug information system. For six drugs in one department of one hospital, waste of $165,000 was calculated. Various estimates were that at least one-fourth of this was "recoverable" with better procedures.
Limitations: It is not possible to extrapolate from this single department/hospital to drug costs in general.


Purpose: This opinion piece describes the impact of prescription costs on the elderly. The Bush plan, the Democrats' plan, and the Breaux-Frist compromise are also described.
Data and Methods: This argues from secondary information.
Results: Finding none of the proposals adequate, the author calls for elimination of poverty and inequality.
Uses: The arguments may serve a political purpose. It demonstrates the wide range of thinking in academic literature.
Limitations: A practical method of eliminating poverty and inequality is not proposed.


Purpose: Kleinke describes the economics of US healthcare and argues for effectiveness analysis.
Data: Secondary data is used. Methods: The author makes comprehensive economic arguments. Results: In a most interesting article, Kleinke argues that medicine, like other industries in the US, is undergoing structural change. Labor is being replaced by technology. Kleinke sees the technology as prescription drugs and the labor as hospitals. The labor of doctors is being reduced but their role as gatekeeper of the technology keeps them busy. Thus pharmacy costs rise and hospital costs fall, but general health is increasing rapidly. Kleinke argues that healthcare payment systems are antiquated. They are based on a model of health care that no longer exists, but they are trying to perpetuate it. Insurers, HMOs, Medicare, and Medicaid will sometimes refuse to pay for a drug that would save them many multiples of the drug’s costs. Solutions proposed to date fail for not recognizing the underlying economics of different drugs. One solution doesn’t fit all. Kleinke classifies drugs as: (1) Fast Pays are drugs (anticoagulants for stroke, some antipsychotics) that will return their cost immediately. Economists would have to say that plans failing to pay for these are irrational. (2) Slow Pays are drugs (SERM for preventing bone density loss) that will reduce the overall (an actuary would say present value of) cost of medicine. A rational insurer may not pay for these if it expects high turnover (or just wants a higher return this quarter). Other payers will accrue the benefit it funded. Kleinke argues for more rational tax law as he thinks the employer link causes high turnover of health plans. Slow-Pays attract direct to consumer advertising. (3) Narrow Pays are drugs (cholesterol treatment, vaccinations) that will benefit a few if distributed widely. (4) Diffuse-Pays increase overall medical costs but decrease disability or productivity loss. Flu shots and allergy medications are examples. The insurer has no economic incentive to pay for these so employers often pay for flu shots outside the health plan. Diffuse-Pays attract direct to consumer advertising. (5) Pay-me-laters reduce short term costs but increase long term costs. Pulmozyme for cystic fibrosis shows this pattern. (6) No-Pays simply increase the overall cost of the medical system. The immune system suppressers that have made liver transplants successful fall into this category. Short-term and long-term costs are increased. So are life expectancy, quality of life, and productivity. Kleinke justifies mandates for some No-Pays. Viagra is another No-Pay. In conclusion, Kleinke wants cost effectiveness analysis performed on each drug and for that to drive control measures. Until then he expects irrational rationing of overall medical care. Uses: Kleinke makes effective arguments that could inform policy. Insurers could use his views to make more cost-effective payments. Limitations: This is highly informed opinion but the complex interactions so convincingly described deserve testing in a model at minimum.


Purpose: This paper describes pharmacy-based Investigational Drug Services (IDS) at two university-based hospitals. It questions if a systematic effort to take advantage of the free drugs is cost-justified. Data: Accounting data and drug dispensing records are compared. 255 drug studies
were involved.

Methods: Cost-benefit analysis is performed in two settings. The budget for an IDS is compared with cost savings from using free drugs. They measure cost saved to the hospital and its patients from using drugs either provided free or paid for by the research sponsor, as well as more efficient use of the drugs. Only drugs for which a price is available, or for which the price of a clear substitute is available, are used in estimating savings. But all costs are included.

Results: They claim cost savings of ten times the administrative budget for the IDS department. Accountability for the study drugs provided to the institution was increased. The majority of cost avoided was for AIDS and oncology patients. Overall cost avoided was 8% of the hospitals’ drug budgets.

Uses: This small project shows a way for a hospital to shift some costs to drug manufacturers.

Limitations: These results are from large research hospitals.


Purpose: Mehl annually updates his forecast for pharmaceutical expenditure and reviews his past efforts.

Data: Secondary data is reviewed.

Methods: Mehl discusses the macroeconomics of the pharmacy industry.

Results: He admits to missing it for 1998 when he forecasted continued small increases. The large increase through ten months of 1998 leads to a higher prediction for 1999. Many of the dynamics of drug costs are discussed, but one focus is on an increase in the cost of generics and its ripple effects. Relatively fewer generic prescriptions may be written and the reduced competition from generics may allow brands to increase prices. The second focus was on the increased pipeline for new drug approvals due to the improved regulatory environment. Many big drugs (Viagra and a couple Alzheimer's drugs) were expected in 1999.

Uses: Health plans could benefit from his forecasts as could other drug purchasers.

Limitations: This is general economic reasoning, not a model.


Purpose: Mehl annually updates his forecast for pharmaceutical expenditure and reviews his past efforts.

Data: Secondary data is reviewed.

Methods: Mehl discusses the macroeconomics of the pharmacy industry.

Results: Cost increases in drugs for the first ten months of 1999 were inconsistent. The increase was very high early on and declined thereafter. Contrary to expectations, fewer new drugs were introduced to the market than in 1998. Predicted cost increases from other sources are mentioned with none lower than 10% for 2000. Drug purchases by seniors are increasing by 15% and pressure mounts for relief. It is acknowledged that a prescription plan for seniors would have ramifications throughout the market. Internet pharmacy has become a reality. Wholesalers and mail-order houses have merged rapidly. Research and
development expense continues to grow at ten to twenty percent.

Uses: Anyone who could benefit from a forecast of drug costs may see value here.
Limitations: Although the annual lookback is refreshing, this is just general macroeconomic reasoning and opinion, not a model.


Purpose: This is Mehl's award reception address to the American Society of Health-System Pharmacists.
Data and Methods: None.
Results: He frames his comments with some history of clinical pharmacy and then paints a picture of the problems of healthcare, especially drug costs, in the US today. One concern expressed was the conflict between the pharmacists' duty to warn of drug interactions, etc., and new healthcare privacy laws that would seem to preclude such activity. He had verbal assurance that exceptions for pharmacists would be forthcoming. His view is unique, except perhaps in his audience. He would solve many problems (such as prescription quality control) by having pharmacists practice outside the walls of the pharmacy, at the patient's bedside. He says that managed care organizations are recognizing this cost-efficient role for pharmacists. The lab task of mixing drugs will fall more and more to pharmacological technicians. The doctor will diagnose and the pharmacist will prescribe in Mehl's view. The pharmacist will be responsible for the entire medication cycle.

Uses: It gives a view of the future of medicine from a unique perspective. It is a scenario to consider.

Limitations: Both the focus and the framework are very narrow.


Purpose: This is the most recent of the journal's annual review and forecasts of pharmaceutical expense.
Data and Methods: No primary data is used. General macroeconomic reasoning is used to analyze and forecast costs.
Results: Double-digit cost increases will continue into 2001. Research and development costs are increasing rapidly, but new drugs are not being introduced as quickly as anticipated when regulations were relaxed twice in the nineties. There are increases in utilization and increases in the cost of existing drugs. The major pharmaceutical companies are merging rapidly. Just four of the top ten were not involved in a merger in the last two years. Drugstore.com has almost one million customers. One factor that may help hold down costs is that several major drugs outlive their patent in the next few years. Also, the Food and Drug Administration has been moving more drugs from prescription to nonprescription status. One item increasing costs is the process of finding new indications for existing drugs.

Uses: Both the reasoning and the actual forecast (if timely enough) could help with budgets, rates, etc.
Limitations: The influences of many factors are considered without an overall model.

Purpose: This considers that a part of the high cost of drugs is wastage and attempts to measure it.

Data: This is a small study (of 73 nonrandom residents) done in one New Hampshire retirement community. The 65+ year old residents were highly educated, had full prescription benefits, and had relatively high retirement income.

Methods: A cross-sectional survey questionnaire was backed up by home visits and counting the actual pills, etc.

Results: Waste of drugs was only 2.3% of all prescriptions. This amounted to $30 per patient per year. This small cost, extrapolated to all seniors in the US, would amount to over one billion dollars. Reasons for waste included healed (37%), ineffective (23%), changed by physician (16%), and adverse effects (14%). Morgan says there is considerable literature on patient compliance with drug treatment. He suggests the need for research on cost-minimizing prescription quantities.

Uses: More importantly, wasted drugs may indicate patients who didn't follow the program and may be suffering because of it. They may incur more expense.

Limitations: Morgan warns of the many reasons why this group is unique and how other groups could have lower or (more likely) greater wastage. Recall was a factor in the reported results so understatement is very likely.


Purpose: The author notes that coverage for drugs is a motivating factor for seniors enrolling in Medicare managed care plans. Rector tests whether decisions to leave managed care plans are affected by prescription benefit exhaustion.

Data: He studies 61,000 enrollees in four plans with prescription maximums of $1,000 or less. About 20% of the enrollees exhausted their drug benefit. Enrollees with indications of other prescription benefits (Medicaid or employer coordination) were excluded. All records were from one HMO, but the study covered the US geographically. All members were in areas with competing plans.

Methods: He uses Cox regression to determine the relative hazard of dropping the plan after benefit exhaustion. Many potential confounding variables were controlled.

Results: The answer is yes, that the Cox regression relative hazard of dropping the plan is twice as high for those who reach the maximum. This brings favorable selection to the plan and increases fee-for-service costs. Those who eventually exhausted their drug benefit were less likely to drop the plan prior to benefit exhaustion, revealing antiselection against the plan.

Uses: Member behavior with respect to plan provisions is always useful information. Other studies have noted that compliance with prescriptions declines when the maximum is reached. Maximums are typically low so this may cause either plan switching or health problems or both, as switching plans may cause a change of physicians. Policy implications include the inefficiency of fragmented systems.

Limitations: The data is from one HMO operating in areas with multiple HMOs. Those
who disenrolled were not followed up or questioned as to reasons or intentions.


Purpose: The authors note prior studies showing that physicians were unaware of drug costs. They test two questions. First, has managed care, with its emphasis on costs, improved physicians' drug cost awareness? Secondly, they do not find prior studies focused on family doctors who act as primary care physicians for many people. Will they do better than other doctors?

Data: They sent written surveys to 189 internal medicine physicians associated with one New York City hospital and 134 responded.

Methods: Mostly descriptive statistics are used to analyze the results.

Results: Doctors are sensitive to this issue and they do allow ability to pay to affect their prescription choice. However, they lack information sources and training in costs. They are far less sensitive to cost issues if the patient has any form of plan covering drugs. Unfortunately, the physicians were less sensitive to drug costs for their patients on Medicare, indicating a possible misunderstanding of Medicare benefits. The surveyed doctors, including internists, did no better than they did twenty years ago at estimating the costs of various medications. They still underestimate the cost of expensive medicine (brands) and overestimate the cost of inexpensive medicine (generics). Only 8% expressed a bias or preference for brand name drugs.

Uses: Cost affects both the overall allocation of societies' resources and the effectiveness of care since the completion of medication programs is affected by the patient's ability to pay. This argues for physician education.

Limitations: The authors discuss the difficulty of testing knowledge of prices. Free form questions lower response rates. Multiple choice ranges may suggest answers. Actual prices may vary. New York has medium managed care penetration.


Purpose: This is not quite scholarly research but a caution and bit of advice to physician practices that consider taking on capitation including prescriptions.

Data and Methods: This is an opinion piece referring to some primary data.

Results: Smith discusses the causes for drug cost increases in the same terms as the other articles. He focuses on three: (1) less out-of-pocket prescription costs allow prices to rise, (2) utilization, and (3) new drug introductions. The requirements for successfully accepting the risk of covering drug costs are (1) an information system including drug database, (2) a fairly large group, (3) physician education, and (4) an uncompetitive market. He discusses education as an antidote for direct-to-consumer advertising and drug detailing. The latter is a term commonly used to describe the efforts of drug salesmen. He describes the upside, potential profit from accepting drug capitation as tiny. He says it depends on how competitive (or how "managed") the local medical market has become.

Uses: This is practical advice for a physician practice. For insurers or policy makers, it is
...a view to how others look at the drug cost situation
Limitations: It is based on the experience of one North Carolina physician.


Purpose: The authors compare compliance with prescriptions, implied costs, and other healthcare cost and use. Management of chronic illness amounts to 75% of medical care in the US. The authors' simple argument is that most (90%) older patients have some chronic illness, chronic illness is treated with maintenance drugs, successful treatment requires compliance with the drug program, and compliance requires dispensing the correct amounts.

Data: Hospital and pharmacy (tax-supported, urban) records over a three-year period are analyzed. Four-thousand hospital patients are tracked. Their situation suggests they would buy almost all medications at the hospital pharmacy and exclusively use the hospital.

Methods: They use the ratio of expected to actual time to refill (medication possession ratio-MPR) as a measure of medication compliance. It is calculated for each drug and averaged over all drugs for each patient. Hospital use and cost was regressed on MPR.

Results: The authors' data on 4,000 patients tracked for three years shows that both oversupply (47% of patients) and undersupply (16% of patients) are associated with noncompliance and with higher rates of emergency room visits and hospitalization. Average MPRs between 80% and 120% were considered in compliance but sensitivity tests were run at other values. The authors refer to research showing that taking 80% of prescribed medications is usually adequate compliance, but they cite a lack of similar data on taking too much medication. They chose 120% for symmetry. They also describe the savings from undermedication and the excess costs of oversupply. The net of the two was a savings. Other studies have stated that 25% of older patient hospital admissions are due to noncompliance with medication routines.

Uses: The authors state that doctors, pharmacists, or hospitals should monitor patients’ drug supplies. Compliance requires correct supply.

Limitations: The population studied is narrow. The correlation between supply and compliance, and the correlation between compliance and outcomes is a two-step process. This is done because of the difficulty in directly studying compliance.


Purpose: The authors try to evaluate the overall economic savings of formularies, including the administrative costs.

Data: Over 2,000 requests were studied. Budget and cost accounting data was used for administrative costs. Data from nonformulary request forms was used to determine savings from switching to formulary drugs.

Methods: Total costs and savings were compared.
Results: The administrative costs are illustrated by the process at one major university hospital. On receipt of a nonformulary prescription, the pharmacist contacts the physician. One of four results occurs: (1) agreement on the formulary alternative, (2) agreement on the nonformulary drug, (3) agreement to use patient’s existing drugs, or (4) disagreement. The latter requires a formal review by one of four specified doctors. In all cases the pharmacist must document the nonformulary request and its resolution (although compliance was poor). Nonadministrative costs mentioned in other studies but not quantified here include: (1) detriment to pharmacist-physician relations, (2) adverse drug events, (3) increased stays, and (4) other increases in medical resource use. Some of these are caused by delays in fulfillment. Each nonformulary request took 15 to 45 minutes of extra administrative time for the pharmacist. The savings exceeded the administrative costs only for expensive injectable drugs.

Uses: The authors think their information can be used to develop formulary policy and procedures. They argue for selective additions to formulary lists and some automatic switching of prescriptions.

Limitations: Many costs were left out of the study. There was considerable noncompliance with formulary rules. However, many prescriptions were switched to the formulary before the prescription entered the process described here. These savings would not be included.


Purpose: This is a descriptive statistical study focused on elderly insureds with the highest prescription costs. The top 4% of spenders consume 28% of the drugs used by seniors (from Medicare data on seniors with drug coverage).

Data: Data was from Advance PCS a company that manages drug coverage for 80 million people. The outpatient drug use of 100,000 was studied.

Methods: Many descriptive statistics were developed.

Results: As might be expected, big spenders (defined as the top 12% of spenders) use more drugs and higher cost drugs compared to the other 88% of seniors. Filling 50 prescriptions per year, they use drugs from more therapeutic categories indicating multiple chronic conditions. Within a therapeutic category, they use more expensive drugs. The drugs they use are more likely to be newer and less likely to be generic. The only mild surprise here is the finding that neither age nor sex predicts the big spenders. In fact, members of the over 85 group are less likely to be big spenders. Costs are rising rapidly. Getting into the top ten percent of spenders took $2,300 in 1997, but $3,600 in 2000. When individuals get into the high cost category, they tend to stay there.

Uses: This could inform policy on Medicare drug benefits.

Limitations: This applies to fully insured individuals.