ANTIBIOTICS RESEARCH SUPPLEMENT

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SIMPLE TRUTHS
WHITE PAPER RESEARCH LITERATURE SUPPLEMENT
PART II

RESEARCH CONDUCTED BY
Michael Scott
Research Consultant

PRESENTED TO
Kevin Guest, Executive Vice President
USANA Health Sciences
SUBJECT
Antibiotics – over-use, drug resistant organisms created from antibiotic use

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NOTE
The original technical and scientific studies have been shortened in this supplement. Links are provided to the original website to view the complete studies.
ANTIBACTERIAL PRODUCTION IN YOUR HOME

CONSUMER ANTIBACTERIAL SOAPS
Effective or Just Risky?

**Background.** Much has been written recently about the potential hazards versus benefits of antibacterial (biocide)–containing soaps. The purpose of this systematic literature review was to assess the studies that have examined the efficacy of products containing triclosan, compared with that of plain soap, in the community setting, as well as to evaluate findings that address potential hazards of this use—namely, the emergence of antibiotic-resistant bacteria.

**Results.** Soaps containing triclosan within the range of concentrations commonly used in the community setting (0.1%–0.45% wt/vol) were no more effective than plain soap at preventing infectious illness symptoms and reducing bacterial levels on the hands. Several laboratory studies demonstrated evidence of triclosan-adapted crossresistance to antibiotics among different species of bacteria.

**Conclusions.** The lack of an additional health benefit associated with the use of triclosan-containing consumer soaps over regular soap, coupled with laboratory data demonstrating a potential risk of selecting for drug resistance, warrants further evaluation by governmental regulators regarding antibacterial product claims and advertising. Further studies of this issue are encouraged. In October 2005, the Non-Prescription Drug Advisory Committee of the US Food and Drug Administration (FDA) was convened to discuss the potential benefits and risks associated with antiseptic products marketed for consumer use, such as soaps labeled as “antibacterial.” The conclusion of the FDA meeting resulted in a call for further research regarding the risks and benefits of specific consumer antiseptic products used in the community setting. Much of the debate regarding consumer antiseptic products has focused on the use of “antibacterial soaps” that contain the active ingredient triclosan. The majority of consumer liquid hand soaps labeled as “antibacterial” contain triclosan [1], and, although the FDA does not formally regulate the levels of triclosan used in consumer products, most of Reprints or correspondence: Dr. Allison E. Aiello, Center for Social Epidemiology and Population Health, 1214 S. University, 2nd Fl., Ann Arbor, MI 48104-2548 (aielloa@umich.edu).

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the popular liquid hand soap brands contain between 0.1% and 0.45% weight/volume (wt/vol). A chemically related compound, triclocarban, is used in antibacterial bar soap formulations. Triclosan is a phenoxyphenol antimicrobial that is marketed as an “antibacterial” ingredient in consumer hygiene products, but it also has some antiviral and antifungal activity [2]. It is bacteriostatic at low concentrations and bactericidal at high concentrations [3]. Triclosan has been shown to inhibit the growth of both gram-positive and gram-negative bacteria in situ, with varying effectiveness across bacterial species [2]. For example, triclosan is relatively ineffective at inhibiting the growth of gram-negative bacteria such as *Pseudomonas aeruginosa* and *Serratia marcescens* [2]. Although the bactericidal activity of triclosan involves some nonspecific killing mechanisms, research findings suggest that the bacteriostatic action occurs by inhibiting a specific bacterial target, known as the “enoyl-acyl carrier protein reductase” [4–6]. Triclosan shares this bacterial biosynthetic fatty acid pathway target with the antibiotic isoniazid [5]. These findings have led researchers to explore whether triclosan may influence the emergence of resistance to antibiotics [7–9]. Similar to the methods used for testing clinical antibiotic resistance, aMIC method is used to assess reduced susceptibility to triclosan. Currently, there are no clinically meaningful MIC cutoff points for monitoring resistance to biocides, and, therefore, the term “reduced susceptibility” is commonly used when discussing bacterial tolerance to triclosan exposure. Similar to their resistance to antibiotics, bacteria may be intrinsically resistant to triclosan via mechanisms of impermeability, efflux pumps, biofilms, and enzyme inactivation. The decreased susceptibility of greatest concern regarding triclosan is acquired tolerance/resistance. The resistance mechanisms are similar to those producing antibiotic resistance and include mutations at the drug target site, chromosome-mediated drug efflux, and overexpression of the target protein. Acquired bacterial resistance mechanisms may lead to an increase in MICs to antibiotics as well as to triclosan [7, 9, 10]. Although several investigators have reviewed studies examining the mechanisms of antiseptic resistance [7, 9–16], there are few systematic reviews that have attempted to summarize the potential risks associated with triclosan in the context of the purported effectiveness of this antibacterial ingredient used in hygiene products in the community setting. The efficacy of soap containing triclosan generally refers to the additional level of effectiveness beyond the ability of plain soap to simply remove transient organisms via surfactants and the mechanical action of the wash procedure [17]. The level of effectiveness may be measured at the microbiological level or at the population level, as added protection against bacterial contamination or the occurrence of common infectious illnesses. Risks, on the other hand, include the potential for bacteria to become unsusceptible to triclosan, for the emergence of cross-resistance to antibiotics, and for the ingredients to become toxic to the environment and to humans.
Only in the past 5 years has the effectiveness of triclosan for preventing infectious illnesses in the community setting been assessed; the first studies of which we are aware were published in 2002 [18]. In this review, we identify and summarize the studies examining the efficacy of triclosan by reviewing research that has examined the effectiveness of these consumer antiseptic soaps at reducing the incidence of infectious illnesses in the community setting and bacterial counts on the skin. Second, we identify and summarize the literature that examines whether there is a potential risk associated with use of hygiene products containing triclosan in relation to emergence of microbes that are less susceptible to triclosan and/or resistant to clinically used antibiotics. Finally, we weigh the evidence regarding the risks and benefits and conclude with recommendations for further research and for examining the implications of the current data on regulation of consumer products containing triclosan.

METHODS

The PubMed database was searched for English-language articles published during the period January 1980–July 2006, using keyword combinations for each search strategy. Keywords included “absence,” “absent*,” “alcohol,” “antibacterial cleaning,” “antibacterial soap,” “antiseptic,” “behavior,” “child care,” “child day care,” “child morbidity,” “child*,” “cold,” “community,” “day care,” “day care center,” “diarrhea*,” “diarrhoea,” “education,” “hand,” “hand sanitizer,” “hand wash,” “hand wash*,” “infection control,” “infectious disease,” “infectious illness,” “infectious*,” “intervention,” “health intervention,” “hygiene,” “hygiene education,” “infants,” “infect*,” “morbidity,” “preschool,” “prevent*,” “respiratory,” “sanitation,” “soap,” “school,” “triclocarban,” “triclosan,” “wash*,” and “water.” An asterisk (*) denotes a truncated search method in which PubMed seeks the first 600 variations of terms with the same root (for example, “infect*” would result in a search for “infect,” “infection,” “infectious,” etc.). The search results were scanned for research articles and systematic reviews. In addition, the reference lists in retrieved review papers were searched for related articles. Articles that focused on triclosan in dentifrice were excluded, because the introduction of triclosan in dentifrice was relatively recent (1997), compared with its introduction in topical antiseptics (1960s) [3, 19]. Our review of the literature was limited to studies that allowed comparison of the effectiveness of triclosan-containing soap with that of plain soap. We also included studies that assessed the effectiveness of triclocarban soap, because this is a chemically similar compound found in most antibacterial bar soaps available to consumers. The study outcomes included reported or diagnosed gastrointestinal infection (such as shigellosis) or upper respiratory tract infection (such as pneumonia), general gastrointestinal and/or respiratory symptom(s) of infection (such as diarrhea or runny nose), gastrointestinal and/or respiratory infectious symptom–related absences (such as school absence for a “cold”), and/or skin infections. Microbiological end points were limited to studies that examined the effect of antibacterial soap containing triclosan on bacterial reductions on the hand, compared with plain soap. Studies conducted among
volunteer participants that were not associated with the clinical setting were included if they were conducted in natural settings or in a controlled laboratory environment. Because this review focused on the use of hand products containing triclosan in the community setting, articles were excluded if the setting was a health care facility, such as a hospital or residential nursing home, or if the study subjects were health care workers. Lastly, studies in which triclosan was combined with other antiseptic ingredients, such as alcohol or iodine, were excluded, because it would not have been possible to estimate the independent effects of triclosan compared with plain soap in these studies [20]. To review the literature associated with risks, articles were included if they (1) assessed mechanisms of cross-resistance, using serial culture adaptation methodologies and/or genetic manipulation of the bacterial molecular target site of triclosan; (2) assessed levels of susceptibility to triclosan among bacterial isolates obtained from humans in the community setting; or (3) examined the statistical association between in-use exposure to triclosan and reduced susceptibility to triclosan and/or antibiotic resistance among humans living in the community setting.

Using available data from the retrieved studies, we summarized the findings regarding the efficacy of triclosan for reducing infectious illness symptoms and bacterial growth on skin. Next, we summarized the studies examining in situ mechanisms of reduced susceptibility to triclosan and cross-resistance with antibiotics. In addition, we summarized the studies that examined the association between the use of triclosan and the emergence of antibiotic resistance among individuals living in the community setting. Lastly, the strengths and limitations of the studies were assessed by considering methods related to design and conduct, such as sample size and masking of treatment from study participants.

RESULTS

The PubMed search identified 1793 citations. On the basis of our inclusion criteria, we identified a total of 27 studies that examined either the effectiveness of triclosan or the risks of antibiotic resistance associated with exposure to triclosan. Efficacy of triclosan. We identified 4 community-based randomized intervention studies [18, 21–23] providing information on the effectiveness of consumer soaps containing triclosan or triclocarban compared with that of plain soap (table 1). Three of these studies were conducted in Pakistan, and 1 was conducted in an urban setting in the United States. The study sample sizes ranged from 162 to 600 household units, and all households were required to include a child _4 years of age. Interventions included household member use of consumer- available bar soap containing 1.2% triclocarban (wt/vol) or liquid hand soap containing 0.2% triclosan (wt/vol) over a 1-year period. The outcomes recorded infectious illness symptoms such as cough, fever, diarrhea, and skin infections. None of these studies included the collection of clinical samples for laboratory identification of the etiologic agent associated with illness.
symptoms. All 4 studies showed no significant reduction in illness symptoms among household members associated with the use of the biocide-containing soap versus plain soap. We identified 9 studies that examined the effectiveness of soap containing triclosan versus plain soap in reducing bacterial levels on the hands (table 1) [24–32]. The majority of the microbiological effectiveness studies (n=8) were conducted in a controlled laboratory setting [24, 26–32], and 1 was conducted under natural conditions in the household setting [25]. Study sample sizes ranged from 10 to 238 subjects, and study subjects were characterized as nonclinical volunteers. Slightly fewer than half (4/9) of the studies mentioned the use of randomization procedures, and only 22% reported masking of study treatments. Most of the studies examined the normal skin flora as the outcome, but 2 of the 9 studies used artificial contamination [24, 32] procedures, by inoculating the skin of volunteers with S. marcescens. Approximately half (5/9) of the microbiological studies compared soap with at least 1.0% triclosan (wt/vol) versus plain soap, whereas the others utilized a concentration of _0.3% triclosan (wt/vol) in the comparison. Five of the 9 studies reported a significant reduction in bacterial counts on hands in association with the use of triclosan-containing soap versus plain soap. All but 1 of these 5 studies utilized soap with a relatively high concentration of triclosan, _1.0% [29–31], and 2 of the 5 studies reported a significant reduction only after multiple hand washes [24, 31], over multiple hand-washing episodes [24, 31], or after washing for 30 s [24, 31]. Only 1 study assessing triclosan at a concentration of 0.3% wt/vol (a concentration closer to the 0.1%–0.45% wt/vol found in many consumer antibacterial soaps) reported a significant reduction in bacterial counts, and this reduction was observed only after 18 hand washes per day, for 30 s each, over 5 consecutive days [31].

**Risks associated with triclosan.** Our search identified 11 laboratory studies assessing the influence of triclosan exposure on the emergence of triclosan-tolerant species and cross-resistance to clinical antibiotics (table 2). A range of bacteria was examined, including gram-negative and gram-positive species; commonly studied species included *Escherichia coli, Staphylococcus aureus,* and *Salmonella enterica.* Seven of the 11 studies demonstrated cross-resistance to _1 antibiotic for at least 1 of the bacterial species examined (table 2). Commonly assessed antibiotics included isoniazid, ciprofloxacin, erythromycin, tetracycline, chloramphenicol, ampicillin, and methicillin. Three of 11 studies reported an increase in MICs to triclosan among bacterial species but did not demonstrate cross-resistance to clinically used antibiotics. One study examining *E. coli* reported no evidence of increased tolerance to triclosan or cross-resistance to antibiotics [39]. Given the variety of bacterial species and antibiotics tested across studies, it was not possible to assess whether a consistent pattern of cross-resistance for specific organism/antibiotic combinations existed. We identified only 3 studies that examined the emergence of antibiotic resistance associated with use of triclosan in the community setting (table 3). The first study included a convenience sample of 60 households [43] divided into those that reported using _1 antibacterial hygiene products and those S140
Table 1. Studies comparing the efficacy of antibacterial soap containing triclosan (Ts) with that of plain soap.

<table>
<thead>
<tr>
<th>Study type, reference</th>
<th>Sample size</th>
<th>Antibacterial soap study group, liquid/ bar (concentration of Tc or Ts)</th>
<th>Nonmedicated plain soap control group, liquid/bar</th>
<th>Outcome(s)</th>
<th>Results (antibacterial soap vs. plain soap)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious illness studies a Luby et al. [21]b</td>
<td>600 households</td>
<td>Bar (1.2% Tc)</td>
<td>Bar</td>
<td>Multiple symptoms</td>
<td>Not statistically significant: RR of symptoms—assessed independently—all 1 Larson et al. [22]</td>
</tr>
<tr>
<td>Luby et al. [23]b</td>
<td>600 households</td>
<td>Bar (1.2% Tc)</td>
<td>Bar</td>
<td>Diarrhea symptoms</td>
<td>Not statistically significant: mean incidence of diarrhea was 2.02 (antibacterial soap) vs. 1.91 (plain soap) Luby et al. [18]</td>
</tr>
<tr>
<td>Microbiological studies Sickbert-Bennett et al. [24]</td>
<td>10 volunteers</td>
<td>Liquid (1.0% Ts)</td>
<td>Liquid</td>
<td>Reduction in mean log10 Serratia marcescens colony-forming units after artificial contamination of hands Not statistically significant: after 1 episode of hand hygiene, 1.90 (antibacterial soap) vs. 2.00 (plain soap) log10 cfu reduction Statistically significant: after 10 episodes of hand hygiene, 2.49 (antibacterial soap) vs. 1.68 (plain soap) log10 cfu (P &lt; .0001) reduction Larson et al. [25]</td>
<td>238 primary care givers</td>
</tr>
</tbody>
</table>
spaced 20 min apart, 0.79 (antibacterial soap) vs. 0.16 (plain soap) log10 cfu reduction ($P < .001$) Larson et al. [31] 40 nonmedical volunteers Liquid (0.3% Ts) Liquid Mean log10 bacterial colony-forming units on hands Not statistically significant: after 1 day of use at 6 hand washes/day, 6.17 (antibacterial soap) vs. 5.71 (plain soap) log10 cfu ($P = .05$) Not statistically significant: after 1 day of use at 18 hand washes/day, 6.11 (antibacterial soap) vs. 5.75 (plain soap) log10 cfu ($P = .05$) Not statistically significant: after 5 days of use at 6 hand washes/day, 5.42 (antibacterial soap) vs. 5.25 (plain soap) log10 cfu ($P = .05$) Statistically significant: after 5 days of use at 18 hand washes/day, 4.56 (antibacterial soap) vs. 5.45 (plain soap) log10 cfu ($P < .05$) Bartzokas et al. [17] 12 volunteers Liquid (1.5% Ts) Liquid Reduction in mean log10 $S. \text{marcescens}$ colony-forming units after artificial contamination of hands Statistically significant: significant reductions were observed after 1 (2.91 log10 cfu), 4 (3.22 log10 cfu), 7 (3.50 log10 cfu), and 10 (3.78 log10 cfu) episodes of hand hygiene with antibacterial soap, compared with 1 episode with plain soap (2.72 log10 cfu) (all $P < .01$)

**NOTE.** RR, relative risk; Tc, triclocarban. a All infectious illness studies followed participants for 1 year. b These studies did not provide a statistical comparison of the antibacterial treatment arm versus the plain soap treatment arm, so we computed statistical comparisons using the data available from the study. It was not possible to control for clustering effects in these calculations. c Infectious illness symptoms such as diarrhea, cough, congestion, pneumonia, and impetigo. d Infectious illness symptoms such as diarrhea, cough, sore throat, fever, and vomiting. e Models adjusted for covariates. S142

**Table 2. Triclosan (Ts) adaptation and antibiotic cross-resistance studies.**

Reference Types of bacterial species Exposure parameters Results Ledder et al. [33]a Coagulase-negative *Staphylococcus* species, *Enterobacter asburiae*, *Escherichia coli*, *Klebsiella* species, *Salmonella enterica* (serotypes Enteritidis, Typhimurium, and Infantis), *Stenotrophomonas maltophilia* Ts/antibioticsb Ts MIC was increased among *E. coli*, *Klebsiella* species, and *S. maltophilia* only; among bacteria with high MICs to Ts, there was no increase in MICs to 4 antibiotics after exposure to Ts Sanchez et al. [34] S. *maltophilia* Ts/antibioticsb Ts-adapted mutants showed reduced susceptibility to tetracycline and chloramphenicol but not to tobramycin, compared with the wild-type strain; these strains overexpressed the multidrugresistance pump SmeDEF Braoudaki and Hilton [35]a S. *enterica* (serotypes Enteritidis, Typhimurium, and Virchow) Ts/antibioticsb S. *enterica* serotype Virchow became more tolerant to Ts and erythromycin after gradual exposure to higher concentrations of these agents (up to 1024 mg/mL) over 6 days; adaptive resistance to Ts and erythromycin was stable for at least 30 days of passage in Ts/antibioticfree medium Braoudaki and Hilton [36]a *E. coli* O111:H24, *E. coli* O157:H7, *E. coli* O55, *E. coli* K-12 Ts/antibioticsb Four sublethal exposures of *E. coli* O157:H7 led to an increase in MICs to Ts of 0.25 mg/mL to 1024 mg/mL; Ts-adapted *E. coli* O157:H7 demonstrated cross-resistance to a number of antibiotics, including amoxicillin, chloramphenicol, ciprofloxacin, tetracycline, and trimethoprim; *E. coli* K-12 and *E. coli* O55 adapted to Ts
showed reduced susceptibility to chloramphenicol and trimethoprim, respectively; other strains did not
demonstrate cross-resistance Braoudaki and Hilton [37] E. coli O157:H7, E. coli K-12, S. enterica (serotypes
Enteritidis, Typhimurium, and Virchow) Ts/antibioticsb An increase in MICs to Ts and cross-resistance with
erthyromycin and ciprofloxacinwas demonstrated for E. coli O157:H7; adaptation of E. coli O157:H7 to
erthyromycin also led to an increase in MICs; S. enterica serotype Virchow demonstrated reduced
susceptibility to Ts and cross-resistance with erythromycin after serial passage Randall et al. [38] S. enterica
Ts/antibioticsb Increase in the mean frequency of mutations that confer resistance to ampicillin Walsh et al.
[39] E. coli Tcc No evidence of increased tolerance to Ts Fraise [40] MRSA Tsd Threefold increase in MICs
to Ts Chuanchuen et al. [41] Pseudomonas aeruginosa Ts/antibioticsb A 94-fold increase in MICs to
ciprofloxacin was observed among strains that showed high levels of tolerance to Ts Suller and Russell [42]
Methicillin-susceptible S. aureus, MRSA Ts/antibioticsb No consistent pattern between high Ts MICs and
antibiotic-resistance profiles after exposure over 1 month; 2 of 3 MRSA strains that were resistant to
mupirocin and several other antibiotics were also less susceptible to Ts; however, coresistance with
mupirocin was not plasmid mediated McMurry et al. [5] Mycobacterium smegmatis Ts/isoniazide A mutation
originally selected for on isoniazid also mediated Ts resistance, and vice versa

Table 3. Community-level studies of the relationship between exposure to triclosan in home hygiene
products and antibiotic resistance.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Sample size (location)</th>
<th>Isolate source</th>
<th>Organism(s)</th>
<th>Antibiotics, no.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cole et al. [43]</td>
<td>60 households; 8 bacterial isolates (US, UK)</td>
<td>Hands of 1–2 household members reporting use of antibacterial products vs. those reporting use of nonantibacterial products</td>
<td>Staphylococcus aureus</td>
<td>18 Comparable triclosan MICs among antibacterial vs. nonantibacterial user homes; a no patterns discerned with antibiotic susceptibilities Aiello et al. [44] 240 individuals; 628 bacterial isolates (US)</td>
<td>Hands of primary caregivers in households using antibacterial vs. nonantibacterial products Acinetobacter species, Enterobacter species, S. aureus, coagulase-negative staphyloccocal species, Klebsiella species, Pseudomonas species</td>
</tr>
</tbody>
</table>
that reported no use of antibacterial hygiene products. Bacteria were isolated from the hands of household members and their home environments. There was no information on the concentration or prevalence of triclosan-containing products among the reported antibacterial-user households. Although the sample size was not sufficient to make statistical comparisons, the authors of the study still concluded that there was no association between use of antibacterial products and the presence of antibiotic-resistant species among household members and their environment. The next 2 studies were derived from a randomized and masked intervention trial of 238 households allocated to using either 0.2% triclosan–containing liquid hand soap or plain soap [44, 45]. Bacterial samples were obtained from the hands of household members at baseline and after 1 year of using the assigned hand hygiene product. Neither of these studies demonstrated the emergence of antibiotic resistance associated with use, over a 1-year period, of the liquid hand soap containing 0.2% triclosan compared with plain soap. The authors did note that several species, such as \textit{P. aeruginosa} and some coagulase-negative staphylococcal species, demonstrated unexpectedly high MICs to triclosan at both baseline and the end of the year [44].

**DISCUSSION**

Triclosan has been used in personal hygiene products in the United States since the 1960s, and this chemical is now the most prevalent biocide ingredient in consumer liquid hand soaps [1]. Our study is, to our knowledge, the first systematic review of research assessing the risks and potential benefits associated with the use of soaps containing triclosan in the community setting. The available data do not support the effectiveness of triclosan for reducing infectious disease symptoms or bacterial counts on the hands when used at the concentrations commonly found in consumer antiseptic hand soaps. The effectiveness was similar to that of plain soap in the majority of studies, and a difference in the reduction of bacterial levels on the hands was generally observed only after longer hand washes with soap containing relatively high concentrations of triclosan (i.e., \(_1.0\%\) wt/vol). Regarding the risks associated with triclosan, we identified several studies that supported a relationship between exposure of bacteria to triclosan in the laboratory and increased MICs to clinically utilized antibiotics. In contrast, research conducted at the population level showed little evidence of cross-resistance with antibiotics associated with household use of hygiene products containing triclosan. Hand hygiene is an important practice for reducing the transmission of infectious illnesses in both the clinical and community setting [46, 47]. Although there are numerous studies examining the efficacy of antimicrobial hand hygiene agents in the clinical setting (reviewed in [46]), few have examined the efficacy of biocide-containing hand hygiene products frequently utilized in the community.
setting. The 4 available studies that examined the efficacy of biocide-containing soap compared with that of plain soap at reducing infectious illnesses showed no significant differences in any of the infectious illness symptoms that were assessed [18, 21–23]. All of these studies were large, randomized, 1-year intervention studies that included rigorous follow-up of study participants and illness outcomes. The study populations ranged in age, but all 4 studies required households to have at least 1 child residing in the home. The null findings were consistent across various study settings, ranging from urban upper Manhattan to squatter settlements in Pakistan. Even in areas with high rates of infectious illnesses, such as the urban squatter settlements in Karachi, there was little benefit associated with use of the soap containing triclocarban compared with plain soap. None of these studies gathered clinical isolates for the identification of the biological agent associated with the illness symptoms, so it is was not possible to assess whether the reported symptoms were associated with organisms other than bacteria, such as viruses. Triclosan is less effective against viral agents [2]; therefore, it is possible that this ingredient showed no impact on infectious illnesses in the household setting because a majority of the infectious etiologies may be associated with viral pathogens. Still, when examining impetigo, for which a viral etiology is unlikely, the results can be regarded more decisively and suggest that triclosan provides little benefit for reducing skin infections caused by bacteria in the community setting [18]. Symptoms such as coughing, sneezing, fever, and diarrhea are commonly observed for many of the significant infectious illnesses observed in the community setting and may be related to infection by viruses or bacteria [48]. Therefore, the available community-based intervention studies suggest that consumer products containing triclosan or triclocarban are not effective against the most common infectious illnesses affecting individuals in the community setting. For these reasons, the public health utility of this antibacterial ingredient for preventing common infectious illnesses, as a measure of added protection beyond that afforded by plain soap use, has not been shown. We were unable to identify any studies that examined the efficacy of soaps containing triclosan among other populations living in the community setting, such as elderly or immunocompromised individuals. Therefore, it is unknown whether soaps containing triclosan could provide protection to groups potentially at higher risk for infection. Many of the available bacterial reduction studies we reviewed tested the efficacy of hand hygiene agents used for _30 s. Similar to our review, others have shown that an increased application time of various hand hygiene agents tends to result in greater efficacy [49]. It is unlikely that a _30-s duration Ant

Bacterial Soap Use: Efficacy and Risks • CID 2007:45 (Suppl 2) • S145 reflects the normal hand-washing practices in the community setting. Even health care professionals generally wash their hands for a much shorter duration [46], and studies of hand washing in the community setting indicate suboptimal handwashing practices [50]. Another factor that has been identified as an important parameter for enhancing the efficacy of antiseptic hand hygiene agents is the concentration of the ingredient [49]. In our review, the majority of studies that identified a significant reduction in bacterial levels on the hands utilized
soap with a concentration of _1.0% triclosan. Other factors, such as experimental contamination versus normal flora, may also lead to findings of enhanced efficacy [49]. Likewise, we identified 2 studies that used artificial contamination [24, 32], and both reported significant reductions with the use of the soap containing triclosan, compared with plain soap. Study design issues, such as a lack of randomization to treatment arms and a lack of masking among study subjects, may also have affected the findings in some of these reports. Collectively, the microbiological efficacy studies strongly suggest that concentrations of triclosan used in consumer liquid hand soaps do not provide a benefit over plain soap for reducing bacterial levels found on the hands. Although some of these studies were limited by study design flaws and variability in testing procedures, the results regarding the lack of efficacy were consistent among studies utilizing a concentration of triclosan found in most consumer liquid hand soaps. Research regarding the risks associated with triclosan use has primarily been conducted under controlled laboratory conditions. This research has elucidated several molecular mechanisms by which sublethal exposure to triclosan may lead to the emergence of antibiotic-resistant bacteria among select species [10]. Some of the triclosan-adapted bacterial species, such as _E. coli_ and _P. aeruginosa_, were able to grow in cultures with concentrations of triclosan of up to 1024 mg/mL, which is close to the concentrations added to many consumer soaps (i.e., 1000 mg/mL p 0.1% triclosan [wt/vol]). These findings were relatively species specific, and much lower concentrations were required to inhibit other organisms, such as staphylococci. Most of the studies followed similar testing procedures for assessing triclosan MICs and antibiotic resistance. However, the bacterial species tested and the antibiotics assessed varied across studies. This limited our ability to classify species- and antibiotic-specific cross-resistance patterns. There have been only a few studies that have attempted to assess the relationship between biocide-containing soap use and the emergence of antibiotic resistance in the community setting. Interestingly, the laboratory findings have not been corroborated among the intervention studies that were conducted in the community under in-use conditions. There are several factors that might explain the discrepancy. First, laboratory testing may not be generalizable to the emergence of antibiotic resistance in the environment. Laboratory exposure conditions may not mirror exposures that occur in the environment under natural antiseptic use conditions. For example, it is possible that bacterial species are exposed to higher concentrations of triclosan under in-use conditions in household settings, compared with relatively low concentrations often used in laboratory studies. This may reduce the selective pressures for antibiotic-resistant bacteria under in-use conditions in the household. Second, selective pressures in the environment may weed out cross-resistant organisms. Organisms that are selected for resistance to both triclosan and antibiotics may be less fit for survival in the environment when they are carrying plasmids or must maintain costly genetic target mutations. Despite these caveats, there are many examples with antibiotics in which difficulty in obtaining resistant mutants in the laboratory did not predict the relative ease of their emergence in the clinical settings—for example, the fluoroquinolones.
Studies that have assessed whether there is an association between exposure to products containing triclosan and antibiotic resistance in the community setting may not be large or long enough to identify the emergence of antibiotic resistance. For example, the 2 studies by Aiello et al. [44, 45] suggest a trend toward resistance, but the studies were powered to detect only moderate to high changes in antibiotic resistance over a 1-year period. The study by Cole et al. [43] examined only S. aureus from the hands and had a relatively small number of isolates available for comparison. Moreover, this study did not randomize households to antiseptic product use or utilize masking of treatments, which could reduce the ability to detect a difference between user groups. The longest period of followup among these studies was 1 year [44, 45], which may not adequately reflect the time course for the development of resistance associated with use of products containing triclosan. Lastly, baseline levels of susceptibility to triclosan among bacterial species in the community setting are virtually unknown. Thus, it is difficult to show a change if the organisms have already achieved some level of resistance [44]. Most of the data on MICs to triclosan are from studies of clinical laboratory strains and culture type collections [2]. Consumer hygiene products containing triclosan have been used since the 1960s, and no formal surveillance mechanisms exist for assessing susceptibilities of bacteria to this agent in the community setting. Further research is clearly needed to assess whether the emergence of antibiotic resistance in the community setting is associated with the growing use of soaps containing triclosan. Because our key aim in this review was to assess the efficacy of and risks associated with the use of soaps containing triclosan in the community setting, our literature search excluded studies conducted in the clinical setting and those with health care workers as study subjects. We did include 3 studies that did not specifically state the source of volunteers included in their studies [20, 24, 28], because there was no indication that these subjects were derived from the clinical setting. Because of our focus on the community, we also excluded studies that assessed exposure to triclosan in the clinical setting and the emergence of antibiotic resistance. Two of the studies by Luby et al. [21, 23] did not present a statistical comparison of the antiseptic treatment arm and the plain soap treatment arm, so we computed statistical comparisons by use of the data available from the study. Therefore, it is possible that these 2 studies did not have adequate sample sizes to detect differences between treatment arms using biocide-containing versus plain soap. The differences, however, were very small and showed an even slightly higher level of infectious illness symptoms, for some of the outcomes, among the biocide-containing soap users compared with the plain soap users. Because hand soaps are one of the most commonly available hygiene products containing triclosan, we limited our review to studies that provided the results of exposure to these products among isolates of bacteria from humans. Two of the studies included in our review isolated bacterial species from humans and the environment [33, 43]. For these studies, we reported only the results regarding the isolates from humans. Importantly, the results were similar regardless of isolate source [33, 43]. In addition, our search did not include studies that were
published in languages other than English. PubMed was the only search database utilized; therefore, print sources such as conference abstracts were excluded.

CONCLUSIONS

The results of our review call into question the marketing of soaps containing triclosan as a product providing efficacy beyond the use of plain soap in the community setting. Soaps containing triclosan at concentrations used in the community setting (0.2% or 0.3% wt/vol) were generally no more efficacious than plain soap at preventing infectious illness symptoms and reducing bacterial levels on the hands. Several studies demonstrated laboratory evidence of triclosan-adapted cross-resistance with antibiotics among multiple species of bacteria. There are still too few studies that have been conducted in the community setting to adequately assess whether the emergence of antibiotic resistance in that setting is associated with the use of consumer soaps containing triclosan. Longitudinal studies are needed to assess changes in levels of antibiotic resistance associated with use of soap containing triclosan over time, and large databases of isolates are required to examine within-species changes in antibiotic-resistance profiles. Still, current findings warrant actions by the FDA for evaluating consumer product advertising claims. Future research should be directed at addressing both the efficacy of and risks associated with the use of triclosan. For instance, data are needed to assess whether products containing triclosan provide an added level of protection among high-risk groups, such as immunocompromised individuals living in the household setting.

Antibacterial Cleaning Products and Drug Resistance

Allison E. Aiello,* Bonnie Marshall,† Stuart B. Levy,† Phyllis Della-Latta,‡ Susan X. Lin,‡


We examined whether household use of antibacterial cleaning and hygiene products is an emerging risk factor for carriage of antimicrobial drug–resistant bacteria on hands of household members. Households (N = 224) were randomized to use of antibacterial or nonantibacterial cleaning and hygiene products for 1 year. Logistic regression was used to assess the influence of antibacterial product use in homes. Antibacterial product use did not lead to a significant increase in antimicrobial drug resistance after 1 year (odds ratio 1.33, 95% confidence interval 0.74–2.41), nor did it have an effect on bacterial susceptibility to triclosan. However, more extensive and longer term use of triclosan might provide a suitable environment for emergence of resistant species. Further research on this issue is needed. Concern is growing over the use of household cleaning and hygiene products labeled as antibacterial as a result of laboratory data showing a link between exposure to ingredients in these products, particularly triclosan, and emergence of
antimicrobial drug resistance (1–3). This study aimed to determine whether home use of antibacterial cleaning and hygiene products (including use of a handwashing soap containing 0.2% triclosan) or other potential risk factors was associated with carriage of antimicrobial drug–resistant bacteria on household members’ hands. We also assessed the association of these antibacterial products with carriage of organisms with reduced susceptibility to triclosan.

Materials and Methods Study Population
The data for this study were collected as part of a double-masked and randomized home intervention trial (4); participant enrollment began in October 2000, and followup occurred for a 12-month period. The methods and randomization procedures for this study have been reported elsewhere (5). A total of 238 households were recruited at baseline; 224 households completed the entire 1-year follow-up (Figure 1). The study was approved by Columbia University Medical Center Institutional Review Board.

Intervention Methods
Households were supplied with over-the-counter, generically repackaged consumer cleaning and personal hygiene products free of charge on a monthly or as-needed basis. Households randomly assigned to use antibacterial products received the following: 1) liquid handwashing soap containing 0.2% triclosan, 2) liquid kitchen spray and liquid all-purpose cleaner for hard surfaces that contained a quaternary ammonium component, and 3) oxygenated bleach laundry detergent. Households randomly assigned to the nonantibacterial group received the same products but without antibacterial ingredients. Both groups received the same nonantibacterial liquid dishwashing detergent and bars of body soap to control for potential use of other products that might contain antibacterial ingredients. Study participants were required to use only assigned home hygiene products and were asked not to change any of their normal hygiene practices. Participants, interviewers, and study coordinators were blinded to brand names and ingredients in all products. Adherence to product treatment group was assessed monthly, and products were weighed during each visit to monitor compliance. Households were immediately dropped from the study if they did not adhere to randomized treatments.

Data Collection
At baseline, and quarterly during the 1-year period, a trained interviewer collected demographic information from the person self-identified as the primary caregiver in the household. The baseline interview determined the type of handwashing soap, hygiene, and cleaning products that were used before randomization into the study (i.e., the antibacterial products and Drug Resistance Allison E. Aiello,* Bonnie Marshall,† Stuart B. Levy,† Phyllis Della-Latta,‡ Susan X. Lin,‡ and Elaine Larson‡ Emerging...
The baseline and quarterly assessment forms provided information such as the number and age of household members, childcare attendance, symptoms of infectious illnesses (fever, diarrhea, sore throat, vomiting, conjunctivitis, skin boils, runny nose), antimicrobial drug use, chronic diseases, self-rated health, birthplace, travel outside of the United States, and occupation. In addition, reported number of handwashes per day by the primary caregiver and a timed observation of the handwash before hand culturing were gathered. The hands of the primary caregiver were cultured during the home visit at baseline and at the end of the 12-month period before and after washing with the assigned liquid handwashing product. The trained data collector used a coin flip to choose the test hand, which was then inserted into a sterile polyethylene bag containing 50 mL culture medium (0.075 mol/L phosphate buffer, pH 7.9, containing 0.1% polysorbate 80). The hand was massaged for 1 min through the wall of the bag containing culture medium. Only postwash samples were used in analyses since they were considered to be representative of normal versus transient flora found on hands. **Laboratory Methods** The laboratory methods for this study have been described previously (5,6). The microbiologic analysis and antimicrobial drug–susceptibility testing were conducted at New York Presbyterian Hospital, Columbia University Medical Center, New York. Selective media were used to isolate gram-positive cocci, gram-negative bacteria (GNB), *Staphylococcus aureus*, and enterococci. Only clinically important bacterial species that were prevalent (species with >38 isolates recovered at baseline and end of year combined) on the hands of homemakers were selected for susceptibility analyses (7,8). These included the following GNB: *Acinetobacter baumannii*, *A. lwoffi*, *Enterobacter agglomerans*, *E. cloacae*, *Klebsiella pneumoniae*, and *Pseudomonas fluorescens/putida*; and the following gram-positive staphylococci: *S. aureus*, *S. warneri*, *S. epidermidis*, and *S. capitis*. Therefore, only persons who were carrying at least 1 of these organisms on their hands were included in the final analyses (N = 164 at baseline and N = 201 at year-end). No significant differences were noted between the measured demographic characteristics (Tables 1 and 2 for listing of demographics) among those included in the final analyses versus those excluded (all p>0.10). Bacterial isolates were tested against a panel of antimicrobial agents by using MicroScan WalkAway 96 SI (Dade Behring, Deerfield, IL, USA). Using the recommendations of the Clinical and Laboratory Standards Institute (formerly NCCLS), we classified antimicrobial drug susceptibility as resistant, intermediate, or susceptible to a particular antimicrobial agent (9). Organisms that tested as either resistant or intermediately resistant to antimicrobial agents were classified as “antibiotic resistant” (10). The selection of antimicrobial agents to be tested for each organism was based on clinical applicability of the antimicrobial drug and consistency with earlier studies that examined a link between triclosan and antimicrobial drug resistance (11–14). GNB were
tested against several antimicrobial agents, and staphylococci were tested against oxacillin to indicate methicillin resistance. For analytic purposes, GNB species were classified as resistant if a given isolate was resistant to >1 antimicrobial agent(s). Triclosan susceptibility was examined at Tufts University School of Medicine, Boston, Massachusetts, by using a modified NCCLS agar dilution method (10). Minimum inhibitory concentration (MIC) was defined as the lowest dilution of triclosan that inhibited visible growth. A detailed description of antimicrobial drug and triclosan testing, including controls used and MIC distribution for each organism, has been described previously (6). Since data from the literature regarding triclosan susceptibility testing are sparse and provide no standardized breakpoints (6), we dichotomized triclosan MIC values for each isolate by using the median MIC as a cutoff; low MIC represents less than or equal to the median value and high MIC indicates greater than the median value. RESEARCH 1566 Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 10, October 2005 Figure 1. Flow chart for randomized trial. After randomization and loss to follow-up, the remaining study participants who carried target organisms were included in the logistic regression analyses. **Analytic Methods** First, chi-square and Student t tests were used to compare demographic characteristics of antibacterial and nonantibacterial users. Next, chi-square tests were used to compare the overall proportion of antimicrobial drug–resistant isolates found on the hands of the antibacterial and nonantibacterial groups. Finally, multivariate logistic regression analyses were conducted to examine the relationship between antibacterial product use and 2 separate outcome variables: antimicrobial drug resistance (measured by the presence of >1 antimicrobial drug–resistant species on the hand) and increased triclosan MICs (measured by the presence of >1 species exhibiting a triclosan MIC above the median value). Each potential covariate (i.e., characteristics of the household and primary caregiver) and our 2 outcome variables were examined in univariate analyses to establish criteria for inclusion in final multivariate models by using a p value <0.05 as the cutoff. Covariates meeting the cutoff criteria were included in multivariate models along with the main effect of the randomized treatment (i.e., antibacterial versus nonantibacterial product use). Analyses were conducted separately for baseline and after 1 year of study participation. Unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (CIs) were generated from logistic regression analyses by using SPSS V.10 (SPSS Inc., Chicago, IL, USA). **Results** GNB and staphylococci were recovered from 164 participants at baseline and 201 participants at year-end. None of the measured demographic and hygiene characteristics differed significantly between the randomized groups (all p>0.10) (Tables 1 and 2). When comparing isolates from Antibacterial Cleaning Products and Drug Resistance Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 10, October 2005 1567 the antibacterial users and nonantibacterial users (Figure 2 and online Appendix Figure, available from http://www.cdc.gov/ncidod/EID/vol11no10/04-1276_app.htm), no significant differences in the proportions of resistance were found in all species combined or within single species (all p>0.05). The odds of carrying >1 antimicrobial drug–resistant strain(s) among antibacterial product users and nonusers
were not significant at baseline (OR 0.97, 95% CI 0.50–1.89) or after 1 year of antibacterial product use (OR 1.33, 95% CI 0.74–2.41) (Table 3). In addition, the odds of carrying >1 organism with high triclosan MIC among antibacterial product users or nonusers were similar at baseline (OR 1.59, 95% CI 0.84–3.01) and at year-end (OR 1.73, 95% CI 0.97–3.09). Individual and Household Characteristics and Susceptibility At baseline, primary caregivers with higher than average CFU on their hands were twice as likely to carry antimicrobial drug–resistant organisms (Table 3). A slightly increased risk of carrying antimicrobial drug–resistant organisms occurred among those who washed their hands for a longer duration before the culture sample at baseline (Table 3). However, longer duration of handwashing was not associated with reduced bacterial CFU on hands (OR 1.02, 95% CI 0.99–1.06). At year-end, both the number of times hands were washed per day and the presence of any household member(s) with a healthcare or daycare occupation were significantly associated with reduced carriage of antimicrobial drug–resistant organisms on hands of the primary caregiver (Table 3). Primary caregivers residing in households with members working in healthcare or daycare were significantly more likely to report above-average number of handwashes per day (OR 3.05, 95% CI 1.71–5.44). None of the other characteristics, such as health conditions or antimicrobial drug use, were significantly associated with carriage at baseline or after 1 year (all p>0.05). Discussion This study is the first randomized intervention study to investigate the relationship between antibacterial cleaning and hygiene product use and antimicrobial drug susceptibility of hand microflora within the community setting. Our earlier research, conducted among the same study population described here, showed that use of antibacterial hand soap containing 0.2% triclosan was no more beneficial than plain soap in reducing infectious illness symptoms or bacterial counts on hands of household members (4,5,15). Several avenues of research have contributed to the view that use of products containing triclosan may foster the emergence of antimicrobial drug– or biocides resistant organisms. This concern stems from reports that exposure to triclosan can lead to bacterial target mutations conferring cross-resistance to isoniazid and selects for mutants bearing resistance to various antimicrobial agents through expression of multidrug-resistant efflux pumps (12,16). Our findings suggest that household use of antibacterial cleaning and hygiene products for a 1-year period is not a significant risk factor for increasing antimicrobial drug–resistant organisms on the hands of persons in the home. Few data compare resistance patterns among hand microflora and susceptibility to antibacterial handwashing ingredients. One recent cross-sectional study (17) reported a higher prevalence of decreased susceptibility to triclosan among methicillin-resistant S. epidermidis compared to methicillin-sensitive S. epidermidis clinical isolates. The findings reported in other cross-sectional studies have mainly examined environmental and clinical isolates of bacteria, and the correlations reported have been inconsistent (11,13,18–20). Other Factors Associated with Antimicrobial Drug Resistance Several hygiene-related factors were significantly associated with carriage, regardless of antibacterial product use. Longer handwashes were slightly associated with increased risk for carriage of
antimicrobial drug–resistant species at baseline; as reported previously, these findings may be an artifact of sampling technique (5). The culture was taken directly after the handwash; an increased

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 10, October 2005 Figure 2. Proportion of study participants with >1 bacterial species resistant to an antimicrobial agent on their hands. In the group that used antibacterial products, 82 and 105 hand samples were available at baseline and at year-end, respectively. In the group that used nonantibacterial products (i.e., plain soap), 82 and 96 hand samples were available at baseline and at year-end, respectively. Duration of the wash may have allowed greater dispersal of bacteria into the culture bag. Primary caregivers residing in households with healthcare or daycare workers had significantly fewer antimicrobial drug–resistant organisms on their hands. This association appears to be influenced by above-average number of handwashes per day by the primary caregiver and indicates that hygiene, regardless of antibacterial ingredients, may reduce household transmission of antimicrobial drug–resistant bacteria.

Limitations for Detecting Changes in Resistance A factor that might have attenuated the associations found in this study is a higher baseline level of antimicrobial drug resistance in this community. Higher baseline levels would make detecting small changes in susceptibility attributed solely to use of antibacterial cleaning and hygiene products more difficult. Most persons from our study population were from the Dominican Republic, a country that provides over-the-counter access to antimicrobial agents. In an earlier study within this same community, antimicrobial agents were taken by 354 (39%) of 911 persons reporting infectious disease symptoms within the previous 30 days, which suggests high levels of use (21). In addition, this study was conducted for a 1-year period and therefore may not adequately reflect the time-course for development of resistance attributable to use of antibacterial products. Changes in antimicrobial drug resistance during the 1-year period might have been lower than the level of detection that this study was statistically powered to identify. This study was designed to detect an OR >2.11 after 1 year of use, given a power of 80% and a 2-sided α level of 0.05. Although triclosan susceptibility was examined among various species, we were not able to evaluate potential mechanisms for cross-resistance, such as overexpression of efflux pumps. In addition, when we examined the association between use of antibacterial cleaning and hygiene products and antimicrobial drug resistance, the definition of resistance (>1 organism[s] with antimicrobial drug resistance) did not allow exploration of the potential association with each separate species or antimicrobial drug tested. However, the purpose of our study was to examine overall trends and shifts in antimicrobial drug resistance attributed to the use of antibacterial cleaning and hygiene products, given that the effects of these products in the community are relatively unexplored.

Conclusion Currently, no evidence suggests that use of antibacterial soap containing 0.2% triclosan provides a benefit over plain soap in reducing bacterial counts and rate of infectious symptoms in generally
healthy persons in the household setting (4,5,15). Our 1-year randomized community intervention study adds to these earlier findings by assessing the potential risks associated with antibacterial product use in the home. The results from our study do not implicate use of antibacterial cleaning and hygiene products as an influential factor in carriage of antimicrobial drug–resistant bacteria on the hands of household members. Although we did not observe a significant impact on antimicrobial drug resistance during the 1-year period, a longer duration and more extensive use of triclosan might provide a suitable environment for emergence of antimicrobial drug–resistant species in the community setting. Further surveillance for the effect of long-term use of antibacterial cleaning and hygiene products on antimicrobial drug resistance in the community is needed.

ANTIBACTERIAL PRODUCTS IN SEPTIC SYSTEMS

University of Arizona

An onsite sewage treatment system or “septic system” is effective way to safely recycle household wastewater back into the natural environment. As a homeowner or business person with a septic system, you are in the wastewater treatment business. A septic system with a properly functioning, soil treatment-based, leach field should reduce bacterial and pathogen levels to an acceptable level, if not completely. Potential organic and inorganic nutrient pollutants, those commonly found present in septic wastewater effluent, should also be reduced or eliminated. The key to effective treatment is proper design, system installation, responsible operation, and periodic maintenance. Note: “Operation” refers to everything we do or put into the system. To achieve proper treatment, a septic system is very dependent on millions of naturally occurring bacteria throughout the system. Daily, we add many beneficial bacteria to our septic systems; bacteria typically found in wastewater, our bodies, and other waste materials we dispose of via our septic system. Two very important types of septic system bacteria are anaerobic (do not require oxygen) and aerobic (require oxygen). Anaerobic bacteria decompose organic materials inside the septic tank. Aerobic bacteria, in the leach field soils, destroy disease-causing pathogens and finish the breakdown of molecular waste products. Simply stated, we normally and naturally add more than enough of the “right kind” of bacteria to our septic systems; there is no need or reason to use expensive, unnecessary additives.

The use of “antibacterial,” “disinfectant,” or “sanitizing” products in the home can and do destroy both good and bad bacteria in septic treatment systems. “Normal usage” (according to directions) of these products will
destroy some beneficial bacteria. Fortunately, the normal bacteria population within the septic system is sufficient and adequate to quickly recover. Significant treatment problems, with conservative use, should not occur. Excessive use of these products in the home can cause significant and even total destruction of the bacteria population. Normally, the use of any single product or single application will not cause major problems. However, the accumulative affect of using too many such products and excessive application may cause serious problems and damage to the septic system. More research is needed to determine what is excessive and which products are more or less harmful to systems. Increasingly, many products are being marketed as “anti-bacterial.” Consumers and onsite system professionals working to diagnose treatment system problems have many questions about individual products. Typical questions being asked are: “How antibacterial is antibacterial?” and “Which products are better or worse than others?”

Anecdotally, several professionals have reported problems with low or no bacterial activity in systems. Upon removal of such “antibacterial” products from the home, beneficial bacterial activity returns and the desired treatment functions resume. “Antibacterial” products affect all treatment systems, some more than others. Special attention is being paid to new “alternative” septic treatment technologies being introduced into the onsite industry. It appears that some alternative systems may be more affected by “antibacterial” products than other systems. Additional and more conclusive research is needed.

What are common “antibacterial,” “disinfectant,” and “sanitizing” products found and used in homes and businesses that might affect your septic system? The list of products include: “antibacterial” hand soaps; sink/counter top cleaners; tub, tile, and shower cleaners; drain cleaners; toilet bowl cleaners; laundry bleach products; and many industrial strength cleaners used commercially. Antibiotic drugs (prescribed medicines) should also be included. These are products that are found in nearly all homes. Such medications often carry a “safe for septic systems” statement printed on the label. A relevant question for using these products and medications may be “how safe?”

All of these practices work toward preventing the loss of beneficial bacteria throughout the system. Bacterial additives (enzymes, starters) are not necessary, may not compensate for excessive use of antibacterial products, and are costly.

It might be that, in an effort to be “super clean” and protective of our family’s health through the use of antibacterial products in our homes, we might be compromising our health in another way — by damaging our onsite sewage treatment system!
The University of Arizona Cooperative Extension Septic System Owner’s Guide suggests:

**To improve septic system performance:**

- Do not use “every flush” toilet bowl cleaners.
- Reduce *the need to use* drain cleaners by minimizing the amount of hair, grease, and food particles that go down the drain.
- Reduce use of cleaners by doing more scrubbing with less cleanser.
- Use the minimum amount of soap, detergent, and bleach necessary to do the job. Frequent use of detergents with bleach additives is considered “excessive amounts” of bleach.
- Choose products that meet your needs safely. When you are shopping, always read the instructions on the product labels. Labels provide information on a product’s content, as well as instruction on how to use it safely. Check to see if the product contains ingredients that, when used properly, can harm people or the environment.
- Use minimal amounts of mild cleaners, as needed only.
- Divert chlorine-treated water from swimming pools and hot-tubs outside of the septic system.
- Dispose of all solvents, paints, antifreeze, pesticides (insecticides, fungicides, herbicides, slug bait, moth balls, wood preservatives, and flea and roach powders, to name a few), and other toxic chemicals through local recycling and hazardous waste channels.
- Do not flush unwanted prescription or over-the-counter medications down the toilet.

There is more information on household septic systems at the University of Arizona Extension publications web page (http://ag.arizona.edu/pubs). This fact sheet was adapted from *Anti-Bacterial Products in Septic Systems*, by Ken Olson, University of Minnesota Extension news release. http://septic.coafes.umn.edu/Homeowner/index.html.

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**Is Antibacterial soap better than regular soap**

http://www.furniturehomedesign.com/healthy-homes/does-antibacterial-soap-work-better-than-regular-soap/

Does antibacterial soap work any better than plain soap in fighting infections? Not according to a study by the Center for Disease Control and Prevention (CDC).
The CDC study conducted an in-depth study of over 200 households, some of which used soap containing 0.2 percent triclosan (an antibacterial) and others using ordinary soap. When compared to plain soap, antibacterial soap appeared to provide no benefits in reducing rates of colds in generally healthy people.

“The kind of soap you use doesn’t matter,” says Samuel N. Grief, MD, medical director of campus care at the University of Illinois at Chicago. “Any liquid or bar soap works just fine in protecting you against colds and infections.”

Most doctors these days are against the use of anti-bacterial soap. Not only does it kill off the useful bacteria, but since it doesn’t always kill the harmful ones, they tend to become more drug resistant. An important example is MRSA, a staph bacteria that has become resistant to 99% of current treatments.

Investigation of antibiotic and antibacterial agent cross-resistance in target bacteria from homes of antibacterial product users and nonusers.
NCBI Pub Med

AIM: To describe the relationship between antibiotic and antibacterial resistance in environmental and clinical bacteria from home environments across geographical locations, relative to the use or nonuse of antibacterial products, with a focus on target organisms recognized as potential human pathogens.

METHODS AND RESULTS: In a randomized study, environmental and clinical samples were collected from the homes of antibacterial product users (n=30) and nonusers (n=30) for the isolation of target bacteria for antibiotic and antibacterial testing in three geographical areas (in USA and UK). Isolates were tested for antibiotic susceptibility, with selected antibiotic-resistant and antibiotic-susceptible isolates tested against four common antibacterial agents (triclosan, para-chloro-meta-xylenol, pine oil and quaternary ammonium compound). Prequalified users and nonusers at each location were randomly selected after meeting exclusionary criteria. Of 1238 isolates, more target bacteria were recovered from nonuser than user homes. Of Staphylococcus aureus isolates (n=33), none showed resistance to oxacillin or vancomycin; for Enterococcus sp. (n=149), none were resistant to ampicillin or vancomycin; and for Klebsiella pneumoniae (n=54) and Escherichia coli (n=24), none were resistant to third generation cephalosporins. Antibiotic resistance to one or more of the standard test panel drugs for Gram-positive and Gram-negative target bacteria was comparable between nonuser and user homes for both environmental and clinical isolates [e.g. resistance of environmental coagulase-negative (CN) Staphylococcus sp. was 73.8% (124/168) from nonuser homes and 73.0% (111/152) from user homes, and Enterobacteriaceae other than E. coli, 75.9%]
(186/245) from nonuser homes compared with 78.0% from user homes]. Of 524 Gram-negatives tested against preferred/alternative drugs, 97.1% (509/524) were susceptible to all antibiotics, across both groups. Isolates of S. aureus, Enterococcus sp. and CN Staphylococcus sp. susceptible to all preferred treatment drugs showed comparable antibacterial minimum inhibitory concentration (MIC) results between nonuser and user home isolates. For Gram-positives resistant to one or more preferred drugs, greatest resistance to antibacterial active ingredients was found in the nonuser group. For Gram-negatives, the antibacterial MIC data were comparable for isolates that were fully susceptible and resistant to one or more preferred/alternative treatment antibiotics. CONCLUSIONS: The results showed a lack of antibiotic and antibacterial agent cross-resistance in target bacteria from the homes of antibacterial product users and nonusers, as well as increased prevalence of potential pathogens in nonuser homes. SIGNIFICANCE AND IMPACT OF THE STUDY: It refutes widely publicized, yet unsupported, hypotheses that use of antibacterial products facilitates the development of antibiotic resistance in bacteria from the home environment.

essortment
http://www.essortment.com/all/antibacterialcl_rluu.htm
We all want our homes clean, right? But how clean is clean enough? Is there such a thing as a house that is too clean?
Starting around 1997, American consumers were introduced to the newest defenses in our ongoing war against germs: antibacterial cleaners. The first antibacterial products were kitchen and bathroom cleaners, all of them promising to make our kitchens and bathrooms virtually germ-free. One cleaner promises destruction of 99.9% of bacteria in your bathroom.

The kitchen and bathroom cleaners were quickly followed by antibacterial hand soaps and lotions, dishwashing liquids, body washes, window cleaners, and just about all other types of cleaner used in the home. Today, in addition to all of the antibacterial cleaning products on the market, some companies have begun to impregnate the plastic used to make cutting boards, toothbrushes, and children’s toys with an antibacterial agent.

With the multitude of antibacterial cleaning products on the market, and an estimated one-half of all soap in the United States containing antibacterial ingredients, it’s not hard to imagine a virtually sterile environment in which to live and raise our families. But is living in a sterile home really what’s best for us?
Fifty years ago, penicillin was the world’s newest wonder drug, an antibiotic used to treat Streptococcus infections. Among other illnesses, Streptococcus is the bacterium that causes strep throat. Penicillin worked great at wiping out these infections, until the Streptococcus bacteria mutated and became resistant to treatment by penicillin. New and stronger antibiotics were developed, and those too, worked to treat strep infections until, once again, the bacteria became resistant. Streptococcus is just one example of many bacteria resistant to some antibiotics.

In June of 2000, the World Health Organization warned that antibacterial products directly contribute to the rise in antibiotic-resistant bacteria. The American Medical Association (AMA) says “(bacterial) resistance ascribed to overuse of antibiotics is a growing problem, and there is concern that some types of infections will eventually not be treatable with antibiotics”. On June 13, 2000, the AMA advised consumers to avoid extensive use of “antibacterial soaps, lotions, and other household products”. The AMA has also urged the Food and Drug Administration to increase regulation of antibacterial products.

So, on one side, we have the advertisements for antibacterial cleaners telling us that killing 99.9% of germs in our homes is a good thing. On the other side, we have the World Health Organization and the American Medical Association telling us that use of antibacterial products might NOT be such a good thing. For the millions of Americans who just want a clean home, whether to use, or not use, antibacterial cleaners can be a confusing decision to make.

According to most experts, the following guidelines are your best bet for keeping your home clean and your family safe, while avoiding the risks associated with antibacterial cleaners:
*Wash your hands thoroughly, and often.

*Limit your use of antibacterial products.
*Use bleach to clean your bathroom.
*Plain old soap and hot water remain the best ingredients to wash your hands, body, and dishes.
*Use separate cutting boards for raw meat and foods such as fruits and vegetables that may not be cooked before eating.
*Wash all fruits and vegetables, either in soapy water (rinse THOROUGHLY), or in one of the new fruit and vegetable washes.
*Wash all kitchen surfaces, dishes, and utensils in hot, soapy water. Make sure you rinse thoroughly. If possible, put everything (including cutting boards) in the dishwasher.
*Every time you run your dishwasher, throw your kitchen sponge in.
*Don’t wipe your counters with a sponge that’s been sitting on your sink. This can deposit even more bacteria on your countertops. Damp sponges are an excellent breeding ground for bacteria. Use paper towels, or replace your dishrag every day with a clean one.

New parents and parents-to-be worry about bacteria and viruses making their little one(s) sick. While this is certainly a concern, especially when there is a newborn in the home, it’s important to remember that a sterile environment is NOT in the baby’s best interest. Why?

Bacteria and viruses are present in our homes, at our work, anywhere and everywhere we go. What prevents us from getting sick from these bacteria and viruses? Antibodies. Our bodies make antibodies in response to exposure to bacteria and viruses. Chickenpox is an excellent example. Chickenpox is a common childhood illness. When we contract the virus that causes chickenpox, our bodies make antibodies to fight the illness. Those antibodies stick with us (antibodies for some viruses and bacteria, such as chickenpox, last for a lifetime), and prevent us from getting sick again from the same virus. However, there are viruses out there (like the virus that causes the common cold) that change their genetic composition on a regular basis. This means that the antibodies we made for last month’s cold may not necessarily work on this month’s cold! If there were no exposure to bacteria and viruses, how would we make antibodies?

Babies who are exposed to bacteria and viruses at an early age make antibodies more quickly than those babies who are kept in virtually sterile environments do. Some illnesses (such as chickenpox), while relatively minor in children, can be very serious in adults. Those children that are exposed to the chickenpox virus at an early age are less likely to have complications from the illness than those exposed later in life. While your instinct may be to scrub your house from top to bottom with every antibacterial product you can find in order to make your home as germ-free as possible, remember that germs are crucial for development of baby’s immune system.

Are germs bad? Some bacteria and viruses cause illness in humans, and some maintain bacterial harmony in our bodies. Some bacteria and viruses are neutral to humans, causing neither illness nor benefit. Are antibacterial cleaners bad? Not necessarily. When used in moderation, antibacterial cleaners can help you keep your home clean. Limit your use of antibacterial products to one or two products. For instance, use an antibacterial spray for your doorknobs, and a bottle of antibacterial hand cleaner for outings. Clean the rest of your house with bleach and/or regular cleaners. Use caution when exposing yourself and your children to unknown environments, but don’t limit outings due to fear of infection and illness. Don’t try to create a sterile environment for yourself and your family. In addition to the potential for antibiotic-resistant bacteria, it’s a virtually impossible task, and you may just be lulled into a false sense of security. That one square inch on
your kitchen counter you missed with your bottle of antibacterial kitchen spray could contain literally millions of bacteria! Instead of spending the entire day trying to annihilate every last germ, take your kids to the zoo, or go for a walk. Get yourself an ice cream cone with the money you would have spent on every antibacterial product you saw in the cleaning aisle at your grocery store. Keep your house clean, but above all else, have fun and enjoy life!

Using Antibacterial products in Your Home

Rob Thomson
SearchWarp.com

A stroll down the soap aisle in your local supermarket can leave you wondering if everyone in North America is using nothing but antibacterial soaps and cleaners in their homes these days. In some places it can actually be fairly difficult to find non-antibacterial varieties; but are all these antibacterial products really all that helpful? What many people seem to forget is that antibacterial products kill bacteria, not viruses. Many of the communicable diseases that we contract every year, like colds and flu, are caused by viruses. Antibacterial products work in a variety of ways; different antibacterial products have an assortment of chemicals in them that kill different sorts of bacteria. Triclocarbon, a common antibacterial agent, persists through wastewater treatment and can accumulate in the environment. Another antibacterial agent, triclosan, is also reported to cause bacteria to become resistant to antibiotics.

Another big problem happens when bacteria are exposed to antibacterial products or antibiotics and the weaker bacteria are killed off; if the strength of the product isn't strong enough to eliminate all of the bacteria some of the strongest bacteria may remain. When bacteria are exposed to, but not killed by, anti-bacterial products they may allow them to adapt a resistance to them.

Even if a product can kill off 99.9% of the bacteria in your environment without creating resistant bacteria in the process there are problems with that as well. If you live in a hyper-sterile environment then you aren't being exposed to the harmless bacteria that most everyone else is and you can become sensitive to bacteria that other people co-exist quite easily with. This excessive removal of bacteria from the living environment of children is theorized to help cause allergies and eczema in later years.
Many people don’t realize that some bacteria actually play beneficial roles not only inside your body, but also on your skin. Removing these beneficial or benign bacteria from your living space can actually do more harm than good.

At the very least consumers need to realize that there is no real benefit to using antibacterial products over and above regular soaps, cleaners, and disinfectants like bleach. When cleaning your home, use hot soapy water or a bleach solution to disinfect; for your skin, use warm water and soap. Don’t buy into the marketing propaganda that says to consumers that they need to buy antibacterial products.

Another Antibiotic Overuse Consequence
UC DAVIS MEDICINE

In another indication that overuse of antibiotics has far-reaching consequences, a study published in the journal Pediatrics has found that accurate diagnosis of a deadly childhood brain infection can be deterred by the prior use of antibiotics. Study author Nathan Kuppermann, professor and chair of emergency medicine, found that diagnosis of bacterial meningitis can be elusive in children who already are on antibiotics for a presumed ear infection, strep throat or some other condition. The study encourages physicians to be very cautious and conservative in evaluating children who are already on antibiotics, because those medications can change the cerebrospinal fluid profile of children with bacterial meningitis.

CDC expands campaign against overuse of antibiotics
CNN.com
http://archives.cnn.com/2000/HEALTH/06/01/antibiotic.overuse/

Another area of concern: the quest for a germ-free household. Besser said there is no benefit in buying such household goods as hand soap, mattresses and toys that include antibacterial elements. "Those products will not improve your health," he said. Washing your hands with regular soap "is a great way to reduce your chances of getting a cold," Besser said. He also recommended that people, particularly children, see a physician for vaccines that counter infections.
Keep Antibiotics Working
Antibiotic Resistance Threatens Public Health
http://www.keepantibioticsworking.com/new/index.cfm

Throughout America, infectious diseases are emerging that we may not be able to cure because bacteria have become resistant to antibiotics.

Over the last 60 years, effective antibiotics have turned bacterial infections into treatable conditions, rather than the life-threatening scourges they once were. The effectiveness of many life-saving antibiotics is, however, waning. Health experts have deemed the rise in antibiotic resistance a public health crisis. Everyone is at risk from antibiotic-resistant infections, but children, seniors, and people with weakened immune systems are particularly vulnerable.

The overuse of antibiotics is to blame. A major source of this overuse is routine use of antibiotics as feed additives for livestock and poultry – not to treat disease, but instead to promote growth and compensate for crowded, stressful, unsanitary conditions. The Union of Concerned Scientists estimates that 70% of all antibiotics in the U.S. are used as feed additives for pigs, poultry and cattle. In June 2001, the American Medical Association went on record opposing the routine feeding of medically important antibiotics to livestock and poultry (i.e., "nontherapeutic" use).

Antibiotic use in animal agriculture has been linked definitively to human bacterial infections resistant to antibiotics. Mounting evidence suggests that widespread overuse of agricultural antibiotics also may be contaminating surface waters and groundwater, including drinking water sources in many rural areas. Nonetheless, agribusiness and the pharmaceutical industry are fighting hard to thwart restrictions on the use of antibiotics in agriculture.

Antibiotic Resistance Threatens Public Health
Doctors depend on antibiotics to treat illnesses caused by bacteria, from pneumonia to meningitis and other life-threatening infections. The effectiveness of many antibiotics has begun to wane, the legacy of decades of unnecessary overuse in both human medicine and agriculture.
**Keep Antibiotics Working** is a coalition of health, consumer, agricultural, environmental, humane and other advocacy groups with more than eleven million members dedicated to eliminating a major cause of antibiotic resistance: the inappropriate use of antibiotics in food animals. For a general overview of the issue, see the Campaign’s fact sheets: [Antibiotic Resistance - An Emerging Public Health Crisis](#) (an annotated version is also available) and [Antibiotic Resistance and Animal Agriculture](#).

**VULNERABLE POPULATIONS**

Vulnerable Populations, a series of fact sheets outlining the specific threat that antibiotic resistance poses to different vulnerable populations:

**Cancer Patients**

Antibiotic Resistance and its Impact on Cancer Patients

For more than half a century, antibiotic drugs have ensured that potentially life-threatening bacterial infections are treatable. Today, however, more and more bacterial infections fail to respond to antibiotic treatment. A federal task force recently warned that antibiotic resistance is “a growing menace to all people” and concluded that if nothing is done, treatments for common infections will become “increasingly limited and expensive-and, in some cases, nonexistent.” Antibiotic resistance poses a threat to everyone, but cancer patients are at particular risk. Cancer is typically treated with surgery, radiation, chemotherapy, and/or transplantation of bone marrow or blood stem cells. Each of these treatment techniques leaves a patient more vulnerable to infection than is a healthy adult of similar age. A large majority of cancer patients undergo surgery. Infections at the site of surgery account for approximately 40% of all infections in surgical patients. Many of these surgery-related infections are bacterial, and growing numbers of them are resistant to multiple antibiotics. Another cancer treatment is radiation, which is often used in combination with other types of therapy. Unfortunately, radiation is not selective and destroys all cells in its pathway, including those necessary to ward off disease. A patient who undergoes radiation treatment for head and neck cancer, for example, may end up with ulcers in the mouth, which breaks down the mouth’s protective barrier and leaves it vulnerable to invasion by harmful bacteria. Chemotherapy, or the administration of drugs to kill cancer cells, is a treatment mainstay for cancer that has metastasized, or spread, beyond the originating site. Chemotherapy also can help reduce pain associated with incurable cancers. As with radiation, all but the newest chemotherapy drugs are nonspecific in their target and destroy many other cells that are necessary to the immune system. There are two very common consequences of chemotherapy. One is the destruction of white blood cells that are required to fight off bacterial infection. The other is severe damage and inflammation of the lining of the mouth, gastrointestinal and respiratory tracts - leaving an easy gateway for disease-causing bacteria to enter the body. Finally, transplantation of bone marrow or blood stem cells has become a standard therapy for patients who require...
high doses of chemotherapy. The procedure requires removal and storage of the patient’s marrow or stem cells before chemotherapy is initiated, because chemotherapy causes prolonged suppression of the bone marrow’s ability to form new disease-fighting cells. Once chemotherapy is concluded, the patient’s marrow or stem cells can then be returned to the patient. But while intensive chemotherapy is underway and before the marrow has resumed normal function, infection is a major cause of mortality. During the first month or two after the transplant, effective antibiotics are a mainstay of treatment and necessary for the patient’s survival. Antibiotics have revolutionized cancer treatment by enabling the use of more aggressive therapies. This has led to dramatically higher survival rates. One of every two men and one of three women in the United States is expected to develop cancer during their lifetimes, and many of them will be treated with one or more of the therapies described above. For this medically vulnerable group—and for society as a whole—the loss of effective antibiotics would have immense ramifications. Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process.

The more often bacteria are exposed to antibiotics, the more resistant they become. Because bacteria reproduce rapidly, these antibiotic-resistant bacteria can spread efficiently. Unlike higher organisms, bacteria can transfer DNA to other bacteria that are not their offspring, and even to members of completely unrelated bacterial species. In effect, bacteria can teach one another how to outwit antibiotics. Antibiotic resistance carries a significant economic toll as well as a medical one. The congressional Office of Technology Assessment calculated that resistance by just six types of bacteria increased hospital treatment costs by $1.3 billion as of 1995. Few new drugs are now in the pipeline, and any new antibiotics will be considerably more expensive than existing ones; research and development costs for a new drug may top $800 million, by some estimates, while prescription costs likely will far exceed those for older medicines. Although the misuse of antibiotics in human medicine has been well publicized, less attention has been paid to the serious overuse of antibiotics in agriculture. By one estimate, 80 percent of all antibiotics and related drugs (antimicrobials) sold in the United States are used in livestock production. The lion’s share—roughly 70 percent of the total—are fed to healthy farm animals to promote growth and prevent diseases that would otherwise result from the unsanitary conditions found in overcrowded agricultural facilities. About half of those drugs are identical or closely related to medicines used in treating humans.

Children

Antibiotic Resistance and its Impact on Children For more than half a century, antibiotic drugs have ensured that potentially life-threatening bacterial infections are treatable. Today, however, more and more bacterial infections fail to respond to antibiotic treatment. A federal task force recently warned that antibiotic resistance is “a growing menace to all people” and concluded that if nothing is done, treatments for common infections will become “increasingly limited and expensive—and, in some cases, nonexistent.”
resistance poses a threat to everyone, but children are at particular risk. Children are more vulnerable to bacterial illness than are adults, and this vulnerability is reflected in their higher disease rates. Infants under the age of one, for example, are 10 times more likely than adults to contract a Salmonella infection. The availability of effective antibiotics has helped decrease infant mortality in the United States from about 20 percent in the late 19th century to under 1 percent in 1998. Despite this triumph, children continue to develop many non-fatal bacterial infections that require treatment with antibiotics. The risk of bacterial infection is higher for infants and children, and treatment options are more limited, for several reasons. First, their immune systems are not fully developed and they have not yet acquired the full range of antibodies required to ward off infection. Second, children tend to be exposed to more disease-causing bacteria through day-to-day activities such as childcare and mouthing behaviors. Finally, many therapeutic medications have not been approved for use in children, in part because metabolic differences between children and adults can make use of certain drugs impractical or unsafe for children. For example, because tetracycline binds to immature calcium structures, it permanently disfigures enamel in teeth. Similarly, animal studies have shown that fluoroquinolones, a powerful class of Cipro-related drugs used to treat serious infections, can damage immature cartilage in bones and joints. If antibiotic resistance further depletes the number of effective drugs available, sick infants and children will have even fewer treatment options. Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process. The more often bacteria are exposed to antibiotics, the more resistant they become

**Persons Living with HIV/AIDS**

Antibiotic Resistance and its Impact on Persons Living With HIV/AIDS For more than half a century, antibiotic drugs have ensured that potentially life-threatening bacterial infections are treatable. Today, however, more and more bacterial infections fail to respond to antibiotic treatment. A federal task force recently warned that antibiotic resistance is “a growing menace to all people” and concluded that if nothing is done, treatments for common infections will become “increasingly limited and expensive-and, in some cases, nonexistent.” Antibiotic resistance poses a threat to everyone, but people living with HIV/AIDS are at particular risk. Approximately 900,000 persons in the U.S. are infected with Human Immunodeficiency Virus (HIV). HIV is a viral rather than bacterial disease, so antibiotics cannot be used to treat it directly. But because the virus disrupts the body’s own disease-fighting immune system, antibiotics critical for treating patients infected with HIV. In addition, many of the therapies used to treat HIV suppress the body’s own infection-fighting white blood cells. In those persons who do not receive effective treatment for the HIV virus, the virus generally leads to Acquired Immunodeficiency Syndrome (AIDS). AIDS is a fatal disease characterized by numerous bacterial, viral and fungal infections,
certain cancers, nutritional wasting and/or deterioration of the central nervous system. Although many HIV-related infections only occur in the advanced stages of the disease, bacterial infections can occur at any time. Bacterial pneumonia and Salmonella foodborne infections are particularly common problems for AIDS patients. Bacterial pneumonia is often the first sign of HIV. When caused by penicillin-resistant bacteria, the mortality rate for AIDS patients is approximately 7.8 times higher compared to infections caused by bacteria that are fully or even partially sensitive to penicillin. HIV-infected patients are also at greater risk of developing serious foodborne bacterial infections. In the 1980’s, persistent infection with Salmonella was identified as one of the infections defining AIDS. Unlike healthy persons who usually require no therapy for Salmonella, AIDS patients need to take antibiotics daily to prevent recurrent infection of the bloodstream (septicemia). Several other bacterial infections also plague these patients. Worldwide, bacterial infections are a principal cause of death in AIDS patients, with antibiotic-resistant infections posing a particular threat. Protecting the efficacy of these antibiotic drugs is critical in maintaining treatment options for these infections in persons living with HIV/AIDS. Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process.

Persons with Diabetes
Antibiotic resistance poses a threat to everyone, but people with diabetes are at particular risk. Diabetes has become an epidemic illness in the United States affecting approximately 16 million people. It is now the seventh leading cause of mortality in this country, causing nearly 200,000 deaths annually. It is an illness that can be treated, but not cured. People with diabetes develop common infections at different rates than non-diabetics, and these infections are often more serious. Diabetics also develop types of infections that differ from those encountered by non-diabetic people. For example, nearly 30,000 diabetics die each year from complications of the flu and pneumonia, nearly three times the mortality rate in people without the disease. Often, when a diabetic contracts pneumonia, the bacterium causing this illness is a more dangerous strain than the ones affecting non-diabetics. Many serious illnesses, such as Salmonella and others, that affect diabetics, tend to be multi-drug resistant making treatment all the more difficult. Finally, some diabetics have greater problems with skin and soft-tissue infections, such as chronic foot ulcers and infection of the underlying bone, because diabetes can limit blood flow and the body’s ability to fight infection. As a result, diabetic patients may require weeks or months of broad-spectrum antibiotics. The viability of such antibiotics therefore is critical to this vulnerable population. Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process.

Seniors
Antibiotic resistance poses a threat to everyone, but seniors - people 65 and older - are at particular risk. The fastest growing demographic group in the United States, seniors as a whole are more prosperous, more active, and healthier than ever before. Ironically, these factors allow many seniors to engage in activities such as travel and volunteer work that can increase their exposure to infectious agents. At the same time, seniors who enjoy less-robust health are likely to be hospitalized, or to reside in long-term care facilities. In these settings, they are especially at risk of encountering infection-causing bacteria in general, and antibiotic-resistant bacteria in particular. Residents of long-term care facilities are very dependent on antibiotics; indeed, approximately 40 percent of all prescription drugs dispensed in nursing homes are antibiotics. Unlike death rates from heart disease and stroke, which have fallen in recent years, death rates from infections continue to rise-and now account for nearly a third of deaths among people 65 and older. Infections are also the most common cause of hospitalization. As people age, they may develop debilitating conditions that reduce their ability to fight infection. An array of physiological changes, some of which impair immune-system function, further increases their susceptibility to infection. In addition, seniors are more sensitive to side effects of medications, further limiting antibiotic options. Unfortunately, as Americans age, so do our antibiotics. Few new drugs are now in the pipeline, and any new antibiotics will be considerably more expensive than existing ones. By some estimates, the research and development costs for a new drug may top $800 million. These costs are passed onto patients in the form of prescription costs that will far exceed those for older generic medicines. For a senior on a fixed income, developing a drug-resistant infection that can only be treated with a newer, more-expensive antibiotic can pose a serious financial hardship.

Transplant Patients

Antibiotic Resistance and its Impact on Transplant Patients

For more than half a century, antibiotic drugs have ensured that potentially life-threatening bacterial infections are treatable. Today, however, more and more bacterial infections fail to respond to antibiotic treatment. A federal task force recently warned that antibiotic resistance is "a growing menace to all people" and concluded that if nothing is done, treatments for common infections will become "increasingly limited and expensive-and, in some cases, nonexistent."

Antibiotic resistance poses a threat to everyone, but transplant patients - a group that included nearly 23,000 Americans in the year 2000 - are at particular risk. Infection and rejection are the two main barriers to a successful organ transplant. A transplant patient receives drugs that intentionally suppress the immune system as an important step in keeping the patient's body from rejecting the transplant. These drugs are usually administered for an extended period of time, or even on a lifelong basis. This constant suppression of the immune system makes the patient much more susceptible to bacterial infections, and thus much more likely to need antibiotics. In addition, solid-organ transplant patients are roughly three times more likely to

die from surgical-site infections or other complications than are healthy people undergoing surgery. Furthermore, some types of transplants, such as kidney, may cause ongoing problems with urinary tract infections requiring antibiotic treatment. In short, effective antibiotics are critical to transplant patients; without them, this vulnerable population would be at extreme risk of frequent and potentially fatal infections. Although careful use of antibiotics can result in the emergence of antibiotic-resistant bacteria, inappropriate use greatly accelerates this process. The more often bacteria are exposed to antibiotics, the more resistant they become. Because bacteria reproduce rapidly, these antibiotic-resistant bacteria can spread efficiently. Unlike higher organisms, bacteria can transfer DNA to other bacteria that are not their offspring, and even to members of completely unrelated bacterial species. In effect, bacteria can teach one another how to outwit antibiotics. Antibiotic resistance carries a significant economic toll as well as a medical one. The congressional Office of Technology Assessment calculated that resistance by just six types of bacteria increased hospital treatment costs by $1.3 billion as of 1995. Few new drugs are now in the pipeline, and any new antibiotics will be considerably more expensive than existing ones; indeed, by some estimates, the research and development costs for a new drug top $800 million. Although the misuse of antibiotics in human medicine has been well publicized, less attention has been paid to the serious overuse of antibiotics in agriculture. By one estimate, 80 percent of all antibiotics and related drugs (antimicrobials) sold in the United States are used in livestock production. The lion’s share—roughly 70 percent of the total—are fed to healthy farm animals to promote growth and prevent diseases that would otherwise result from the unsanitary conditions found in overcrowded agricultural facilities. About half of those drugs are identical or closely related to medicines used in treating humans. Because of the growing health crisis of antibiotic resistance, which could render these “wonder drugs” useless in treating infections, the American Medical Association now opposes the routine feeding of antibiotics to healthy farm animals. The American College of Preventive Medicine, the American Public Health Association, and the World Health Organization have taken similar positions. A National Academy of Sciences report estimates that eliminating all such uses in poultry, cow, and swine production would cost U.S. consumers only about $5 to $10 per person annually. The Centers for Disease Control and Prevention has observed that “decreasing inappropriate antibiotic use is the best way to control resistance.” Key steps in doing so include adoption of policies aimed at ending the inappropriate use of antibiotics in agriculture, as well as continued implementation of programs to educate patients, parents, and physicians about the need to use antibiotics more sparingly. In particular:  
- Congress should phase out the routine feeding of medically important antibiotics to healthy livestock and poultry and other inappropriate uses of vital antibiotics in agriculture. S. 2508, introduced by Sen. Edward M. Kennedy, and H.R. 3804, introduced by Rep. Sherrod Brown, would accomplish these objectives.  
- Producers and marketers of meat and poultry should voluntarily agree to stop selling or buying meat produced with routine feeding of antibiotics to healthy animals, and pharmaceutical companies
should stop producing antibiotics for such use in animals. • Finally, those who decide which meat products to purchase - whether an individual shopper buying a few pounds of meat during a weekly trip to the grocery store, or a food-service corporation that purchases millions of pounds in a single transaction - should select meat produced without the inappropriate use of antibiotics. Unless we act now, we face a future of untreatable bacterial infections. Transplant patients will be among the first to pay the price. For a full report on antibiotic resistance

The danger of Antibiotic overuse
Kids Health
http://kidshealth.org/parent/h1n1_center/h1n1_center_treatment/antibiotic_overuse.html

Every year, your family probably faces its share of colds, sore throats, and viruses. When you bring your child to the doctor for these illnesses, do you automatically expect a prescription for antibiotics? Many parents do. And they're surprised, maybe even angry, if they leave the doctor's office empty-handed — after all, what parent doesn't want their kid to get well as quickly as possible? But your doctor could be doing you and your child a favor by not reaching for the prescription pad.

How Antibiotics Work
Antibiotics, first used in the 1940s, are certainly one of the great advances in medicine. But overprescribing them has resulted in the development of bacteria that don't respond to antibiotics that may have worked in the past. Plus, kids who take antibiotics when they aren't necessary run the risk of adverse reactions, such as stomach upset and diarrhea.

To understand how antibiotics work, it helps to know about the two major types of germs that can make people sick: bacteria and viruses. Although certain bacteria and viruses cause diseases with similar symptoms, the ways these two organisms multiply and spread illness are different:

Bacteria are living organisms existing as single cells. Bacteria are everywhere and most don't cause any harm, and in some cases may be beneficial. Lactobacillus, for example, lives in the intestine and help digest food. But some bacteria are harmful and can cause illness by invading the human body, multiplying, and interfering with normal bodily processes. Antibiotics are effective against bacteria because they work to kill these living organisms by stopping their growth and reproduction.

Viruses, on the other hand, are not alive and cannot exist on their own — they are particles containing genetic material wrapped in a protein coat. Viruses "live," grow, and reproduce only after they've invaded
other living cells. Some viruses may be fought off by the body's immune system before they cause illness, but others (colds, for example) must simply run their course. Viruses do not respond to antibiotics at all.

Taking antibiotics for colds and other viral illnesses not only won't work, but also has a dangerous side effect: over time, this practice helps create bacteria that have become more of a challenge to kill. Frequent and inappropriate use of antibiotics selects for strains of bacteria that can resist treatment. This is called bacterial resistance. These resistant bacteria require higher doses of medicine or stronger antibiotics to treat. Doctors have even found bacteria that are resistant to some of the most powerful antibiotics available today.

Antibiotic resistance is a widespread problem, and one that the U.S. Centers for Disease Control and Prevention calls "one of the world's most pressing public health problems." Bacteria that were once highly responsive to antibiotics have become increasingly resistant. Among those that are becoming harder to treat are pneumococcal infections (which cause pneumonia, ear infections, sinus infections, and meningitis), skin infections, and tuberculosis.

Taking Antibiotics Safely
So what should you do when your child gets sick? To minimize the risk of bacterial resistance, keep these tips in mind:

Treat only bacterial infections. Seek advice and ask questions. Letting milder illnesses (especially those thought to be caused by viruses) run their course to avoid the development of drug-resistant germs may be a good idea — but it's still best to leave what constitutes a "mild illness" up to your doctor. Even if the symptoms don't worsen but linger, take your child to the doctor. At the office, ask questions about whether your child's illness is bacterial or viral, and discuss the risks and benefits of antibiotics. If it's a virus, don't pressure your doctor to prescribe antibiotics, but ask about ways to treat symptoms.

Use antibiotics as prescribed.
Don't save antibiotics for next time.
Never use another person's prescription.

Ask your doctor about ways to treat the symptoms that are making your child uncomfortable, such as a stuffy nose or scratchy throat, without the use of antibiotics. The key to building a good relationship with your doctor is open communication, so work together toward that goal.

Use the medication properly. Antibiotics are only effective against a bacterial infection if taken for the full amount of time prescribed by the doctor — and they take time to kick in, too, so don't expect your child to feel better after taking the first dose. Most kids take 1 to 2 days to feel a lot better. Similarly, don't let your child take antibiotics longer than prescribed.
And most important, never use antibiotics that have been lying around your home. Never take antibiotics that were prescribed for another family member, either — doses for kids vary, and if your child did have an illness requiring antibiotics, you’d want to make sure you were treating it correctly. Saving antibiotics "for the next time" is a bad idea, too. Any remaining antibiotic should be thrown out as soon as your child has taken the full course of medication.

Help fight antibiotic resistance by taking simple steps to prevent the spread of infections. Encourage hand washing, make sure your kids are up to date on immunizations, and keep kids out of school when sick. Doctors are aware of increasing antibiotic resistance and are trying to solve the problem. New antibiotics may be on the horizon, but antibiotics will continue to need to be prescribed and used appropriately.

Reviewed by: Steven Dowshen, MD
Date reviewed: November 2008

Antibiotic Overuse
About.com Pediatrics
http://pediatrics.about.com/cs/weeklyquestion/a/100702_ask_2.htm
Where are my antibiotics?
Question of the Week
By Vincent Iannelli, M.D., About.com
Updated March 19, 2007
About.com Health's Disease and Condition content is reviewed by the Medical Review Board

Q. My son has had a green runny nose for three days. I took him to a new Pediatrician today and for the first time, I left without a prescription for an antibiotic. Doesn't he need an antibiotic to clear up his sinus infection? How come my last doctor always gave us a prescription?

A. No, he likely doesn't need an antibiotic to get better. If he simply has a green runny nose for three days, even if he also has a cough and fever, that is probably just a cold and it will get better on its own.

It can help to understand why he doesn't need antibiotics if you realize that a cold is just a viral infection and antibiotics don't work against viruses. Your child simply needs time to get better on his own.
It also helps if you understand the natural progression of a cold, which usually starts off as a clear runny nose, perhaps with a fever and cough or a green or yellow runny nose, and then, after 3-5 days of worsening, your child will slowly get better over the next 7-10 days.

There are times when your child may need antibiotics when he has a cold, like if he has a secondary bacterial infection, such as an ear infection or pneumonia. If he continues to worsen after 5 days of cold symptoms and has a persistent fever, then that can be a sign that it is turning into a sinus infection, and antibiotics may also be needed.

If your previous doctor always gave you a prescription for an antibiotic, even when your child just had a cold, he or she was likely overusing antibiotics and prescribing them when they weren't necessary.

But won't antibiotics help him get better faster?

No. This is one of the common myths that help contribute to the overuse of antibiotics. While many parents now realize that their child will get over their cold symptoms on their own, they still may believe that they will get better even faster with an antibiotic. This is simply not true. Antibiotics don't work against viruses.

Antibiotics also won't help to prevent him from developing an ear infection or sinus infection when your child has a cold, so starting an antibiotic early or 'just in case' is usually not a good idea either.

Here is a good way to think about it:

Pediatrician: I think little Johnny has a cold and he should get better in about 7 days.

Mom and Dad: But what if you give us an antibiotic? How long will it take him to get better then?

Pediatrician: About a week.

Are there any dangers to using antibiotics when they aren't needed?

In addition to wasting money and putting your child at risk for side effects of taking an antibiotic, such as diarrhea and allergic reactions, taking an antibiotic unnecessarily also makes your child more likely to develop infections with bacteria that are resistant to commonly used antibiotics.
When a bacteria develops resistance, it means that it has come up with a way to counteract the antibiotic or keep it from working, so that the bacteria can keep growing and your child's infection worsens or lingers.

The other problem occurs when a child is prescribed an antibiotic for a cold and then he isn't getting better after a few days. What do you do then? Since we expect antibiotics to begin working in 2-3 days, if the child isn't getting better, he is usually changed to another stronger antibiotic. And then when he does get better 2-3 days later, everyone thinks it was the antibiotic that worked, when instead, he likely just got better on his own.

Is resistance really a problem?

Yes. And it is becoming an increasingly bigger and more serious problem. According to the CDC, 'antibiotic resistance has been called one of the world's most pressing public health problems.'

Has your child ever needed more than one or two antibiotics to fight an ear infection or sinus infection? If so, then it is likely because the first antibiotics didn't work and the bacteria causing your child's infection had developed resistance.

And as more antibiotics are used, especially when they are used when they aren't needed, the problem of resistance will increase. Fortunately, a lot of education of parents and doctors has been done in recent years to cut back on the overuse of antibiotics.

What else contributes to the overuse of antibiotics?

Although doctors often blame parents who demand antibiotics when their children are sick, and parents blame doctors who don't educate them enough about whether or not an antibiotic is really needed, we are all partly to blame.

Here are some steps you can take to help combat the overuse of antibiotics:

- Don't ask for antibiotics when they aren't needed. When your child is sick, ask for a specific diagnosis. If your doctor diagnoses your child as having a cold, upper respiratory tract infection (URI), bronchitis or the flu, then antibiotics usually shouldn't be prescribed. You also don't need antibiotics if your child has a sore throat and a negative test for strep. If your doctor gives you an antibiotic every time
your child has a sore throat and doesn't test for strep, that is a good sign that your child is taking antibiotics

- Learn the difference between viruses and bacteria. You don't expect or demand antibiotics when your child has other common viral infections, such as chickenpox or gastroenteritis (diarrhea), so why should you get them when your child has a cold or the flu? There is something about a green or yellow runny nose that makes people think ANTIBIOTICS, but remember that is most likely a virus causing that green runny nose and not necessarily a sinus infection unless it has been lingering for 10-14 days or more.

- Tell your doctor that you don't expect antibiotics every time your child is sick, especially when they aren't needed. This will help combat the myth that 'parent's just want antibiotics when they go to the doctor.' Often parents just go to the doctor to make sure their child doesn't have an ear infection or something else more serious and they are often relieved that it is 'just a cold.'

Or, at the beginning of your doctor visit, you could say something like, 'I think it is just a cold and he needs to get better on his own, but I wanted to make sure his ears were okay.' You could also send or present your doctor with this letter about antibiotic overuse, which declares that you don't expect antibiotics when they aren't necessary.

There is nothing wrong with going to the doctor when your child is sick and you don't have to wait for 7-10 days of cold symptoms to go in if you aren't comfortable doing that, but make it clear that you don't necessarily want an antibiotic unless it is really needed.

- Ask about what you can do to make your child feel better. That is your real goal anyway, right? Symptomatic treatment with over-the-counter or prescription strength cold and cough medicines, pain and fever relievers, a humidifier and lots of fluids can help to make your child feel better until he gets over his infection.

- When you are prescribed an antibiotic, take it as prescribed, finish it, and throw out any that is leftover. Don't stop taking an antibiotic once you feel better or save an antibiotic to use again later.

- Educate day care providers that children can usually return to day care when they no longer have a fever. Excluding kids from day care when they have a fever is reasonable, but requiring a doctor's note or an antibiotic prescription to return is wrong. Have your doctor fill out this letter so that your child can return to day care.

- Ask your doctor to educate you about your child's illnesses and appropriate treatments. It is easier and faster to just write a prescription for Amoxil or another antibiotic than to teach a parent about
when antibiotics are needed, the problems of resistance, etc., but in the long run, you both save a lot of time if you do things right and don't overuse antibiotics.

- If your doctor can't take the time to teach you about the proper use of antibiotics, there are lots of resources online that will, including:

So who is the better doctor, the one that quickly writes you a prescription for an antibiotic every time you go in, or the one that refuses to do so and only uses antibiotics when they are really needed? The answer is clear to me and hopefully to you too, but there are still parents who get mad when they don't get a prescription at each visit.

Some points to remember:

- It is easier to just write for an antibiotic then it is to take the time to only use antibiotics when they are really needed and to explain to a parent why they aren't needed.
- Your Pediatrician has nothing to gain by not writing a prescription for an antibiotic when your child is sick. And there is a great benefit in keeping your child healthy and helping to combat antibiotic resistance when he or she doesn't overuse antibiotics.
- If you are worried about having to return to the doctor's office if your child isn't getting better after a week or two of cold symptoms, ask if you can simply call the office and get a prescription then. Of course, if your child is much worse, he will need to be seen again.

AAFP FP Report
Deadly risks of antibiotic overuse warrant widespread education
http://www.aafp.org/fpr/20000300/01.html

Green mucus implies a bacterial infection. ... If a cold lasts a week, you should consult a physician. ... Antibiotics might not help you get better, but they can't hurt. Right?

Wrong! Physicians involved in curbing the excessive and inappropriate use of antibiotics insist misinformation is the main culprit.
Education for physicians, office staff and patients would go a long way in preventing antibiotic resistance, said family physician John Hickner, M.D., who serves on a CDC panel developing principles for the judicious use of antibiotics for respiratory infections in adults.

According to him, green mucus isn't a good indicator that antibiotics are needed. Research shows cold symptoms commonly last longer than a week. And the misuse of antibiotics leads to strains of bacteria developing resistance to drugs. Misinformation, such as these commonly held beliefs, results in many patients prematurely visiting their physicians and expecting a prescription for antibiotics. Too frequently, the physicians comply, Hickner said.

"When you look at well-designed studies of antibiotics for bronchitis or sinusitis, for example, there's no evidence of any clinically significant benefit, just very marginal benefits," said Hickner, professor of family practice at Michigan State University College of Human Medicine in East Lansing. "Nearly all people get better from bronchitis and sinusitis on their own without the use of antibiotics. But doctors are a little uncertain about that."

About 70 percent of patients diagnosed with bronchitis and more than 90 percent of those with sinusitis are prescribed antibiotics, he said. "There is still some belief that antibiotics are effective enough to be used in those cases, but the data just don't bear that out." And the consequences are serious.

Drugs that once guaranteed eradication of bacterial diseases are suddenly up against strains that don't respond as predictably. These bacteria have developed resistance in part because of overuse and misuse of the drugs, often in ambulatory settings. As a result, patients are getting sicker, and death rates for some communicable diseases, such as tuberculosis and malaria, are on the rise in regions where such diseases had been under control.

"Some doctors think of antibiotics as harmless placebos," said William Hueston, M.D., family medicine department chair at the Medical University of South Carolina in Charleston. "You risk not only harming the patient when you prescribe unnecessary antibiotics, but also harming the community."

Although doctors should refresh their knowledge and get up to speed on issues surrounding antibiotic use, patient education also is key.
The January Family Medicine details research conducted by Hueston with his university colleague Arch Mainous, Ph.D., to assess the use of two interventions aimed at reducing the rate of antibiotic prescribing for pediatric upper respiratory infections. The interventions -- (1) providing feedback about the physicians' antibiotic prescribing habits and (2) providing physicians with patient education materials on antibiotic use -- had little overall effect. However, providing patient education materials to physicians did seem to have a slight positive impact on antibiotic prescribing.

The study notes that "providing them with tools for educating patients may be a good way to help physicians change prescribing practices, and thereby confront the public health problem of antibiotic resistance." If physicians don't have time to do it, nurses or other staff members could be trained to teach patients the facts about antibiotics, said Hueston. The CDC offers a plethora of resources on the topic, including a handy Q&A sheet for patients (see "A pill that cures every ill?").

"One of the biggest ways we can help patients gets back to why we're family physicians," Hueston said. "Let's talk to our patients. If we take the time to educate patients, we'll save them money and keep them healthier in the long run."

Better telephone triage also helps by teaching patients to know when an office visit is warranted. If patients get good counseling from staff, they won't head to the office for a prescription and therefore won't misuse an antibiotic, said Hueston.

Hickner said that overall, he's optimistic about the situation. "For example, physicians have dramatically decreased antibiotic prescriptions for adults with upper respiratory infections," he said. "For the common cold, antibiotic prescriptions have gone way down. It's now around 20-30 percent, and most of those patients probably have something else, too. I think we're moving in the right direction."

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Silent Killers: Scary Super bugs
48 hours mystery
CBS) Two years ago, Bobbie Mackeon got a paper cut. She thought it was no big deal.
But it got infected. Bobbie, a nurse practitioner, spoke with the doctors at her hospital, and they all figured an antibiotic would take care of it.

It didn’t. Nor did the next two antibiotics she tried. “The bug that was in there was eating these antibiotics for breakfast,” she says.

With her infection still raging, Bobbie turned to an intravenous antibiotic, which finally did help. But complications then led to potentially fatal blood clots. “The blood clot was about four inches across and it had little bubbles around it, which told us it was infected,” she says.

The clots were so severe that her life now depends on high doses of blood thinners, which created new problems. Any injury can now be life threatening, because it is difficult to stop her body from bleeding. Now, instead of running as she used to, she works out, carefully, in her garage.

That a tiny infection could spiral into a life-threatening condition doesn’t surprise Michael Shnayerson or Mark Plotkin. In their new book, “The Killers Within,” they explore why antibiotics don’t work the way they used to. Susan Spencer reports.

“The bad news is the bad bugs are getting badder faster. They’re getting stronger faster,” says Plotkin.

“We no longer live in a time when antibiotics work 100 percent of the time and in fact there are some bugs resistant to all the antibiotics used against them. And people are dying,” says Shnayerson. Even common staph infections, once easily cured, now can kill. The superbugs, which first showed up in hospitals, are everywhere.

The culprit: overuse of antibiotics. Like all living things, bacteria adapt to the environment. Faced with an antibiotic, a few hearty bugs survive. Those superbugs then multiply, creating a new strain that the old antibiotic can’t touch.

The more antibiotics used, the more the bacteria evolve. After five decades, Americans have been using and now overusing these “wonder drugs.”

“Too many doctors still feel that antibiotics basically do no harm. And that it’s better to give them than not,” says Shnayerson.
Patients demand them even for colds - viral infections against which antibiotics are useless. Adding to overuse is agriculture. Farmers use antibiotics in feed, mostly to make the animals grow a little faster. According to Plotkin, a recent study estimates that farms use 70 percent of all antibiotics in the U.S.

“I think we’re looking at the end of the antibiotic era if we don’t start changing our behavior,” says Mackeon’s colleague, Dr. David Witt, an infectious disease specialist at Kaiser Permanente in California.

Most chilling, Witt says, is the rising rate of resistance in one very common bug, pneumococcus, which causes most cases of pneumonia, ear infection, and sinusitis. “Everybody gets them. All of your kids have had them,” Witt says.

When Gail Mullin’s 3-week-old daughter, Hollie, got her first ear infection, Gail, like many mothers, asked for antibiotics. But more infections followed. And the antibiotics kept coming: amoxicillin, augmentin, zithromax, receptin - 17 different courses in one year. By the time Hollie was 18 months old, she contracted a bacteria that was resistant to every oral antibiotic available.

Her only hope was a drug called vancomycin, a potent antibiotic given intravenously. The doctor told her it was the last option.

Hollie was lucky. Vancomycin did work. Her parents learned a lesson. “By giving Hollie as many antibiotics as we did by the time she was a year old we created a superbug,” says her mother.

Vancomycin saved Mackeon as well. But now she struggles with the blood clots. Despite efforts to regain her health, Bobbie has been unable to work for much of the past two years.

“Bobbie is a good example of the worst-case scenario,” says Witt. He expects to see many more such cases, which is why he carefully checks and rechecks every antibiotic ordered at the hospital.

“I don’t want to give you the wrong impression. I love antibiotics. They are life-saving, they are miracles. And I want to save them for when we need them,” he says.

There is some good news. A new study finds that doctors are ordering fewer antibiotics for children. But experts estimate that there’s still are tens of millions of unnecessary prescriptions being written each year.
Now even Vancomycin is losing its punch. This prospect is “chilling,” Witt says.

But could there be alternatives to antibiotics? Old technology from the former Soviet Union may hold a surprising answer.

Dr Greene
http://www.drgreene.com/21_646.html

About 40% of the time kids see a doctor, they leave with a prescription for antibiotics. This astounding figure includes sick visits and routine well-child checkups. Antibiotics are wonderful, life-saving tools, but their overuse is dangerous.

Because antibiotics were such a revolutionary advance in the treatment of infectious diseases, doctors slipped into the habit of prescribing them for minor illnesses, even those known to be viral, just to "be on the safe side." They also thought they might help the child get better a bit faster.

Now we know that the opposite is true. This practice is harmful to children and to the environment by selectively breeding ever-more frightening bacteria. Children may get better a bit quicker at first, but then they are likely to get sick more often, with longer, more stubborn infections caused by more resistant organisms.

The routine use of antibiotics makes life worse for children and parents—even apart from the side effects and allergic reactions many children have. To be on the safe side, antibiotics should be withheld unless they are clearly needed.

Nevertheless, up to 60 % of children with common colds are treated with antibiotics (Journal of Family Practice 1996; 42:357--361). Because children average three to eight colds each year, most accompanied by green or yellow runny noses, they can get many, many rounds of unnecessary (and therefore harmful) antibiotics.

Why do we still do this? There are many reasons, but the one cited most frequently by physicians is that parents want or expect a prescription (Pediatrics 1998; 101:163--165). Admittedly, we physicians should
know better. But when we see you in the office, things sometimes get muddled. Your child has a fever and is cranky. His or her nose has been running for 5 days, and the mucus is getting thick and green. His or her appetite is down, and no one is sleeping well. You've waited for this to get better on its own, but it is getting worse. And you can't afford to miss more work. We want to be able to help you and your child get through this faster. Prescribing an antibiotic this one time won't hurt--much.

I will teach you one sentence that can greatly improve your child's health. Use this tool before the doctor even examines your child. When you are explaining why you came in, add the sentence, "If there is any way to safely help her feel better without antibiotics, that is what I would prefer."

When not to use antibiotics!
Recognizing the urgent problem of antibiotic overuse, the Centers for Disease Control and the Academy of Pediatrics have issued guidelines for when to use (and when not to use) antibiotics for the most common pediatric respiratory infections (Pediatrics 1998; 101:163-184 and Pediatrics 2004; 113:1451-1465). Ear infections, sinus infections, bronchitis, sore throats, and colds account for three fourths of all antibiotic prescriptions. These guidelines should not be rigidly adhered to for every child, but they do give a good general idea of when to avoid antibiotics. I will summarize the guidelines for you. I will not explain each statement, but you can use them as excellent discussion points with your physician:

Sore Throats
Strep throat is diagnosed with a Strep test, not by looking in the mouth.
Antibiotics should not be given for sore throats without a positive test for Strep or another bacterial infection. One of the penicillins (not the newer, broad-spectrum antibiotics) is the best choice unless the child is allergic to it.

Bronchitis
Regardless of how long it lasts, bronchitis or a nonspecific cough illness in children rarely warrants antibiotics.

Occasionally, if the cough has lasted for more than 10 days and specific bacteria are suspected, one round of antibiotics may be worthwhile. Children with underlying lung disease (not including asthma) might also benefit from antibiotics when their diseases flare up.

Colds
Antibiotics should not be given for the common cold. Thick, discolored nasal discharge is a normal part of a cold and is not a reason for antibiotics unless it lasts longer than 10 to 14 days.

Sinus Infections
Most children should not be given antibiotics for a sinus infection unless there are both nasal discharge and cough without any improvement after more than 10 to 14 days. If there is some improvement by day 10, antibiotics are probably not helpful.

Children with severe symptoms (facial swelling, facial pain, a fever over 103) may benefit from earlier treatment. Use the most narrow-spectrum antibiotic possible.

Ear Infections
Not all ear infections are the same. Each ear infection should be classified as acute otitis media (AOM) or otitis media with effusion (OME). Most children with ear infections have OME -- fluid in the ear without signs of an acute middle ear infection. Half of young children with colds get OME. AOM is fluid in the ear accompanied by signs such as pus behind the eardrum, eardrum pain, distinct redness of the eardrum, or discharge from the ear. Ear pulling, runny nose, fussiness, and changes in sleep pattern can accompany either AOM or OME and do not establish a diagnosis of AOM.

Antibiotics may be appropriate for AOM with documented fluid in the ear and clear signs of acute illness. The Ear Check Middle Ear Monitor is a good way to confirm the presence of fluid. A red eardrum without fluid is not AOM (or OME for that matter).

Healthy children greater than 2 years of age with uncomplicated, nonsevere AOM may be better off observed without antibiotics for 48-72 hours. Treatment for pain with pain relievers is appropriate. If severe symptoms (moderate to severe pain or fever above 102.2 degrees) develop or the child is not better in 48-72 hours, antibiotics can be prescribed at the time.
Antibiotics are not useful for the initial treatment of OME, although they may be worth a try if OME lasts for longer than 3 months. OME is important in that it reduces hearing when present, but antibiotics are usually not the solution.
Continued fluid in the ear found at an ear recheck after AOM is to be expected and does not necessitate another round of antibiotics, except in the less common situation where signs of acute infection are still present.

Preventive antibiotics should only be given, if at all, after three or more separate cases of documented AOM in 6 months or four or more in 12 months.

Children fight off most childhood illnesses better without antibiotics. The physician's job is to gently treat children with uncomfortable symptoms so they can get the rest and fluids they need. Occasionally, antibiotics are a vital part of the healing process. Equipped with this information, you are in an excellent position to remove the "pressure to prescribe" and to work with your doctor to offer your child the very best care.

The good news is that more parents and more physicians seem to be aware of the dangers of antibiotic overuse. At Stanford University and throughout the nation, the next generation of doctors is being taught the guidelines above. In my own experience, practicing and teaching pediatric medicine, I see more physicians explain why they are not prescribing antibiotics and more parents willing to “wait out” their children's infections. I am hopeful that soon we will see studies documenting a decrease in antibiotic overuse.

Alan Greene MD FAAP
Reviewed by: Khanh-Van Le-Bucklin MD & Liat Simkhay Snyder M.D.
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Hydro Med Inc
http://www.grossan.com/zaaphmol.html
ZAAP stands for Zap Antibiotic Abuse Personally

You have heard that antibiotics are overused, that more than 1/3 are over prescribed or abused. But did you know that:

The risk of breast cancer is in proportion to the frequency of antibiotic use (JAMA. 2004;291:827-835)? That abuse of antibiotic in now associated with increase of asthma, allergic skin conditions, and urinary infections?
That the side effects of antibiotics often outweigh their benefits?
In hospitals all over the world, perhaps most often in the countries with the most advanced medicine, people are dying of infections because bacteria have become drug resistant due to antibiotic abuse. You are your loved ones are at risk.

What can we do? Wait for the drug company establishment to act? We can't afford to wait. YOU need to tell your friends and family about antibiotic abuse to counter the billions spent by drug companies urging us to always take pills.

What Is Antibiotic Abuse?

Doctors who allow themselves to get talked into prescribing antibiotics when they know its for a virus or that there are alternatives.

Doctors who prescribe an inadequate supply of antibiotics so that more drug resistant organisms grow.
Doctors who rely solely on antibiotic therapy and forget to mention adequate rest, fluids, stop smoking, etc.
Patients who insist on an antibiotic with every sniffle or sneeze.
Patients who take a couple of antibiotic pills whenever they feel "sick".

What You Should do:
Discuss need for antibiotic with your doctor and be willing to try other ways.
Encourage your friends to do the same.

Warm your friends of the dangers of popping an antibiotic any time, of not finishing the antibiotic prescription. Teach the importance of Hot Tea and Chicken Soup for a cold.

Read about drug free alternatives. Some are at www.sinuses.com
Each specialty- Pulmonary Medicine, Asthma, Dermatology has a web site you can refer to about your need for medication. Check these out.

Of course, antibiotics save lives and are wonderful products. But they must not be abused.
With less needless antibiotic prescriptions, your cost of health care will go down. With less drug resistant infections, your own life may be saved.

Be a ZAAPER today!
Get others involved!
Write to this address to suggest other ZAAP web sites and methods.

ICPA
International Chiropractic Pediatric association – research foundation
http://www.icpa4kids.org/research/children/antibiotics.htm

Antibiotic Use in Pregnancy Linked to Allergy-Related Symptoms in Child
A study of British children suggests that women who have an infection or take antibiotics during pregnancy are more likely to have a child with an allergy-related condition such as asthma, hay fever or eczema.
Researchers at the University of Nottingham evaluated the medical records of nearly 25,000 British children and their mothers. The study found that children exposed to antibiotics in the womb had a higher risk of developing asthma, hay fever and eczema than did children whose mothers did not take the medication during pregnancy. Because a person's immune system develops while he or she is still in the womb, some experts speculate that factors that modify microbial exposure at this time may have a long-term effect on the risk of developing allergic disease.

Antibiotic Abuse Has Led to Increase in Ear Surgery
Amer. J. Respiratory and Critical Care Med., 2002 (Sept 15); 166 (6): 827-832

An increase in the number of acute otitis media (AOM) paediatric patients with suppurative complications at a tertiary care medical center appears to be related to a rise in incidence of resistant Streptococcus Pneumoniae isolates.

Cases needing surgery, they point out, are perceived to be on the increase in the era of antibiotic resistance. The number of cases requiring surgical intervention was also seen to increase along with an increasing number of resistant Streptococcus Pneumoniae isolates.
Antibiotics not always necessary in treatment of otitis media
Well it always takes a crisis (resistant Streptococcus Pneumoniae) to conclude the obvious. Once again, another report comes up emphasizing the watch and wait approach.
"Children with otitis media who do not have a high temperature or vomiting during the first three days will most probably not benefit from antibiotics.

"Family doctors should wait for 24 to 48 hours before prescribing antibiotics for children with otitis as many will settle down on their own, analysis of a randomised controlled trial shows"
Hopefully the practitioners will step out of their paradigm and put the research to practical application.

Antibiotics Don't Help Sinusitis
Antibiotics do not help most children with acute sinusitis, according to a study in Pediatrics. Investigators studied 180 youngsters, aged 1 to 18 years, with acute sinusitis. The children were divided into three treatment groups: 1) amoxicillin, 2) amoxicillin-clavulanate, or 3) placebo. Treatment lasted 14 days.
Seventy-nine percent of the youngsters on amoxicillin improved after 14 days, as did 79% of those taking placebo pills and 81% of those on amoxicillin-clavulanate.

Most children with prolonged cold-like symptoms suggestive of acute sinus disease get better within three weeks, without antibiotic therapy," explains chief investigator, Jane Garbutt, MB, ChB. "Our study suggests that, for children with uncomplicated acute sinusitis, it makes sense to delay antibiotic treatment and watch carefully."

"Antibiotics are expensive and can cause side effects, most commonly diarrhea," Garbutt says. "Another concern is that they are an important factor in the emergence and spread of antibiotic-resistant bacteria." Garbutt JM, Goldstein M, Gellman E, Shannon W, Littenberg B. // A randomized, placebo-controlled trial of antimicrobial treatment for children with clinically diagnosed acute sinusitis. // Pediatrics 2001 (Apr); 107 (4): 619

Antibiotics Usually Not Necessary for Ear Infection
For decades, chiropractors have expressed concern about the aggressive use of antibiotics in children with ear infection. Now, a study in the British Medical Journal validates that concern.

A total of 315 children, with acute otitis media were assigned to 1 of 2 cohorts: 1) a 72-hour waiting period with no antibiotic use or 2) immediate antibiotic intervention. Findings showed that "immediate antibiotic
prescription provided symptomatic benefit mainly after the first 24 hours, when symptoms were already resolving.* Although children who were given antibiotics recovered an average of 1 day earlier than children who did not take the medication, no difference was seen in school absence or pain/distress scores. And, only 9% of children in the watchful waiting group developed diarrhea, compared with 19% of those taking antibiotics.

Overall, 77% of parents of children in the watchful waiting group expressed satisfaction with the care their youngsters received. In addition, these parents were less likely than parents of children who received antibiotics to predict that their youngsters would require antibiotics for subsequent ear infections.


Antibiotics May Hurt Discs
Antibiotic drugs may affect intervertebral disc health, according to a report published in the journal Spine. As part of the study, scientists exposed cultured human annulus cells to four antibiotics commonly given to patients undergoing spinal surgery: cefazolin, gentamycin, cefamandole and vancomycin. After six hours, cells exposed to high concentrations of cefamandole or vancomycin showed decreased metabolism. After 48 hours, viability was lower in cells treated with all four drugs. Cells exposed to cefazolin and cefamandole also exhibited reduced proliferation.

"These findings show that high doses of antibiotics can have direct, deleterious effects on cultured disc cell survival, cell proliferation and metabolic rates," wrote the study's authors. "Studies such as the current investigation . . . show the importance of a greater understanding concerning antibiotic effects on disc cell proliferation and metabolism."


Antibiotics Not Necessary for Most Ear Infections
Researchers in the Netherlands report that children should not be given antibiotics when they initially present with ear infections. The study looked at 240 children, aged 6 months to 2 years, with acute otitis media. The children were prescribed either placebo or 40 mg/kg per day of amoxicillin. Youngsters who took amoxicillin were 13% less likely to exhibit persistent symptoms at day 4 - and were less likely to take pain
medication - compared with children who were given placebo. However, there was no significant difference between the two groups in otoscopic findings, pain duration, or crying. In addition, tympanometric findings in both groups were similar at 6-week follow-up. The study's authors concluded that, "This modest effect does not justify prescription of antibiotics at the first visit, provided close surveillance can be guaranteed."

Damoiseaux RAMJ, van Balen FAM, Hoes AW, Verheij TJM, de Melker RA // Primary care based randomised, double blind trial of amoxicillin versus placebo for acute otitis media in children aged under 2 years // BMJ 2000 (Feb 5); 320 (7231):350-354

Antibiotics may Cause Stomach Disorder in Newborns
Infants who are given the antibiotic erythromycin have increased odds of developing infantile hypertrophic pyloric stenosis, compared with infants who do not take antibiotics, according to the Centers for Disease Control and Prevention in Atlanta, Georgia.

Investigators looked at 157 babies less than 3 weeks of age who were treated with erythromycin after being exposed to whooping cough. A total of 5% of the newborns that took erythromycin developed hypertrophic pyloric stenosis, which was treated with surgery. This figure is dramatically higher than the average incidence of the disorder, which only 0.1% to 0.3%.

Hypertrophic pyloric stenosis in infants following pertussis prophylaxis with erythromycin. // MMWR Morb Mortal Wkly Rep 1999 (Dec 17); 48 (49): 1117-1120

Avoiding Antibiotics for Acute Otitis Media Reduces Community Load
The routine prescription of antibiotics for acute otitis media continues to be questioned. In a recent report in the British Medical Journal (BMJ), Dr. Christopher Cates reports what happened in his practice one year after he and his partners decided not to prescribe antibiotics for children with an ear infection who were not systemically ill. Instead, they gave the parents a detailed handout and a deferred prescription. Before the change, acute otitis media accounted for more than half of all their antibiotic prescriptions for children; afterwards it accounted for a third and their total antibiotic use for all childhood infections was reduced by a fifth. Most parents welcomed the handout, and deferred prescriptions were often not redeemed. The authors concluded "This approach may be useful in reducing the antibiotic load of children and in dealing with antimicrobial resistance."
Antibiotics Again Proven Ineffective for Ear Infections

January’s Parenting magazine sites a watch and wait approach taken in the Netherlands when it comes to ear infections. Studies there have shown no risk from withholding them. In one study, out of all the children (4,000), only one child developed a complication—mastoiditis. Antibiotics were then administered and the infection subsided.

Most Acute Otitis Media Patients Recover Without Antibiotics

A study conducted by the Southern California/RAND Evidence-based Practice Center (EPC) and sponsored by the Agency for Healthcare Research and Quality reveals that nearly two-thirds of children with uncomplicated acute otitis media recover from pain and fever within 24 hours of diagnosis without treatment with antibiotics. And, over 80% recover within 1-7 days. When treated with antibiotics, up to 93% of children recover during the first week.

Investigators found no evidence that children with acute otitis media treated with amoxicillin fared any differently from those treated with newer, more aggressive antibiotics - which are more expensive and more likely to provoke side effects.


Study Looks at Over-Prescription of Antibiotics

A recent study highlights the cultural and economic forces spurring the over-prescription of antibiotic drugs, and the evolution of super-resistant microbes. The report notes that antibiotics cost the U.S. about $15 billion per year. Extra hospital costs associated with drug-resistant hospital-acquired bacterial infections total at least $1.3 billion annually. Of 51 million visits to physicians for "colds," upper-respiratory infections and bronchitis, 50% to 66% resulted in an antibiotic prescription, even though these conditions usually do not require antibiotics. To explain this trend, the study’s authors point to direct-to-consumer advertising, consumer demand, a medical training system that puts the least experienced doctors in charge of prescribing drugs and overloaded hospitals.
Too much of a good thing, as they say, is bad. China is supposed to have the world's highest rate of antibiotics abuse and the problem, apart from killing an estimated 80,000 a year, is leading to an increased resistance of bacteria to drugs, resulting in a rising number of recessive syphilis cases, among others. An ambitious two-year project has now been launched to train over 30,000 medical staff across China in the responsible use of antibiotics.

According to a TIME article in 2005, China's "tendency to overprescribe antibiotics can be traced back to its traditional medical beliefs". So the next time a Chinese doctor offers to put you on a drip for a minor ailment, stand up for yourself and say no

ANTIBIOTIC ABUSE

The Boston Globe

August 8, 2005

THE GREAT, life-saving medical advance of the 20th century was the discovery of antibiotics. Now, in the 21st century, the effectiveness of these miracle drugs is being undercut by their misuse in both people and animals.

The fight to end overuse of the drugs in animals had two recent victories: a decision last month by the Food and Drug Administration to ban the use of two antibiotics in poultry and an announcement Tuesday by a major food services company, Compass Group, that its pork suppliers would no longer use antibiotics to promote growth. As welcome as these steps are, the best route to stop agricultural misuse of these drugs is legislation pending in Congress.

According to the Union of Concerned Scientists, 70 percent of all antibiotics used in the United States are put in the feed of poultry and livestock. This is done not to treat infections but to speed growth or prevent disease in the unhygienic quarters of the animals. One effect of this indiscriminate use of the drugs is to
breed strains of bacteria that are resistant to them, eroding their ability to cure infections in humans. The risk is greatest with germs that pass from animals to humans, such as salmonella.

In 2000, the FDA started the process of banning two antibiotics in poultry farming after a study showed that 17.6 percent of humans who were treated with these drugs in 1999 had resistant bacteria strains. In 1995, when the drugs were first approved for use in poultry, just 1 percent of humans had resistant strains. One maker of poultry antibiotics, Abbott Laboratories, quickly agreed to withdraw its drug from the market, but the Bayer Corp. chose to contest the ban. Because of the FDA's cumbersome procedures, it has taken five years to get a final ruling against Bayer.

That timeline is an argument in favor of a Senate bill, whose sponsors include Senators Olympia Snowe of Maine and Edward Kennedy, that would ban the nontherapeutic uses of antibiotics in animals. The ban would go into effect two years after enactment of the law, with provisions for financial aid to farmers. The National Academy of Sciences estimates that the ban would raise a person's annual meat bill by $5 to $10. The American Medical Association, the American Academy of Pediatrics, and the American Public Health Association all favor an end to this use of antibiotics.

Resistant bacteria are also the result of doctors prescribing the drugs for conditions not caused by bacteria and of patients prematurely breaking off a course of antibiotic doses. Efforts to curb resistance have to address these as well. But banning the nontherapeutic use of antibiotics in animals is a sensible step to make sure medicine doesn't lose these potent weapons against infection.

### ANTIBIOTICS & FOOD

NC Cooperative Extension
Preventing Antibiotic Residues in Milk
http://www.ces.ncsu.edu/depts/foodsci/ext/pubs/antibioticresidues.html

**Preventing Antibiotic Residues In Milk**

*J.E. Rushing* and D.P. Wesen
Departments of Food Science and Animal Science, NCSU

The occurrence and detection of antibiotic residues in milk continue to be concerns for the dairy industry. Several steps have been taken to assure the public that the milk supply is safe. Many dairy producers have
voluntarily adopted the 10-point "Milk and Dairy Beef Residue Prevention Protocol." This relies on the HACCP concept to "manage out" the hazards by close attention to critical control points. On the regulatory front, increased surveillance and testing have been mandated.

**Standard Test**
For years, the standard for antibiotic testing has been the Bacillus stearothermophilus disc assay method. This was the official test for regulatory use. A few other tests which mimic the results of the disc assay were also approved. They were designed to detect residues of penicillin, the most commonly used antibiotic. Penicillin may still be the antibiotic of choice for treating selected diseases of lactating cows. However, other antibiotics are now being used. Many of these antibiotics are being used in an "extra label" fashion. That is, they are prescribed by veterinarians to be used in a way not indicated by the manufacturer's labeling information. Often, this means that the withholding times necessary before the milk can be used for food are not well established. Antibiotic residues above the FDA-established "safe" or tolerance levels could be present. The disc assay is not adequate to detect antibiotics at this level nor does it effectively detect the range of antibiotics currently used.

**Random Testing**
To detect milk with antibiotic residues above the legal limit, regulatory agencies have relied on random and regularly scheduled sampling of producer and market milk. Many plants have tested for penicillin residues on a regular or intermittent basis. In addition to the official tests,( i.e., the disc assay) and some screening tests designed to reproduce the results of the disc assay, additional screening tests appeared on the market. Some of these screening tests had the ability to detect penicillin-like beta lactam antibiotic residues at lower levels than could be tested by the official tests. New tests appearing on the market also detected antibiotics other than the beta lactams, prompting widespread reports of antibiotic residues in milk.

**A Testing Dilemma**
With the increasing sensitivity of new antibiotic tests, the question turned in two directions:
1. Of what significance are low level antibiotic residues?
2. How does one verify the presence of low level residues when official tests are not designed to operate in those low ranges?

The first point was addressed with the establishment by FDA of "safe levels" and tolerance levels of antibiotics in milk. Residues above these levels were considered to be violative, while those below were not considered to be of public health or regulatory significance. The practical difficulty of detecting these
residues resides in the accuracy and precision of the newly developed tests. That leads to the second question.

Confirmatory analytical techniques had to be developed in order to verify the results of new screening tests. This was accomplished for most antibiotics.

Evaluation and standardization of these tests remained to be done. Since screening tests had been developed to detect many individual antibiotics and families of antibiotics, regulatory agencies began with the most common antibiotics. Screening tests which detect the beta lactam family of antibiotics were the first to be evaluated.

**Evaluation of Screening Tests**

Screening tests were evaluated by FDA for six antibiotics in the beta lactam family: penicillin, ampicillin, amoxicillin, cloxacillin, cephaiprin, and ceftiofur. Only tests successfully completing FDA evaluation may be used for official testing. The criterion was established that the test must detect four of the six antibiotics. An abbreviated summary of the results is shown in Table 1.

As we can see from the table, no test regularly detects all the target antibiotics at the "safe" or tolerance level. Some, such as the Delvo-X-Press with ceftiofur or the Charm II with cephaiprin, detect residues well below the legal limit and could cause legal milk to be rejected or subjected to further regulatory action. The acceptance of these tests ends the industry option to use other non-evaluated screening tests, including the disc assay, to fulfill regulatory testing requirements.

**Residue Monitoring and Surveillance**

As of 1992, industry is required to 1) screen all bulk milk pickup tankers for beta lactam residues prior to processing, and 2) collect four random samples for FDA testing in separate months during every consecutive six months. Random sampling is at the discretion of the regulatory agency. Regular audit of the industry program by the regulatory agency requires samples of 10 percent of the tankers on site the day of inspection to be checked quarterly. When a positive tanker is found, the regulatory agency must be notified, the violative producer identified, and further pickups from that producer discontinued.

A producer's Grade "A" permit will be suspended when the regulatory agency is notified of a positive drug residue. After completion of at least one milking (or one milking plus two days for the second violation in a 12 month period), the producer may be reinstated if an official milk sample tests negative. This is provided the Milk and Dairy Beef Residue Prevention Protocol is in place on the farm. Should the protocol not have been instituted, it shall be in place within 30 days from the date of the reinstatement. The third occurrence in
a 12-month period requires the two-day suspension and initiation of procedures to revoke the producer's permit.

The Screening Program
The effectiveness and fairness of the residue monitoring and surveillance program hinges on the proper choice of the antibiotic screening test to be used and its proper application by the analyst. In order that the industry might meet the requirements to screen every bulk milk pickup tanker prior to its being processed, FDA has established training and certification procedures for industry analysts. As of July 19, 1994, all bulk milk tanker drug screening tests must be performed by either an Industry Supervisor, or an Industry Analyst. In order to understand these procedures, the following terms are defined:

**Industry Supervisors (IS)** are designated industry representatives who are trained by state LEO's to perform specific official drug screening tests. They and their "backup supervisors" are to supervise their company's screening program and train IA's.

**Industry Analysts (IA)** are analysts designated and trained by Industry Supervisors to perform drug residue screening tests. The IA's certification is only valid for the time his Industry Supervisor's certification is valid.

**State Laboratory Evaluation Officers (LEO)** have attended FDA's test kit workshops are eligible to train Industry Supervisors. They have the responsibility to train and certify industry personnel and laboratories.

**Certified Industry Supervisors (CIS)** are analysts in an official NCIMS certified laboratory who are certified to perform various tests for regulatory action.

Industry Supervisors, or their designated IA, may screen bulk milk pickup tankers. They may not open a regulatory sample to identify a positive producer. However, a certified analyst or a CIS may split the sample in an NCIMS Certified Laboratory. In order for regulatory action to be taken for or against a producer, it must be based on the results from an NCIMS Certified Laboratory. Laboratories can be certified to do drug testing only.

**An Analysis of the Program**
The milk industry has made excellent progress in a relatively short time. It has gone from random screening for penicillin and a few other residues to screening of every load of milk for at least four beta lactam antibiotics. In addition, random sampling of bulk milk pickup tankers provide for the testing of other residues by regulatory agencies. The validation of new screening kits and the training of analysts leaves some questions unanswered. Some of these are:
What about the other antibiotics? The newly approved tests detect only four, or at most, five beta lactams. What about the several other families of antibiotics currently available for use?

What about the problem of overly sensitive tests? All of the approved tests will detect at least one antibiotic at levels below the legal limit. This could cause legal milk to be rejected resulting in severe economic losses for the producer.

What about testing individual cow samples? The new kits were tested and approved for commingled milk samples. The producer does not have at his disposal tests which have been shown to be satisfactory for testing the milk from an individual cow prior to reintroducing her to the milking string.

Testing is Not the Answer
Above are just a few of the problems associated with efforts to ensure quality and safety by testing. The rest of the food industry and the manufacturing industries are rapidly becoming less dependent on testing as the mainstay of their quality programs. In its place, the principles of HACCP or TQM are being employed. The 10-point Milk and Dairy Beef Residue Prevention Protocol has been designed to return the residue prevention activity to where it belongs — to the producer level.

Antibiotic therapy takes place at the producer level. Nothing the processor or the regulatory agency can do will prevent antibiotic residues from occurring in bulk tank milk, though they may be able to screen out some violative loads. The prevention of antibiotic residues sits squarely on the shoulders of the producer and his veterinarian. It is the producers’ management practices and their exercise of control in antibiotic therapy programs which can prevent residues in the milk supply. The penalties for violations are severe. A producer may lose his permit to ship milk and with it his livelihood. Consumers, the industry, and the government are speaking with one voice: “Antibiotic residues are not acceptable in the milk supply and the responsibility lies with the producer — the producer alone.”

Milk: It does a body good
It all depends on where it comes from, doesn’t it?
The Weston a Price foundation
http://www.westonaprice.org/transition/dairy.html
By Lori Lipinski
The subject of milk sparks just about as much controversy as the subject of fats. Many alternative practitioners feel that it's not necessary for humans to consume cow's milk and link its consumption to health problems, such as ear infections, allergies, cancer and diabetes. On the other hand, the medical community has convinced us that if we don't drink enough milk our bones will disintegrate. And the American Dairy Association wants us to think we'll be cool like celebrities with milk mustaches if we drink lots of milk. The purpose of this article is not to convince you to drink milk or not to drink milk. Instead, it addresses those who do--or would like to--drink milk and consume dairy products. If you fit into this category, then you need to know where your milk has come from and what it has been through.

LIVING CONDITIONS
If I were to ask you to picture a cow, you would most likely see in your mind a cow grazing in an open pasture, like one you'd probably seen before on a small family farm. That's a lucky cow, compared to most of the cows bred for dairy production in this country. The majority of commercial dairy cows don't have the luxury of grazing on open fields. Instead they are kept in intense confinement, in individual stalls, on hard cement floors, hooked up to milking machines, forced to produce milk ten months out of the year, in an overcrowded building. This is how the average commercial dairy cow spends her short, miserable life--42 months on average, compared to 12-15 years for a cow on pasture.

ENVIRONMENT
Not only is the unnatural building environment a problem for the cow, but it can be a huge problem for the people around it as well. The massive amount of waste produced on a factory farm is overwhelming and can have devastating effects on the surrounding environment. Over one-fifth of the country's dairy products are produced in the central valley of California where confinement operations create as much waste as a city of 21 million people! Much of that waste is forced unnaturally into the environment, polluting our lakes, rivers and streams. On the other hand, small farms are able to recycle manure back into the earth to enrich the soil.

FEED
A cow's natural diet consists mostly of grass, but since there isn't enough grass to go around on the factory farm, today's factory cow is fed a diet of mostly grain, and other things that they would not normally eat. The bulk of the feed consists of corn and soy, which receives 80 percent of all herbicides used in the US. When we think of pesticides we usually think of produce, but animal products can contain up to 14 times more pesticides than plants!1
Simply switching the cow's diet from grass to grain can cause many problems, but that's only the beginning. According to a recent article in US News & World Report, Some 40 billion pounds a year of slaughterhouse wastes like blood, bone and viscera, as well as the remains of millions of euthanized cats and dogs passed along by veterinarians and animal shelters, are rendered annually into livestock feed. . . . Animal-feed manufacturers and farmers also have begun using or trying out dehydrated food garbage, fats emptied from restaurant fryers and grease traps, cement-kiln dust, even newspapers and cardboard that are derived from plant cellulose. Researchers in addition have experimented with cattle and hog manure, and human sewage sludge.”2

When I first read this I thought there were probably only a handful of farmers crazy enough to feed dead cats and dogs and other animals parts to their vegetarian cows, but I was dead wrong! During the BSE scare, the FDA ordered a halt to feeding all slaughterhouse wastes to cattle and sheep in the US. At that time 75 percent of the nation’s 90 million cattle had been eating feed containing slaughterhouse by-products! Like humans, animals need nutrients to thrive and be healthy. Obviously the feed given to factory farmed cows is not intended to provide proper nourishment. Instead, farmers, or shall I say food manufacturers, are interested in stuffing whatever they can into the cows to bulk them up as quickly as possible. This can quickly lead to sick animals and heavy doses of drugs. Like pesticides, these drugs end up in the milk of the dairy animals, as do trans fats from bakery wastes, undigested proteins from soy and animal foods and aflatoxins from moldy grain. To make matters worse, levels of vitamin A and D drop off precipitously when cows are given any feed other than green growing grass.

ANTIBIOTICS

If you’re like a growing number of people today, you would rather not take antibiotics when you get sick. You may even be proud of the fact that you haven’t had to use them in years. However, if you drink commercial milk or eat commercially raised meats and poultry, you could be consuming antibiotics on a daily basis, without even knowing it! Over 50 percent of all the antibiotics produced in this country are mixed directly into animal feed. Ideally, antibiotics should be used in farming only when necessary to treat infection. However, due to the sickly nature of factory farmed animals, they are fed a constant supply of antibiotics from birth until the time of slaughter.

Antibiotic resistance is a serious issue that has gotten a lot of press in recent years. Basically, bacteria are mutating and outsmarting the antibiotics, making them ineffective. (The same phenomenon is occurring on farms where bugs are mutating to withstand pesticide applications.) We criticize medical doctors for over-
prescribing antibiotics, but that is only part of the problem. Not only are antibiotics overused in this country, but they are also over-consumed. People are unknowingly consuming more antibiotics than they are actually taking by choice. Due to the heavy doses of antibiotics used on factory farmed animals, your steaks, hamburgers, chicken, and hotdogs are all laced with antibiotics. Milk alone contains traces of up to 80 different antibiotics.3

HORMONES
Back in 1930, the average dairy cow produced 12 pounds (about a gallon and a half) of milk per day. In 1988, the average was 39 pounds per day. This was accomplished by selective breeding to obtain dairy cows that produced a lot of pituitary hormones, thereby generating large amounts of milk. But the industry was not satisfied with this output. Today rBGH, a synthetic growth hormone, is used to get even more milk out of the dairy cows, bringing the average up to 50 pounds (over 6 gallons) of milk per day.

This sounds like a great thing for dairy farmers, right? However, when you mess with Mother Nature, you will suffer the consequences. FDA documents show that cows injected with rBGH are 79 percent more likely to contract mastitis.4 In 1991, a report on Monsanto's BGH test herd at the University of Vermont found the same kinds of problems identified by the FDA, plus an alarming number of dead and deformed calves born to cows treated with BGH.5 Other problems include reproductive difficulties, increased need for antibiotics, digestive problems, enlarged hocks and lesions, and foot problems.

According to the Humane Farming Association, The FDA admits that BGH injections increase sickness and drug use in dairy cows. Consumer's Union reports that because of increased udder infections, it is more likely that milk from treated cows will be of lower quality--containing more pus and bacteria--than milk from untreated cows."6

PASTEURIZATION
Pasteurization is a process of heat treating milk to kill bacteria. Although Louis Pasteur developed this technique for preserving beer and wine, he was not responsible for applying it to milk. That was done at the end of the 1800s as a temporary solution until filthy urban dairies could find a way to produce cleaner milk. But instead of cleaning up milk production, dairies used pasteurization as a way to cover up dirty milk. As milk became more mass produced, pasteurization became necessary for large dairies to increase their profits. So the public then had to be convinced that pasteurized milk was safer than raw milk. Soon raw milk consumption was blamed for all sorts of diseases and outbreaks until the public was finally convinced that pasteurized milk was superior to milk in its natural state.
Today if you mention raw milk, many people gasp and utter ridiculous statements like, You can die from drinking raw milk!” But the truth is that there are far more risks from drinking pasteurized milk than unpasteurized milk. Raw milk naturally contains healthy bacteria that inhibit the growth of undesirable and dangerous organisms. Without these friendly bacteria, pasteurized milk is more susceptible to contamination. Furthermore, modern equipment, such as milking machines, stainless steel tanks and refrigerated trucks, make it entirely possible to bring clean, raw milk to the market anywhere in the US.

Not only does pasteurization kill the friendly bacteria, it also greatly diminishes the nutrient content of the milk. Pasteurized milk has up to a 66 percent loss of vitamins A, D and E. Vitamin C loss usually exceeds 50 percent. Heat affects water soluble vitamins and can make them 38 percent to 80 percent less effective. Vitamins B6 and B12 are completely destroyed during pasteurization. Pasteurization also destroys beneficial enzymes, antibodies and hormones. Pasteurization destroys lipase (an enzyme that breakdown fat), which impairs fat metabolism and the ability to properly absorb fat soluble vitamins A and D. (The dairy industry is aware of the diminished vitamin D content in commercial milk, so they fortify it with a form of this vitamin.)

We have all been led to believe that milk is a wonderful source of calcium, when in fact, pasteurization makes calcium and other minerals less available. Complete destruction of phosphatase is one method of testing to see if milk has been adequately pasteurized. Phosphatase is essential for the absorption of calcium.

ULTRAPASTEURIZATION
As the dairy industry has become more concentrated, many processing plants have switched to ultrapasteurization, which involves higher temperatures and longer treatment times. The industry says this is necessary because many microorganisms have become heat resistant and now survive ordinary pasteurization.

Another reason for ultrapasteurization is that it gives the milk a longer shelf life--up to four weeks. The grocers like this but many consumers complain of a burnt or dead taste. The milk is virtually sterile--is that what you want to drink?

Milk producers are not advertising the fact that they are ultrapasteurizing the milk--the word is written in very small letters and the milk is sold in the refrigerator section even though it can be kept unrefrigerated until opened. Horizon, the major organic brand, is ultrapasteurized, as are virtually all national brands.
HOMOGENIZATION
Milk straight from the cow contains cream, which rises to the top. Homogenization is a process that breaks up the fat globules and evenly distributes them throughout the milk so that they do not rise. This process unnaturally increases the surface area of fat exposing it to air, in which oxidation occurs and increases the susceptibility to spoilage. Homogenization has been linked to heart disease and atherosclerosis.

MILK: TO DRINK OR NOT TO DRINK?
Considering how modern commercial milk is produced and processed, it's no wonder that millions of Americans are allergic to it. An allergic reaction to dairy can cause symptoms like diarrhea, vomiting (even projectile vomiting), stomach pain, cramping, gas, bloating, nausea, headaches, sinus and chest congestion, and a sore, or scratchy throat. Milk consumption has been linked to many other health conditions as well, such as asthma, atherosclerosis, diabetes, chronic infections (especially upper respiratory and ear infections), obesity, osteoporosis and cancer of the prostate, ovaries, breast and colon.

Once you understand how modern milk is produced and processed, it seems logical to just avoid it altogether. But Real Milk—full-fat, unprocessed milk from pasture-fed cows—contains vital nutrients like fat-soluble vitamins A and D, calcium, vitamin B6, B12, and CLA (conjugated linoleic acid, a fatty acid naturally occurring in grass-fed beef and milk that reduces body fat and protects against cancer). Real milk is a source of complete protein and is loaded with enzymes. Raw milk contains beneficial bacteria that protect against pathogens and contribute to a healthy flora in the intestines. Culturing milk greatly enhances its probiotic and enzyme content, making it a therapeutic food for our digestive system and overall health. So the answer to the question is—go ahead and drink milk only if you can get unprocessed milk from pastured cows. In the meantime, here are a few steps that can help you make the transition to more natural dairy products.

STEP 1: REMOVE COMMERCIAL MILK FROM YOUR DIET
Normally I propose a step-by-step process for making a dietary change, but considering where commercial milk has come from, and what it has been through, it is best to just remove it from the diet altogether. Instead use some of the better quality dairy products such as raw cheese, good quality whole yogurt, butter and cream that has not been ultrapasteurized. (You can use butter or cream mixed with water on breakfast porridge.) Check the Weston A. Price Foundation Shopping Guide for a listing of good quality dairy products sold in supermarkets and health food stores.
STEP 2: FIND A SOURCE OF REAL MILK IN YOUR AREA
In states like California, this is easy because raw milk is sold in health food stores. In other states you need to either purchase raw milk from a farm or through a cow-share program. The best place to start is by contacting your local chapter or visiting the realmilk.com website. Most people who cannot tolerate commercial milk do beautifully on Real Milk--milk that comes from pastured cows, that contains all the fat and that is unprocessed. It is an especially good food for growing children who need extra nutrients during their growing years.

ANTIBIOTICS IN PREGNANCY

Healthline
Infections in Pregnancy: Use of Antibiotics
http://www.healthline.com/yodocontent/pregnancy/antibiotics-infections-during.html

Medicines used to fight bacterial infections are called antibiotics. Those used to fight fungal infections are called antifungals, while those that fight viruses are antivirals. All of these drugs may be grouped under the term anti-infectives. However, in this discussion, the term antibiotics will be used more generally to refer to all three.

Penicillin (PenVK), tetracycline (Sumycin), and sulfa drugs (trimethoprim-sulfamethoxazole, Septra) are among the better-known types of antibiotics. Some antibiotics (such as penicillins) are narrow spectrum—that is, they attack a single or several specific infections. Broad spectrum antibiotics (tetracyclines or ampicillins) attack a range of bacterial illnesses.

Though antibiotics are useful drugs, they should only be taken when necessary because:

- antibiotics can cause harmful side effects, ranging from stomach upset to allergic reactions, birth defects, or even death. Also, while fighting infection-causing bacteria, antibiotics can kill some of the bacteria that benefit the body. This can hinder the body’s ability to prevent and fight illness; and

- antibiotics can become less effective over time. Overuse of antibiotics can actually strengthen bacteria and make them resistant to treatment. This is now a serious worldwide issue. The injudicious, improper, or unnecessary use of antibiotics over time has led to the development of more and more resistant bacteria, which are becoming harder and harder to treat.
If doctors prescribe antibiotics when they are not necessary, patients may be exposed to needless risk. This is especially true during pregnancy, because both the mother and her baby are exposed. Some drugs may be completely harmless to an unborn child, but others have been known to cause major malformations.

Because only a few controlled scientific studies have addressed whether drugs are safe to use during pregnancy, physicians usually rely on data from animal research and from the collective experience in practice to decide whether to prescribe antibiotics to a pregnant woman. In 1979, the Food and Drug. Here are a few general rules of thumb on using antibiotics during pregnancy:

1. Since the majority of antibiotics have not been studied in controlled trials, most "safe" antibiotics are classified as FDA Category B.
2. In general, unborn babies are most likely to be harmed when they are most immature-when their organs and tissues are just developing (first trimester of pregnancy). One exception to this is the use of sulfa antibiotics, commonly used for urinary or other infections in combination with another antibiotic, trimethoprim, in the drug Septra or Bactrim. While Septra does not cause congenital abnormalities and is safe for use early in pregnancy, it can cause jaundice in newborns. It is generally not used later in pregnancy.
3. It is important to remember that the choice of an antibiotic relies on multiple factors, including the targeted organism, the possibility for resistance, and the potential for adverse effect on pregnancy and lactation. Very few medications are absolutely contraindicated in any situation. Likewise, very few medications are universally appropriate. Your doctor should be able to explain his particular choice of antibiotic, and he should be able to help you balance the risks and benefits of its use.

### Commonly Used Antibiotics in pregnancy

Dr Spock

[http://www.drspock.com/article/0,1510,5314,00.html](http://www.drspock.com/article/0,1510,5314,00.html)

by Marjorie Greenfield, M.D.

reviewed and revised by Marjorie Greenfield, M.D.

Women in the childbearing years are commonly treated with antibiotics and other anti-microbial medications. In pregnancy, the issue of which medication to use comes up frequently, whether for bladder infection, yeast vaginitis, sinus infection, herpes, or other conditions. Obstetricians frequently get calls from women who were prescribed something by another physician, calls from dentists, and calls from other doctors checking to be sure that a particular antibiotic is OK to use during pregnancy. In this
article, I will review commonly used anti-microbial medications. I will not include medications that are given by vein or are used only in rare instances. For information on those sorts of medications, and for information about your individual risks and benefits for any medication, you should speak to your practitioner.

In general, every medication is assigned to a category (B, C, D, or X) based on how safe or risky it is to use during pregnancy. To learn more about general principles of medication use in pregnancy, see Medications in Pregnancy. (Note see categories by going to web site)

Is it safe to take antibiotics during pregnancy?

Babycenter
http://www.babycenter.com/404_is-it-safe-to-take-antibiotics-during-pregnancy_1362964.bc

Gerald Briggs, pharmacist clinical specialist

It depends. Some antibiotics are safe to take throughout pregnancy, some pose known risks to a developing baby, and a host of others fall in between.

When a drug falls into this last category, it's because there's not enough safety information available or the potential risk of the drug needs to be carefully weighed against the harmful effects of the condition it's being used to treat.

In other words, if you're very sick and an antibiotic is the only thing that will help you get better, you may need to take it in spite of the potential risk to your baby. In some cases, not treating your illness could be more risky for your baby's health than exposing him to an antibiotic.

What's more, as with any medication, the safety of a particular antibiotic depends not only on the characteristics of the drug itself but on factors such as how much you take, how long you take it, and where you are in your pregnancy.

With so many antibiotics available, it isn't possible to list all of them here. But common antibiotics that are generally considered safe during pregnancy include penicillins (such as amoxicillin and ampicillin), cephalosporins (such as cephalexin), and erythromycin.

Some experts used to suspect that the drug metronidazole (used to treat some vaginal infections, such as trichomoniasis and bacterial vaginosis, as well as other kinds of infections) caused birth defects. New
research hasn't supported this suspected link, and it's now considered safe in most cases.

If you get recurrent urinary tract infections or if the infection gets into your kidneys, your caregiver may recommend taking nitrofurantoin (trade name Macrodantin or Macrobid) for the rest of your pregnancy to prevent another infection. You should stop taking this drug at about 36 weeks (or immediately if you go into preterm labor) because there's a very small risk that it will destroy some of your baby's red blood cells if you take it within several days of delivery.

Trimethoprim is an ingredient often found in drugs used to treat urinary tract infections, such as Bactrim and Septra). Trimethoprim is not a good option during pregnancy because it blocks the effects of folic acid. Folic acid is crucial during pregnancy and preconception because it reduces your baby's risk of developing neural tube and other birth defects.

If you have no other choice and must take one of these drugs, be sure to take your daily prenatal vitamin as well. Research suggests that taking a daily folic acid supplement of at least 400 milligrams (prenatal vitamins generally contain twice this amount) can overcome the blocking effects of trimethoprim.

Antibiotics you should avoid altogether during pregnancy include streptomycin (used to treat tuberculosis), which can cause hearing loss in your baby, and tetracycline (including minocycline, oxytetracycline, and doxycycline), used to treat acne and respiratory infections. If you take tetracycline in the second or third trimester, it could discolor your developing baby's teeth.

Is it safe to take antibiotics during pregnancy
MayoClinic.com
http://www.mayoclinic.com/health/antibiotics-and-pregnancy/AN01145
Is it safe to take antibiotics during pregnancy?
Answer from Roger W. Harms, M.D.

If you develop a bacterial infection during pregnancy, antibiotics can nearly always be taken safely. It's important to choose the specific medication carefully, however. Some antibiotics are OK to take during pregnancy, while others are not. Safety depends on various factors, including the type of antibiotic, when in your pregnancy you take the antibiotic, how much you take and for how long.

Here's a sampling of antibiotics generally considered safe during pregnancy:
Amoxicillin
Ampicillin
Clindamycin
Erythromycin
Nitrofurantoin
Penicillin

Certain other antibiotics should be avoided during pregnancy. For example, tetracyclines — such as doxycycline, tetracycline and minocycline — can damage a pregnant woman’s liver, discolor a developing baby’s teeth and cause various birth defects.

If an antibiotic is the best way to treat your condition — you have a urinary tract infection, for example, or you test positive for group B strep late in pregnancy (in which case antibiotics are given during labor) — your health care provider will prescribe the safest antibiotic at the safest dosage.

ANTIBIOTICS IN FOOD

A daunting price to pay
Guardian.co.uk
http://www.guardian.co.uk/antibiotics/

Six billion bacteria are living and breeding in every human being; without this flora, as they are poetically described, we couldn’t even digest our food. What we have overlooked is that they can live without us, and did for two billion years before we evolved. Their powers of propagation and survival make them the most successful organism in the history of the planet. These are the crucial facts behind the crisis we have created through our wilfully blind and wanton use of antibiotics.

We have waged indiscriminate nuclear war on bacteria by our extensive use of antibiotics in medicine and agriculture, but it is a war we could never win given bacteria’s astonishingly fast capacity to mutate. Scientists have warned for decades that strains of bacteria resistant to antibiotics would emerge, and they have. Already a few people have died from infections which could not be treated with antibiotics, but they are only the tiny tip of the iceberg to come. At risk are many of the advances of medicine in the last half-century: treatment of diseases such as tuberculosis, pneumonia and septicaemia as well as invasive surgery from appendicectomies to hip joints.
This problem will make BSE look marginal. While consumers have rightly begun to question genetically modified organisms, they are overlooking the greater threat to human health right now. After a string of recent reports (such as that by the government advisory committee on the microbiological safety of food), we now have overwhelming scientific evidence. There are plenty of good questions to ask about how we got in this mess: we have to reflect on the greed and unthinking faith with which we have applied the remarkable scientific breakthroughs of the 20th century. That must prompt a huge shift in understanding how we can best promote our own health and that of the food chain on which our well-being depends.

But alongside this wider agenda is a long list of urgently needed policies which joined-up government must implement fast. The ministries of health and agriculture, farming and fisheries (MAFF) must tackle this together. The former is planning a useful public awareness campaign to be launched next month: trips to see the doctor must not automatically result in an antibiotic prescription. GPs must be trained to use antibiotics more sparingly, and there must be research in how to target their use precisely. But from MAFF, we hear little beyond the mournful refrain: "we need more time".

It is a depressing echo of the BSE saga. MAFF has not learned the lesson that it cannot simply represent the interests of farmers, but has a responsibility to consumers too which cannot be abandoned until the new food standards agency is up and running. We want Nick Brown to announce a ban on antibiotics used as growth promoters, phasing it in if necessary for the benefit of farmers. The Swedes have done it, the Danes are about to; the decision of Grampian Country Foods, the UK's third largest chicken producer, to give up the practice shows it makes commercial sense as well as improving the welfare of animals.

But, ultimately, this problem is beyond the capacity of national governments: bacteria know no borders and the multi-drug resistant tuberculosis rife in Russian prisons will eventually land up in London. Globalisation has huge health implications in the light of our interdependence as a species. In the long term, the only way to secure our health will be by improving health standards right across the globe.

ALARMS RANG 50 YEARS AGO

Alarm bells started ringing over the widespread use of antibiotics in agriculture almost as soon as they made their entry into livestock farming in the US 50 years ago. By 1969 scientists in Britain were warning of the "real and potential danger" that overuse in animals would help speed the rate at which bacteria in humans developed resistance to the medicines.

In 1999, when use of antibiotics on farm animals and pets had increased by at least 3 times, another group of scientists was predicting "calamitous consequences" if the control of infection in human populations by antibiotics became ineffective.
They said there was conclusive evidence of a link between humans, animals and food, even if the extent to which it contributed to the overall problem of resistance was still uncertain.

The arrival of the wonder drugs not only changed the face of human medicine, it also revolutionised agriculture in the US and Europe. Their use has been crucial to the growth of intensive farming. They not only allowed effective and rapid treatment for diseases, they prevented whole herds or tightly-packed flocks from catching infections. They also became a key factor in speeding up the growth of animals destined for the food tables.

It was discovered that poultry grew 5% faster when routinely fed small doses of the drugs. This, combined with breeding and other changes helped halve the lifespan of the broiler chickens to just six or seven weeks before slaughter.

Today nearly all UK broilers are given these drugs to feed Britain's hunger for cheap meat. In the last week Britain's biggest producer has recanted on accepted practice and decided to phase out growth promoters by the end of the year. Most pigs are routinely fed antibiotics too. Their use has been common in the US since 1949 and Britain since 1953.

Soon all agricultural use of antibiotics was under review. By 1967, 168 tonnes were being injected or fed to animals in the UK, compared with 240 tonnes to humans. But when relative weights of the "patients" were taken into account, a committee headed by Michael Swann told the government two years later, the use of the drugs in human medicine probably accounted for four times that in agriculture and veterinary medicine.

It called for tighter controls on their use, and far better monitoring. On this front, hardly anything happened. Other countries were no better. Until the mid-1990s, the blip of concern seemed to have disappeared from the political radar screen.

Only last month the advisory committee on the microbiological safety of food reported that 921 tonnes of the drugs were used in animals in 1997, although some animal drug industry sources argue a truer figure would be just over 750 tonnes because the higher one includes medication against parasites in birds that is not technically antibiotic.

Even so, human use of drugs may only have risen to 560 tonnes in the same 20 year period.

And now the animal industry's official body also suggests that as much as 209 tonnes of antibiotics are used for growth promoting alone, twice the figure suggested by the advisory committee.
The committee disputed claims by some farmers, vets and drug industry representatives, that there was still no compelling evidence of drug resistance in livestock, and asserted "that resistant bacteria in food animals have arisen as a consequence of the use of antibiotics in the farm environment and current husbandry practice".

That meant, it said, that there should be less use of all antibiotics, not just growth promoters. Committee members were particularly worried by the agricultural use of fluoroquinolones, synthetic antibiotics often used in severe cases of human infections such as E. coli, salmonella and typhoid.

Among evidence from around the world it used to substantiate this view was a food poisoning incident in December 1996, in which turkey meat appeared the most likely cause. One of 13 old people who fell ill on an outing died. Five, including the victim, were subsequently found to have a bug resistant to a human antibiotic whose close relative was widely used in turkey flocks. Nevertheless, as the public health laboratory in England and Wales told the Commons agriculture committee last year: "This may be the first of many such outbreaks."

Last summer an outbreak of salmonella poisoning in Denmark was linked to pork. Seven people went to hospital, six were treated with antibiotics but the treatment had no effect on four of them. One died.

Research carried out by Henrik Wegener of the Danish veterinary laboratory proved the link between one type of growth promoting antibiotic and bacteria resistant to the same family of drugs in humans. The resistant bacteria only occurred in humans who ate meat from animals and birds regularly fed these growth promoters.

A number of growth promoting antibiotics have been suspended by the European Union, avoparcin in 1997, and another four since July this year. The moves have been justified on the precautionary, or "better safe than sorry", principle because of the possible link between humans and animals. A debate is raging over avilamycin, one of only two growth promoters left available to the poultry industry, since there are high hopes a similar human antibiotic called everninomycin will soon be able to fight hospital superbugs. Critics of present practices argue that its prospects must not be compromised before it is even available, but others, while accepting scientific surveillance, says the use of the drug in feed, and the slight increase it can mean for farm productivity, could help make the difference between profit and loss.

Roger Cook, of the National Office for Animal Health, representing manufacturers, said: "This product has been on the animal market for years. One of the reasons it is on the animal market is because the medical profession said it did not want it. Now the medical profession has got in a muddle and they are saying 'Hang
on, can we have it back please?’. This is like big brother having broken his own toys wants his little brother's back.

"If you follow that back to its logical conclusion, that if an antibiotic is used in human medicine, it cannot be used in animal medicine, there is going to be no antibiotic available for animal treatment."

And he warns against comparing bare tonnage figures on consumption of humans and animals. "The potency of different antibiotics varies enormously. It is like the difference between a pint of beer and a pint of whisky. Using a tonne of a very modern antibiotic in human medicine could be the same as using 10 or 15 tonnes of first-generation ones developed in the 1950s."

The organization also says most of the growth in the animal antibiotic market has been in drugs almost abandoned for human use. Defenders of the present system maintain the existing monitoring of antibiotic residues in meat, deemed insufficient by the advisory committee, prove there is no big problem. But the effect of growth promoters cannot be measured in that way. They are not absorbed into flesh anyway.

But others, while accepting that using antibiotics to treat human infections in intensive care units or indeed outbreaks in intensive livestock buildings do help develop resistance in bacteria, are really worried about the persistent use of the drugs in low doses to prevent diseases, even before they are apparent, in animals.

Richard Young, of the Soil Association, leading campaigners against the agricultural use of antibiotics, maintains: "Society has got to ask whether it can afford to eat cheap meat any longer. Some small increase in the cost of meat has got to be cheaper than people dying."

HEADS IN THE GROUND

In earthquakes, buildings fall down: but, in most places, engineers learn from their mistakes and ensure that they stay up next time. Life is not like that. Earthquakes are nasty, but much the same. Biology, however, has its own agenda, which means that it fights back against any attempt to interfere. It is called evolution. The idea is simple. Darwin called it "descent with modification"; which nowadays means "genetics plus time", a series of successful errors - mutations - that allows those best able to copy themselves to prevail by natural selection.

Bacteria show what selection can do when it gets the chance; and some of its best chances are - quite literally - being handed to it on a plate.
Farmers, like Bourbons, have learned nothing from the mistakes of others: from the shambles that accompanied antibiotics in medicine. They plan their rural factories as if they made soap and not flesh. Eat meat or not, we will all soon pay the price.

The Murray Collection is a series of reference strains of bacteria gathered before 1950 and kept in suspended animation ever since. Every strain is, when reanimated, susceptible to all the antibiotics used today. They are a reminder of what a revolution those drugs made. Wards were once filled with patients dying from infections of the blood. After penicillin, they could be cured with ease. Those glorious days will soon be over, because of evolution, and - worst of all - the problem is growing for reasons that have nothing to do with health.

Twenty years ago, penicillin could kill the bacterium that causes meningitis. In some places, three-quarters can now defy it. In Norway, where antibiotics are controlled, one septicaemia strain in 500 is resistant to more than one drug, while in Greece, where they are available over the counter, half are.

Plenty of European countries use more than a tonne a day, and, in Kenya, tetracycline and ampicillin are sold on the street. Farmers use much more, as they add "growth promoters" (anti-biotics, that is) to animal feed. True, most are not used in medicine; but - given the obsolescence of the standard drugs - they soon may be. Again, Africa leads the way. It is easier to add a powder than to clean up a farm, and Kenyan chickens are filled with bacteria resistant to tetracycline.

For bacteria, venereal disease evolved early. Infectious third parties called plasmids, sections of mobile DNA, are multiplied each time their hosts divide. Some can hop from host to host, carrying resistance genes as they go. In Madagascar a single strain of plague bacillus has genes against seven antibiotics, all carried on a single plasmid. On American farms, bacteria in human guts have become resistant to the growth promoters. Some resistance in gut bacteria can enter pathogens (such as the agent of gonorrhoea) and, at a stroke, give them protection.

What is to be done? The relative success of Norway in keeping resistance at bay and the news that this country's largest chicken producer has banned the use of growth promoters suggests that the answer is simple: stop the drugs and in time the new genes will disappear, just as black moths disappeared when the air was cleaned up.

Now comes alarming news. Resistance is indeed expensive, and some bacteria spend half their energies on it, with long and complicated biochemical pathways that evolution takes years to craft. Keeping such bugs in culture without the antibiotic means any mutation that removes the pricy resistance is favoured and, quite soon, they lose their defences.
All very comforting; but only part of the story. Start the drug again and there is an instant response that gives high levels of protection. That is because to lose just one step in the chain saves most of the expense: much of the carefully crafted armour stays around, silent, unused and - apparently - scarcely noticed by the bacteria's internal economy. Unlike the slow process of building resistance in the first place, a single mutation can restore the fortifications in full. We may go for unilateral disarmament by abandoning the use of growth promoters on farms in the hope that one day the drugs may be useful in medicine, but it is too late. Our enemies have no incentive to follow: their armies can be kept on standby at almost no cost.

So feckless have we been that medicine's finest days may soon be over. The last new class of such drugs was discovered 20 years ago and no more are on the horizon. To refuse to stock genetically manipulated soybeans while happily selling chickens stuffed with resistant bacteria is a sad comment on our understanding of risk.

The only hope seems to be to become a vegetarian: but - didn't you know? - farmers now spray crops with growth promoters to increase their yield.

NURTURE THROUGH NATURE CHALLENGES CHEMICAL FARMING

When Jamie Butler's pigs go for slaughter this winter, he will be keeping his fingers crossed about their weight and condition.

The growth-promoting drug he used to put in his animals' feed was banned by the European Union on July 1. He did not replace it with an alternative.

And the family business at Whitewool Farm at East Meon, near Petersfield, Hampshire, is looking at other ways of reducing the routine use of antibiotics. It has invested in better buildings for the 350 breeding sows and the 8,500 pigs a year that spend their five to six-month life being weaned, grown and "finished" for the dinner table.

"We have taken measures to reduce our antibiotic use significantly. We have improved our ventilation and cut our stocking rates. We were giving them things to prevent pneumonia. That can be a headache at times and get really scary. It's the same as humans. They cough, splutter, and don't grow. In severe cases, they die."

Mr Butler will still be treating infections as they occur. "It is very, very difficult to farm entirely without antibiotics, and it would cause huge problems, but we must take a responsible attitude towards using them."
The mixed farm, which has dairy cows and sheep, has an annual veterinary and medicines bill of about £20,000. He is awaiting the results on the growth promoters with interest. "We have changed so much is is difficult to know whether those worked or not."

Outdated buildings have been transformed, with thermostatically controlled windows to improve natural ventilation.

Mr Butler's farm has also been involved in trials to reduce antibiotic treat ment for mastitis - inflammation of cows' udders. These could be important for the dairy industry, but there are concerns about whether the animals would produce too many white cells, and so make the milk unusable.

Other farmers already use alternative medicines. Helen Browning, chairman of the Soil Association, the organic watchdog, uses some antibiotics on her pigs but tries to use more natural, complementary medicines.

"As we are becoming more skilled we are reducing antibiotic use in some circumstances virtually to zero."

Her farm at Bishopston, near Swindon, finishes about 2,000 pigs a year.

But more farmers are interested in the new medicines, says Sjaak Brandes, owner of a Dutch-based firm Hyperformance, which has recently entered the British market with cheaper herbal medicines, which it says means antibiotics can be reserved only for acute infections. To fight lack of energy and appetite in a range of animals, it offers a mixture of Russian ginseng, garlic, milk thistle fruit, hearts ease herb, purple coneflower and cat's paw.

FARM ANTIBIOTICS POSE RISK TO HUMAN HEALTH

The farming industry was told yesterday to wake up to the "calamitous consequences" of overusing antibiotics on farms. The government's food safety advisers said there was conclusive evidence that the practice was helping to create superbugs that threatened human health.

The advisory committee on the microbiological safety of food demanded big reductions not only in the use of drugs to speed growth of farm animals, but also in their routine prescription for whole herds or flocks to prevent disease.

It criticised poor monitoring of how organisms move through the food chain and develop resistance to drugs intended to cure human infections. Checks on medicated feeds on farms were also insufficient.

Committee chairman Doug Georgala said that although there was "not a case for panic today and stopping eating" there was a "fear for the future based on solid scientific evidence". But there was time for farmers,
vets and drug companies to change their ways, and some farms already showed how improvements in
caring for livestock, including feed, ventilation and housing, could cut the need for antibiotics.

His committee was particularly concerned about the agricultural use of fluoroquinolones, synthetic
antibiotics also useful for treating human infections such as E coli, salmonella and typhoid.

"The arrival of new antibiotics in the market place is likely to be rarer than in the past," Prof Georgala said.
"Therefore preserving the efficacy of what we have, both for human and animal welfare, is very important."

The committee backed a recent EU ban on some growth promoters and said others should be kept under
review, especially as equivalents for human medicine were developed.

The government had already told doctors it was unacceptable to prescribe antibiotics for some conditions in
the unfounded hope they might do some good. It should now take the same approach with vets and farmers.

There should be a robust system to find out exactly how many antibiotics were administered and why, more
research on the extent of antibiotic resistance and tougher licensing procedures for veterinary products.

Norman Simmons, a microbiological consultant on the committee, compared the state of knowledge about
antibiotic resistance to a man who fell out of a window of the Empire State building. "As he passed each
window he said 'so far, so good'. I am sure we are out of the window but I am not sure how far we are above
ground."

Joyce Quin, junior agriculture minister, said the report would be carefully considered.

It was welcomed by the Soil Association, which has campaigned hard on the issue. Its policy adviser
Richard Young said: "The real question is what the government is going to do. The politicians are all on
holiday and keeping their heads down. They hope everyone will have forgotten about it by the time they
come back."

Roger Cook, of the National Office for Animal Health, representing animal drug companies, said they were
already taking measures to reduce antibiotic use. Authorities should take account of that before introducing
more regulation.
ANTIBIOTICS IN FOODS

Antibiotics in Foods

Copperwiki

http://www.copperwiki.org/index.php/Antibiotics_in_Foods

Antibiotics belong to a category of drugs called “antimicrobials,” and include medicines like penicillin, tetracycline, and amoxicillin. These drugs are used to kill or inhibit the growth of bacteria without causing significant harm to the host (such as a human or an animal). When bacteria are able to get past natural defenses (i.e., the skin or the highly acidic stomach), some can begin to colonize their host, discharging hazardous toxins as they multiply and even when they die.

[edit] Traditional Uses

In humans, antibiotics are used to treat infections caused by bacteria, including ear and skin infections, food poisoning, pneumonia, meningitis and other serious illnesses. They are also crucial in treating infections that can complicate medical procedures such as surgery, cancer therapy, and transplants.

Traditionally, antibiotics were derived from natural compounds. Many organisms (including various species of fungi) produce substances that destroy bacteria and thus prevent infection. Penicillin, for example, is made from mould. Today, antibiotics such as fluoroquinolones are synthetic – meaning they neither occur naturally nor are they derived from natural compounds.

Since their first application many years ago, antibiotics have increased in number and variety. Today there are hundreds of antibiotics in use, though the discovery of new antibiotics has slowed significantly.

[edit] What are Antibiotic-Resistant Bacteria?

It is important to have the full course or prescribed dosage of antibiotics. Having a few antibiotic pills may actually be harmful. When bacteria are exposed to small amounts of antibiotics, the antibiotics can actually make the bacteria stronger. This is because while some microorganisms die off as a result of the antibiotic, not enough of the drug is present to kill the stronger bacteria. As a result, the stronger bacteria live on, adapt to living with low levels of antibiotics, and multiply. These stronger bacteria are called
“resistant bacteria” because they have adapted to surviving with the antibiotics, and therefore antibiotics can’t kill them. As a result, traditional antibiotics are losing their effectiveness in the battle against infectious diseases. Some strains of tuberculosis, for example, have become resistant to common antibiotics.

A good example of antibiotic resistant bacteria would be *Staphylococcus aureus*. This is a highly pathogenic microbe that is linked to toxic shock, skin abscesses, and heart valve infections. In the United States, almost every strain of S. aureus is now resistant to penicillin, and strains of the disease have even begun to develop resistance to newer drugs like methicillin and vancomycin. The threat of prolonged illness or death from an S. aureus infection has increased as it has become more resistant and fewer drugs are able to effectively control or eliminate it.

Campylobacter bacteria are the most common cause of bacterial food-borne illness, with over 2 million such cases of "food poisoning" annually. Most Campylobacter infections do not require treatment. But of those that do, one in six (18%) are resistant to a fluoroquinolone antibiotic, the treatment of choice for food poisoning. Ten years ago, such resistance was negligible.

Although antibiotic resistance is a natural phenomenon, humans have greatly speeded up the process through our overuse of antibiotics in humans and animals. There lies the problem. Over-prescribing antibiotics for conditions like the flu or a common cold (against which antibiotics are useless) contributes to antibiotic resistance. What is less well known is that antibiotics are also fed unnecessarily to livestock, poultry, and fish to promote faster growth and to compensate for the unsanitary conditions on factory farms.

[edit]Antibiotics and the Animal Industry

Modern industrial livestock operations are an example of how rampant overuse of antibiotics threatens to increase the prevalence of antibiotic-resistant bacteria. These industrial farms have been mixing antibiotics into livestock feed since 1946, when various studies showed that low levels of antibiotics (too low to actually fight disease) seemed to help animals grow faster and put on weight more efficiently, thus increasing profits for meat producers. When antibiotics are used for these purposes — i.e., for purposes other than treating an illness — it is known as non-therapeutic use.
Aside from promoting growth, the routine use of antibiotics is also necessary for preventing disease in conventional industrial farming systems. Modern industrial farms, or confined animal feeding operations (CAFOs), are ideal breeding grounds for germs and disease. Animals live in close confinement, often standing or laying in their own filth, and are under constant stress, which inhibits their immune systems and makes them more prone to infection. Because of these less than hygienic conditions, about half of the antibiotics used by farms are mixed into the feed of healthy animals in order to prevent disease. The trend seems to be to prevent diseased animals by using antibiotics meant for cure, even before any proof of illness, and save on sanitizing the area. Unfortunately, low-level use of antibiotics for extended periods of time is one of the best ways to speed the development of antibiotic-resistant bacteria.

The Union of Concerned Scientists (UCS) estimates that the quantities of antimicrobials administered to livestock and poultry far outweigh the amount of antibiotics used on humans. According to UCS estimates, humans use approximately 4.5 million pounds of antibiotics annually for medical treatment and in topical creams, soaps, and disinfectants. In comparison, antibiotic use in beef, pork, and poultry production is estimated at 24.6 million pounds annually – approximately five and a half times the amount used in human medicine. Thus, the use of antibiotics in livestock agriculture accounts for 84% of total antimicrobial use in America.

Many of the antibiotics routinely given to healthy livestock and poultry to promote growth are identical, or nearly so, to drugs that health providers rely on to treat sick humans. These include penicillin, tetracyclines, erythromycins and bacitracin, among others. For example, the Union of Concerned Scientists estimates that nearly 5 million pounds of two tetracycline antibiotics are fed to swine each year in the U.S. The volume of these two medicines fed to pigs alone, according to UCS estimates, is sixty percent greater than the volume of all antibiotics given to sick humans.

The same mechanisms by which bacteria in humans develop resistance also work in animals that are fed antibiotics. The genes that confer antibiotic resistance to bacteria can travel from food animals to humans via several routes, including on contaminated food and through contamination of the environment.
Contamination of the Environment: Spread of Antibiotic-Resistant Bacteria

Large livestock operations produce an enormous amount of waste – over 1 billion tons annually – that often contains intact and undigested antibiotics, as well as antibiotic-resistant fecal coliforms (bacteria that live in the intestines). It is estimated that as much as 80-90% of all antibiotics given to humans and animals are not fully digested or broken down and eventually pass through the body and enter the environment intact through waste. Thus, these antibiotics are released into the environment where they may encounter new bacteria and create more resistant strains. Many of the antibiotics used on livestock and poultry farms are identical or similar to those used in human medicine, meaning that bacteria from farms can infect people with diseases that cannot be treated with common antibiotics.

Antibiotic Resistance and Public Health

The rise of antibiotic-resistant bacteria is a major public health crisis because infections from resistant bacteria are becoming increasingly difficult and expensive to treat. Already, an estimated 14,000 Americans die every year from drug-resistant infections, and the National Academy of Sciences calculates that the increased health care costs associated with antibiotic-resistant bacteria exceed at least $4 billion annually – a figure that reflects the cost of additional antibiotics and longer hospital stays, but not lost workdays or human suffering.

Although everyone will be at risk if antibiotics stop working, the threat is greatest for those with weaker immune systems, such as cancer patients undergoing chemotherapy and organ transplant patients. Young children and seniors are also at particular risk because the immune system functions less effectively for people in these age groups.

Should a colony of drug-resistant bacteria bloom at an industrial livestock operation, there are three basic means by which the germs can make their way to the human population: via food, via the environment (i.e. water, soil, and air), and via direct contact with animals (i.e., farmers and farm workers). It is estimated that 25-75% of all antibiotics administered to animals could be passed unchanged directly into the environment through manure. Since huge quantities of livestock manure are sprayed on farm fields to be re-absorbed into the environment, antibiotic-resistant bacteria can leach into ground
water and drinking wells, endangering the health of people living close to large livestock facilities.

**Alternatives to Antibiotics Available**

On industrial farms, animals are administered antibiotics on a routine basis – through feed, water, or injection. But not all animals are raised in such a manner. Ending or minimizing the use of antibiotics in animal agriculture is both feasible and potentially beneficial to consumers. According to a study by the National Academy of Sciences, if the U.S. were to ban the non-therapeutic administration of antibiotics to livestock, the average consumer's total food costs would only increase by $4.85 to $9.72 per year. The study suggested that this ban would not affect the profits of farmers who utilize good management practices. Furthermore, the ban would be expected to decrease health care costs.

In 1997, 14 percent of the U.S. domestic chickens sampled were found to contain Campylobacter bacteria resistant to fluoroquinolone antibiotics. In 2000, the American Public Health Association issued an interim policy calling on manufacturers to withdraw their fluoroquinolone products used in poultry, saying that it "constitutes the quickest, most responsible way to address the public health threat."

In June 2001 the American Medical Association went on record opposing the use of antibiotics in healthy food animals. Other groups of health professionals have taken a similar stand.

Europe is moving in the direction of a total ban on routine use of antibiotics in animal feeds. Sweden and Denmark have already completed a phase-out, while other European Union countries have ended such uses of most antibiotics and are scheduled to end use of the rest by 2006. These nations have led the development of large-scale livestock management techniques that use better hygiene rather than antibiotics to raise healthy animals, with no interruption in the meat supply. A growing roster of U.S. producers also avoids routine use of antibiotics.

Many small, sustainable producers do not use antibiotics at all, in large part because they don’t have to compensate for unhealthy conditions. On sustainable farms, animals are raised in a clean, natural environment that is not a breeding ground for bacteria.
Other sustainable farmers will use antibiotics to treat animals only when they become sick, and they will make sure the antibiotics have passed out of the animal's system before using its meat, eggs or milk.

Federally regulated organic standards prevent antibiotics being used in the production of certified organic meats. In the Eat Well Guide, farmers who never administer antibiotics to their animals carry the label “No Antibiotic Use.” Some sustainable producers will use antibiotics to treat animals that fall ill, and in this case, food from those animals cannot be sold as “USDA Certified Organic” or with the label “No Antibiotic Use.” Eat Well Guide producers who only use antibiotics when an animal becomes ill carry the label “No Routine Antibiotic Use.” In these instances, a suitable amount of time must pass after an animal is treated and before its meat, milk or eggs can enter the food supply.

What You Can Do

Some consumers prefer to buy meat from animals that were never given antibiotics; other individuals are not concerned about medically-necessary antibiotic use. The key is to avoid animals that were fed low doses of antibiotics on a regular basis either to promote growth or prevent disease. Not only does this greatly increase the occurrence of antibiotic-resistant bacteria in our environment and food supply, it also indicates that the animals were probably housed in crowded, unhealthy conditions which make them prone to sickness.

- Buy directly from the farmer. The best way to know how or if antibiotics were used is to ask your farmer. Find a farmer near you using the Eat Well Guide, an online directory of small farms, stores, restaurants, and online catalogs that offer sustainably-raised meat, poultry, dairy, and egg products.

- Farmers’ markets are popping up all over the U.S. and Canada as their popularity continues to grow. If you can’t make it to the farm, farmers’ markets are a great alternative. Usually the farmer or someone who works on the farm is available and more than happy to answer your questions about antibiotic use and how the animals were raised.
• Buy local. When you buy locally produced fruits, vegetables and meat products, you support your local economy. Community Supported Agriculture programs, Farmers’ markets and Co-ops are good options for doing this.

• Advocate for change. Individual consumers can help bring about broader policy change by urging the government and industry to reduce unnecessary antibiotic use in animal agriculture.

• Don’t take antibiotics unless you have a bacterial infection! Colds and viruses cannot be treated with antibiotics. And all those products containing antibiotics, such as antibacterial soaps, are no better for you than regular soap, so there’s no need to use them.

Does the use of antibiotics in food animals pose a risk to human health?
The Journal of Antimicrobial Chemotherapy
http://jac.oxfordjournals.org/cgi/content/abstract/53/1/28

The use of antibiotics in food animals selects for bacteria resistant to antibiotics used in humans, and these might spread via the food to humans and cause human infection, hence the banning of growth-promoters. The actual danger seems small, and there might be disadvantages to human and to animal health. The low dosages used for growth promotion are an unquantified hazard. Although some antibiotics are used both in animals and humans, most of the resistance problem in humans has arisen from human use. Resistance can be selected in food animals, and resistant bacteria can contaminate animal-derived food, but adequate cooking destroys them. How often they colonize the human gut, and transfer resistance genes is not known. In zoonotic salmonellosis, resistance may arise in animals or humans, but human cross-infection is common. The case of campylobacter infection is less clear. The normal human faecal flora can contain resistant enterococci, but indistinguishable strains in animals and man are uncommon, possibly because most animal enterococci do not establish themselves in the human intestine. There is no correlation between the carriage of resistant enterococci of possible animal origin and human infection with resistant strains.

Commensal Escherichia coli also exhibits host-animal preferences. Anti-Gram-positive growth promoters would be expected to have little effect on most Gram-negative organisms. Even if resistant pathogens do
reach man, the clinical consequences of resistance may be small. The application of the
‘precautionary principle’ is a non-scientific approach that assumes that risk assessments will be carried out.
Keywords: antibiotic resistance and food animals, animal antibiotic use and human health risk

ANTIBIOTICS IN DETERGENTS

Mercola

Antibiotics Kill Your Body’s Good Bacteria, Too, Leading to Serious Health Risks

Simply put, antibiotics are poisons that are used to kill. Only licensed physicians can prescribe them. The
drugs are used to kill bacteria. Certainly, many people have benefited from using them. However, if bacteria
were the only organisms that antibiotics killed, much of this book would be unnecessary. In fact, I con tend
that poisons that kill small organisms in small doses -- organism-specific varieties notwithstanding -- can
also kill big organisms, when they are taken in big doses. You, my friend, are a big organism.
We’ve talked about the link between fungus and human disease. This chapter addresses the possibility that
antibiotics may help fungi to proliferate within the human body.

As an adult human, you have three to four pounds of beneficial bacteria and yeast living within your
intestines. These microbes compete for nutrients from the food you eat. Usually, the strength in numbers
beneficial bacteria enjoy both keeps the ever-present yeasts in check and causes them to produce nutrients
such as the B vitamins.

However, every time you swallow antibiotics, you kill the beneficial bacteria within your intestines. When you
do so, you upset the delicate balance of your intestinal terrain. Yeasts grow unchecked into large colonies
and take over, in a condition called dysbiosis.

Yeast are opportunistic organisms. This means that, as the intestinal bacteria die, yeasts thrive, especially
when their dietary needs are met. They can use their tendrils, or hyphae, to literally poke holes through the
lining of your intestinal wall. This results in a syndrome called leaky gut. Yeasts are not the only possible
cause of this syndrome. Some scientists have linked non-steroidal, anti-inflammatory drugs (NSAIDS) such
as naproxen and ibuprofen to the problem. Given their ability to alter intestinal terrain, antibiotics also likely
contribute to leaky gut syndrome.
In addition to possibly causing leaky gut syndrome, I believe that parasitic yeasts can also cause you to change what you eat in that they encourage you to binge on carbohydrates including pasta, bread, sugar, potatoes, etc. So, it should come as no surprise that weight gain counts as one of the telltale signs of antibiotic damage and subsequent yeast overgrowth.

By altering the normal terrain of the intestines, antibiotics can also make food allergies more likely. An array of intestinal disorders can ensue, as well. Sadly, most doctors claim ignorance concerning their patients' intestinal disorders rather than admit that the drugs they themselves prescribed actually caused the disorders to begin with.

Tons of antibiotics are fed to American livestock on a daily basis, purportedly to proof them against bacteria. This practice not only possibly contributes to antibiotic resistance in humans -- many experts feel weight gain, and not disease prevention, is the real reason antibiotics are so widely used. Fat cattle sell for more than thin cattle. That's all very well, but imagine what the antibiotics thereby possibly present in dairy products could be doing to our children's health.

Back in the 1950s, two researchers in Albany, New York, worked to develop an antimicrobial drug from a substance produced by a soil-based fungus. Although the nystatin they discovered is technically a mycotoxin, it works wonders an intestinal antifungal. This as yet revolutionary drug stops the yeast overgrowth caused by all other antibiotics and is 100 percent safe to use. In addition, nystatin works with no side effects, though it can cause a pseudo sickness that patients often confuse with side effects.

Also in the 1950s, scientists used mice to grade the relative toxicity of 340 antibiotics (Dr. William S. Spector, The Handbook of Toxicity, 1957). The researchers based their rankings on the amount of a given antibiotic required to kill half of the lab mice injected with it. I relate this story only to ask you, before 1957, how did scientists decide what would serve as prescriptive doses for these very same antibiotics when used in humans?

I'll assume that the same toxicity scale remains in place today. If it does, and if a given dose of penicillin will kill 50 percent of mice injected, it stands to reason that a much larger dose, or perhaps repetitive doses extended over 40 years, might prove fatal to a human. I don't know if larger doses are in fact administered to people. And, the 40-year scenario has its problems. But you have to admit, it's certainly food for thought.
The time span between when patients take rounds of antibiotics and when they die interests me. That’s because I believe that few people really die of heart disease and diabetes. In actuality, antibiotics are responsible for deaths attributed to these diseases, because these drugs are what caused people to develop the diseases to begin with. And yet, incredibly, death certificates usually state the probable cause of death without mentioning whether the deceased had a history of taking antibiotics.

Remember, antibiotics are dangerous mycotoxins -- fungal metabolites. Just as importantly, medical experts have written articles maintaining that these drugs kill people. But, other experts insist on remaining sceptical as to the problem, even though these same experts readily recognize the link between weakened immune systems and death.

According to the 2001 Allergy and Asthma Report, the first immunodeficiency syndrome was identified in 1952. This document tells us that since that time, "more than 95 immune syndromes have been identified, with new conditions coming to light every day." The report goes on to say that research indicates that "increased antibiotic use in human infancy may be associated with increased risk of developing allergies." Max Planck won the 1918 Nobel Prize in Physics. He once weighed in as to why science is slow to change even in the presence of overwhelming evidence that it should do so.

"A new scientific truth does not triumph by convincing its opponents and making them see the light," Planck said, "but rather because its opponents eventually die and a new generation grows up that is familiar with the ideas from the beginning."

That a new generation will grow up knowing of the dangers inherent in taking antibiotics is a good thing. That doctors will continue randomly prescribing fungal toxins should teach us the importance of knowing medical facts before blindly accepting any prescription. Please study the antimicrobial benefits and the immune system stimulants that nature provides. Know also that, in some instances, antibiotics may become necessary.

If you reach the point where no alternatives exist, I recommend that you ask your doctor to prescribe nystatin simultaneously with the antibiotic (see Dr. Holland’s article). Also, keep in mind the post-antibiotic importance of restoring the intestinal terrain with plain yogurt and probiotics. If you experience bloating, belching, gas, constipation, diarrhea, GERD, or other intestinal problems, probiotics can play an important role in restoring your intestinal terrain.
Antibiotics -- to Take or Not to Take?
by David A. Holland, M.D.

I looked up antibiotics in Harrison's Textbook of Internal Medicine. The listing referred me to "antimicrobials." This caused me to realize how much more accurately the second term describes these substances, given the broad-spectrum nature of a lot of them.

I must confess that, as a doctor, I do prescribe "antimicrobials." Perhaps I prescribe more antifungals and nonprescription remedies than the usual doctor, but I do prescribe antibiotics, as well. Perhaps even more horrifying, considering Doug's articles condemning them, is that I've taken them myself! In fact, in these times it's a rare individual who goes through life without ingesting those little pills. So, three questions have become important -- when should you take antibiotics, when should you refrain, and what will you do when you've already taken them?

Alexander Fleming, by the grace of God, brought us a mixed blessing in 1928 with his accidental discovery of penicillin produced by, of all things, a fungus. Medicine's interest treating people for exposure to fungi dropped dramatically in succeeding years, until the microbes were only thought important insofar as their ability to produce increasingly diverse varieties of antibiotics.

Interest in fighting bacteria proliferated like a flesh-eating Strep infection, fueling the race to discover ever more antibiotics. Pharmaceutical salespeople invaded doctors' offices and hospitals, intent on convincing physicians their antibiotic was better than the others. These salespeople supported their pitches with studies, graphs, charts and convincing stats, while often failing to mention that their research had been funded by their own companies. The possible conflict of interest was, and remains, enormous.

I have no quarrel with such salespeople. They're regular men and women like you and me, just trying to make a living. However, when human lives are involved, funding research to prove that your own product is better than the competition's is just plain wrong. The advantage is obvious, and the danger that a great deal of objectivity could be lost is only all too real.

I believe that an impartial, third party should be assigned to perform such research, funded by a mandatory "ante" from all pharmaceutical companies involved in producing a given category of drug. Of course, that will be the day! In case the above scenario never happens, we would do well to take with several grains of salt the unregulated information that companies provide about their own products.
Perhaps you are wondering about the use -- and abuse -- of antibiotics in general. Let me give you an example. One of the most common diagnoses given at a doctor’s office is the upper respiratory infection (URI). It accounts for up to 70 percent of all antibiotics dispensed (Annals of Internal Medicine. American College of Physicians. American Society of Internal Medicine. March 20, 2001).

However, according to Dr. Carol Kauffman, most URIs are not caused by the bacteria that antibiotics are designed to fight. Rather, Kauffman says, they are caused by fungi. So, unless a secondary, bacterial infection presents itself -- and even then, the rules change -- most URIs do not require the use of antibiotics. Regarding ear infections, in one study, children administered antibiotics for acute otitis media suffered double the rate of adverse effects compared to children in the study who took placebos (Clinical Evidence. 2000). The difference in outcome for those children in the study who took antibiotics compared to those who do not was almost negligible. Some scientists counter that children who take antibiotics run lower risks of secondary ear infections such as meningitis or mastoiditis (infection of the angular bone located behind your ear).

Of course, the landscape is complicated by noncompliance. The portion of people who take their antibiotics as prescribed has been estimated at anywhere between 8 to 68 percent. So it’s difficult to say just how effective antibiotics actually are.

Now, say my daughter were to get sick for 10 days, miserable with a high fever and screaming ear pain. Say our doctor said her ear canal checked out as angry red. Am I going to have my daughter take the prescription? Probably so. We cared for a young woman at the hospital where I worked who was literally at her death bed with overwhelming Streptococcal -- bacterial -- pneumonia. One of her lungs was saturated with the infection, which had also spread throughout her bloodstream.

I went on to my next rotation thinking that was the last I would hear of that patient. However, I later spoke with her attending physician. He told me she walked out of that hospital, completely cured. So, antibiotics save lives, but it’s not exactly a common occurrence. Certainly, most of you out there suffering from the common cold are not near death, so you should think twice about taking antibiotics.

The non-synthetic antibiotics are fungal by-products called mycotoxins. Penicillin is perhaps the best example. In other words, mycotoxins kill off fungi’s competitors, allowing fungi to grab up all of the nutrients for themselves. Alexander Fleming himself observed this in action, and it later led him to develop penicillin. When a mold -- molds are fungi -- contaminated a bacteria colony upon which Fleming was performing an
experiment, the invader cleared the area around it of all bacteria. When Fleming investigated, it turned out that the fungus had produced a substance he would later call penicillin, killing the bacteria in residence. Just because they kill bacteria, you may be thinking, doesn’t mean that some, many or especially all of the mycotoxins used as antibiotics are necessarily harmful to human beings. A. V. Costantini in effect counters this idea when he speaks of the work of two scientists by the name of Bernstein and Ross. Costantini says that the men found that two or more months of treatment with penicillin and other antibiotics contributed to what they saw as a "significantly increased risk of non-Hodgkin’s lymphoma in humans (Costantini, A. V. Fungalbionics. 1998)."

How many people, children included, have undergone dose after dose of antibiotics for recurring infections? Doug and I believe that these relatively small doses taken over long periods of time are actually harming us in similar, incremental fashion, later showing up as cancer, diabetes, vasculitis or other diseases. We take antibiotics when we are sick, when our immune systems weaken. The mycotoxins pharmacies dispense for use as antibiotics only exacerbate the problem, because the lion’s share of these substances have been shown to be immunosuppressants (CAST Report No. 116. November 1989.). Not only are they capable of hamstringing our immune systems, they also destroy the friendly bacteria that guard our intestines.

These friendly bacteria include Lactobacillus acidophilus, Bifidus and Bulgaricus, supplements for which can be found in any health food store’s refrigerated section. They protect us against pathogens such as Salmonella, yeast, cholera, and the bad E. coli. They are so potent that, prior a trip abroad, to protect yourself from traveler’s diarrhea you’d do better to skip the usual antibiotics and instead take acidophilus supplements.

Unfortunately, these good flora are so vulnerable to antibiotics that, in mice, a “single injection of streptomycin can eradicate the protective effect of the normal flora. (Mandell. Principles and Practice of Infectious Diseases. 2000.)” And, once gone, these friendly bacteria are replaced by hostile bacteria such as Pseudomonas, Clostridium, and Klebsiella, and by Candida yeast, a powerful member of the fungi family. So, we have the good and the bad regarding our chemical friends known as antibiotics. They can "save the day" at times, but they have ruined them at others -- just ask any woman with a yeast infection or look at any baby who suffers from thrush. You should know that, even should you just say "no" when your doctor moves to prescribe antibiotics for you, theoretically speaking you may still be taking them with every bite of steak and pork you eat.
That's because more antibiotics per pound are used on livestock than in human medicine. How much of those antibiotics are passed on is difficult to determine, but the mere possibility of this kind of thing is certainly a worry.

Our goal in this book is to educate you and to help you make informed decisions. Some final, simple tips follow:

An ounce of prevention.... Exercise, eat intelligently and take a few supplements. Avoid alcohol, smoking, and recreational drugs. Get some rest once in a while. Pray.

Despite our best efforts, most of us will get sick at some point and decide to go see a doctor. If you are a stubborn, married man, your wife will likely make the appointment for you.

Ask Questions. If your doctor diagnoses you with an upper respiratory infection, sore throat (in which the strep test is negative), bronchitis, sinusitis, or ear infection, and you wonder if you really need an antibiotic, make a point of asking her about it. A lot of physicians would be pleasantly surprised that one of their patients would even consider trying to recuperate without antibiotics. Ask if you can treat your condition symptomatically and come back or call in a couple of days if you are not better.

If your questions annoy your doctor, then get another doctor. After all, you pay the bills, either directly or out of your paycheck in the form of insurance, and you deserve adequate treatment. On the other hand, if you feel you, in fact, do need an antibiotic and your doctor disagrees, try to work a deal in which she will prescribe an antibiotic for you if you don't feel better in a couple of days. I learned an important lesson about this kind of disagreement during college, on a visit to the infirmary. The doctor there refused to give me an antibiotic for a URI I'd come down with. I had to suppress my anger at what I saw as arrogance on his part, but lo and behold, he was right. I got better without the pills I'd been sure I'd needed. I think a lot of people tend to underestimate their bodies' healing abilities, in much the same way as I did. That's just one reason why doctors are oftentimes in a better position to make the call as to whether or not to prescribe.

Take an objective look at yourself and your life-style. If you keep coming down with the same thing, do some research and a little thinking. Do you drink a lot of soda? Do you smoke? Are you taking antibiotic after antibiotic and now have a secondary yeast or fungal infection? How is your spiritual life? Your stress level? The point is, myriad factors contribute to "wellness."
As far as chronic sinus infections go, Johns Hopkins researchers are now saying most such conditions are caused by a fungus. So, if you do have chronic sinusitis, stop taking antibiotics, get on an antifungal diet, and ask your doctor for antifungal medications. If your doctor refuses, visit a health food store for natural, off-the-shelf antifungals such as olive leaf extract, garlic, and Caprylic acid.

Once you improve, make sure you go back and let your doctor know how things worked out. Chances are she is neither experienced nor comfortable with prescribing antifungal medication. Your story may convince her to do her own research, the first step to changing her treatment philosophy.

It shouldn't be too difficult to convince your doctor to let you try a prescription of nystatin. As one of the better gut antifungals, nystatin is also remarkably safe and free of side-effects.

If you've decided to go ahead and take an antibiotic:

Get the facts. Ask your doctor how many days you must take the antibiotic and if you, in fact, do need the latest, most powerful one on the market. Simple urinary tract infections are now treated with only three days of antibiotics. Sinus infections, bronchitis, and ear infections in children over two years of age can be treated with as few as five days of antibiotics, new or old, generic or name brand. This may not be possible, however, if you have other medical conditions or if you smoke.

Build trust. Commit to the full course of the antibiotic unless you experience significant side effects or an allergic reaction. You sought medical advice and agreed to the prescription. You will build trust with your doctor if you work as a team. This trust will be very important once you see number 3 below.

Take an antifungal with the antibiotic. For example, you could ask your doctor for a prescription of nystatin to take during the course of your antibiotic. Many dermatologists do this when prescribing long-term antibiotic courses for acne. I suggest adults take two tablets twice a day -- 1 cc of suspension twice a day for children -- to prevent yeast overgrowth in your intestines. Most cases of upset stomach or diarrhea that kick in a few days of beginning a round of antibiotics can be cured with a single dose of the drug. Diarrhea after a two-week round of antibiotics is likely caused by a different bug altogether -- be sure to bring that to your doctor's attention.

I should tell you that, in my clinical practice years, many of my patients made great strides against acne through taking nystatin and a change in diet alone, without the antibiotics.
Supplement your intake. Take an antioxidant supplement, one which includes vitamin E, zinc, selenium, vitamin C, and vitamin A, among others. According to A.V. Costantini, all antioxidants are antifungal. (Costantini. 1998.)

Keep your bowels moving. If antibiotics kill off your friendly, intestinal bacteria, once you cease taking antibiotics you’ll run a higher risk of infection by other, more hostile bacteria. These bacteria will be quick to find and exploit pockets of debris that could be collecting and putrefying in your intestines if you happen to become constipated. So, be sure to keep your digestive tract as clear as possible until you can repopulate it with friendly bacteria. Psyllium hulls fiber from your local health food store is the best, bulk fiber to use, as long as you don’t have a history of intestinal obstruction. Psyllium not only relieves constipation. It also slows diarrhea by absorbing excess water.

Replace the good bacteria in your intestines. Supplement with an acidophilus supplement for a few weeks following any course of antibiotics. Do not take these simultaneously with your antibiotic, or you will simply end up with a lot of very dead, albeit still friendly bacteria in your intestines. At the very most, take acidophilus supplements either in between antibiotic doses or after you have completely finished your prescription.

Look back at why you became ill to begin with. I once suffered from strep throat after indulging in half a box of chocolates. That should have come as no surprise. Who wouldn’t be crippled by that amount of garbage? More than likely, you have your own experience regarding similar binges. My point is, diet plays at least as much a role as actual exposure to germs as to whether we get sick -- when we are healthy and eating correctly, our bodies are amazingly resistant to infection.

One, last note: Please ignore advertisements that recommend guzzling orange juice for the vitamin C it contains. A big dose of sugar is what you’d actually be getting. I have heard more than a few patients note that once they felt they were coming down with something, they immediately began downing glass after glass of orange juice, only to get even sicker. They concluded that they must not have caught the illness in time, which couldn’t have been any further from the truth.

The truth is, they simply fueled the fire of their infections with lots of sugar, all because they trusted a corporation’s advertisement to educate them about proper healing strategies. If you want that much vitamin C, you will be perfectly fine taking it in the 1,000 mg pill form a few times a day. As far as fluid requirements are concerned, your body is 70 percent water -- and that is exactly what it needs!
Beyond Antibiotics

http://www.drlwilson.com/Articles/antibiotics.htm

By Lawrence Wilson, MD
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Beyond Antibiotics is the title of a book by two medical doctors, Keith Sehnert and Lendon Smith. These gutsy authors challenge one of the most sacred cows of conventional medicine, the widespread use of antibiotics. I have drawn information from the book to write this article.

Doctors prescribe antibiotics at what can only be termed an incredible rate. According to several studies done around the year 2000, obstetricians and gynecologists wrote 2,645,000 antibiotic prescriptions every week. Internists prescribed 1,416,000 per week. This works out to 211,172,000 prescriptions annually, just for the two specialties! Pediatricians prescribe over $500 million worth of antibiotics annually just for one condition, ear infections.

The intent of this article is not to suggest that antibiotics should never be used. They obviously can be life-saving. However, many health authorities are beginning to admit that antibiotics are overprescribed and toxic, creating problems that are worse than the original condition. Let us examine antibiotics more carefully in light of recent findings.

MYTHS ABOUT ANTIBIOTICS

Among the prevalent myths about antibiotics are the following three:

Myth #1. Antibiotics are responsible for the decline in infectious disease. The truth is that antibiotics are helpful for many infections. However, antibiotics have not resulted in the elimination of infectious diseases by themselves. In fact, we now have antibiotic-resistant diseases that are much more difficult to treat as a direct result of overprescribing of antibiotics such as certain strains of gonorrhea and tuberculosis, as well as many others that are less well known such as strepococcus that is resistant. These cause many deaths, especially in hospitals. In Beyond Antibiotics, the authors use graphs to trace the incidence of the major infectious diseases from 1900 to 1973. The diseases include measles, scarlet fever, tuberculosis, typhoid fever, pneumonia, influenza, whooping cough, diphtheria and polio. All were in decline for several decades before the introduction
of antibiotics or vaccines. After reviewing the data, researchers John McKinlay and Sonja McKinlay at Boston University concluded that "... at most, 3.5% of the total decline in mortality since 1900 could be ascribed to medical measures introduced for the diseases considered here". Improved nutrition and improved sanitation and hygiene were far more important than the 'wonder drugs' or vaccines to reduce these diseases.

**Myth 2. Antibiotics are useful against colds and flu.** In truth, antibiotics are only helpful for bacterial infections. However, many physicians continue to prescribe them for viral conditions such as colds and flu. The rationale is to prevent secondary bacterial infection. This would be fine, except for myth #3 below, the dangers of antibiotics. Given the dangers of antibiotics, it is prudent in most cases not to take antibiotics for colds and flus. They can worsen the situation and prolong recovery.

**Myth #3. Antibiotics are harmless.**
This is the most insidious myth. It leads to overprescribing and blinds physicians and the public to the dangers of antibiotics, described in the next section. Meanwhile, safer methods of avoiding and treating infections are ignored on the premise that the antibiotics will take care of everything. The *Physicians Desk Reference* lists the adverse effects of antibiotics. Anyone who is taking an antibiotic (or any other medication) should read about the adverse effects. This can help prevent nasty surprises. The interaction between antibiotics and other medications should also be noted. In addition to the side effects and cautions described in books, antibiotics present other problems that are described below.

**PROBLEMS WITH ANTIBIOTICS**
The list of problems with antibiotics is quite long. Some are common and well known. Others are subtle, but no less important. I have divided the adverse effects into nine categories:

1) **They contribute to cancer.** A 2008 study of 3,000,000 people divided the participants into groups that had taken no antibiotics for the past two years, those that had taken 2-5 prescriptions and those that had taken six or more prescriptions in the same time period. Participants were tracked for six years afterwards. Those who had taken 2-5 antibiotic prescriptions had a 27% increase in cancers compared to those who took none. Those who took six or more prescriptions had a 37% increase in cancers. This was a carefully done study on a large group of people and published in a very reputable journal (*Int J Cancer* 08;123:2152-2155).

Other studies show the same thing. A National Cancer Institute study in a major medical journal found that the incidence of breast cancer doubled among women who took more than 25 antibiotic prescriptions or took antibiotics for more than 500 days over 17 years (*JAMA* 04;291:827-835).

2. **Allergic Reactions.** I used to worry every time I prescribed penicillin when I was a medical intern. It had been explained that rarely a patient would have a fatal allergic reaction to it. I was taught that if I
practiced medicine long enough someone would die in my office after a shot of penicillin. While this is uncommon, other allergic reactions to antibiotics occur frequently. Not only can the drug cause a reaction, but most antibiotics contain chemical colors, sugar and other additives that can trigger a reaction in sensitive individuals.

3. Destruction Of Beneficial Bowel Flora. Like pesticides, antibiotics kill good bugs along with the bad ones. Wide-spectrum antibiotics are notorious for this. The human intestine has a somewhat delicate ecology in which certain bugs help digest food, produce certain vitamins, and maintain a balance of organisms that prevents harmful bacteria and yeasts from multiplying. Wide-spectrum antibiotics derange the normal ecology of the intestine. This can cause parasitic infection, vitamin deficiencies, loss of minerals through diarrhea, inflammation of the gut, malabsorption syndromes and development of food allergies due to defects in intestinal function.

4. Development Of Resistant Species Of Micro-organisms. An article in *Science Magazine*, August 1992, stated, "Doctors in hospitals and clinics around the world are losing the battle against an onslaught of new drug-resistant bacterial infections including staph, pneumonia, strep, tuberculosis, dysentery and other diseases that are costly and difficult, if not impossible, to treat. Bacteria have a certain ability to mutate. Antibiotics kill bacteria that are susceptible to their action, but this leaves the field open for mutant strains to multiply even more. It is a case of survival of the fittest. The use of antibiotics actually encourages the development of the mutant, drug-resistant super-bacteria.

5. Immune Suppression. This may sound odd, as the purpose of antibiotics is presumably to help the immune response. However, evidence indicates that people treated with antibiotics have more repeat infections than those who are not treated. This is especially true of children whose ear infections are treated with antibiotics. Vitamin A and C and the use of simple herbs such as echinacea and astragalus, for example, are much safer and often equally effective. In fact, antibiotics do not aid the immune system. They replace one of its functions. Antibiotics act by inhibiting certain enzymatic processes of bacteria, and by changing mineral balances. Normal cells, however, are also affected. This may be one reason why antibiotics weaken the immune response. Other toxic effects of antibiotics, such as the effect upon the normal bowel flora, may also be a cause. AIDS research indicates that a risk factor for AIDS is an impaired immune response. This can be due to a history of repeated antibiotic use. Perhaps it is no accident the same group with the highest incidence of AIDS, male homosexuals as of 2009, is also a group that uses more antibiotics than other groups in America. The link between antibiotic use and increased cancer rates can also be explained this way. This topic is discussed in the paragraphs above under #1.

6. Overgrowth of Candida Albicans And Other More Dangerous Intestinal Infections. Normally, candida albicans, a common yeast, lives peacefully in our intestines and elsewhere, in harmony with other flora that keep the yeast in check. Take an antibiotic and all of this changes. By suppressing the normal flora,
candida takes over and problems begin. In its mild form the result is diarrhea or a yeast infection. Far more serious is the growing problem of chronic muco-cutaneous yeast infection. This is described in books such as *The Yeast Connection* and *The Yeast Syndrome*. It is a major iatrogenic illness today, and a very debilitating and potentially fatal condition. One of the prime risk factors for chronic candida infection is repeated antibiotic use. Even more dangerous is that antibiotic use opens the intestines to infection by other species of pathogenic or disease-causing bugs, parasites, yeasts and other types of organisms ranging from amebas to far more toxic ones that can cause all types of systemic damage, as well as damage to the intestinal lining and related areas.

7. **Chronic Fatigue Syndrome.** This is another ‘new’ health plague. It is associated with chronic viral illness and a weakened immune system. While its exact origins are not clear, one of the major risk factors for chronic fatigue syndrome is - you guessed it - repeated antibiotic use.

8. **Nutrient Loss And Resulting Deficiency States.** Nutrient loss from antibiotics is due in part to diarrhea, which causes a loss of essential minerals. Destruction of friendly bacteria in the intestines can also impair the synthesis of certain vitamins in the intestines. While not a major cause of malnutrition, antibiotic usage may be another factor contributing to poor nutrition and thus a weakened body chemistry.

9. **Treating Effects, Not Causes.** Antibiotics only address the end-stage result of a weakened body chemistry - bacterial invasion. The bacteria may only be there to "mop up" the biological debris that are present because the body is too weak to eliminate the poisons. Fever is one way the body burns up toxic substances. Providing it does not get out of hand, the infectious process can serve a useful purpose. Cutting short the process with antibiotics aborts the cleansing function of a fever and impairs long-term health. Not true, you might say. However, I believe it is true in some cases because on tissue mineral tests, there are clear indicators of increased susceptibility to infections. The indicators are: 1) a low energy level, 2) a low sodium/potassium ratio, 3) toxic levels of mercury, copper, or cadmium, and 4) low zinc. In hundreds of cases, when these imbalances are corrected, the tendency for infections decreases drastically. In other words, healthy people do not get as many infections. Infections do not strike randomly. There is a logic to infections, and the underlying causes can be addressed. This line of reasoning traces back to the famous debate between Pasteur and Beauchamp. Dr. Pasteur insisted that germs are the cause of disease. His colleague, Beauchamp, insisted that the health of the host was more important than the germs. On his death bed, Pasteur was said to have declared that Beauchamp was correct - "the host is everything, the germs are nothing". Orthodox medicine, however, embraced Pasteur's view, and ignored Beauchamp. It is time to focus more on the person, and less on the germs.

10. **High Cost.** While the cost of a single antibiotic prescription may not be extremely high, newer ones are somewhat costly. The costs are high when the side effects are considered, along with the sheer numbers of prescriptions that are written around the world each day, month and year. Millions of doctor visits and prescriptions for antibiotics add up to a major expense. While penicillin is not expensive, other newer
antibiotics are quite costly. These newer antibiotics are used more frequently today due to the presence of penicillin-resistant strains of bacteria. We must also include in the cost of antibiotics the cost of allergic reactions, candida albicans infections, repeat infections, development of resistant organisms and immune suppression. The cost is justified if life is at stake. However, if less toxic and less costly alternatives can be used, shouldn't these be tried first? Bringing health care costs under control is not just a matter of eliminating waste and inefficiency. We need methods of healing that build up the health of the people, not tear it down.

CONCLUSION
Antibiotics are an important class of medications that can save lives. However, antibiotics are overprescribed and toxic. They should be used as a last resort, not the first. Very often, simple, inexpensive natural methods described here work better with far fewer adverse effects. However, infections are always serious conditions, even seemingly mild ones. Therefore, take care of infections as soon as possible and with natural remedies, use them faithfully and even aggressively, since they are non-toxic for the most part. Finally, always ask for help if you are not sure how to use simple, natural methods or if an infection is not beginning to get a little better, at least, after two or three days, at the most. Most often, natural methods work exceedingly well at low cost and very low toxicity.

Full report via website link

Over the counter antibiotic treatment
University of Michigan News Service
http://www.ns.umich.edu/htdocs/releases/story.php?id=1335
Over-the-counter antibiotic treatment for UTI would not be cost-effective

ANN ARBOR—Health consumers plagued by urinary tract infections (UTI) might be pleased by the convenience of over-the-counter availability for UTI antibiotic treatment. A cost-effectiveness analysis conducted by researchers at the University of Michigan School of Public Health, however, suggests that such a move would be risky business.

"Over-the-counter antibiotic treatment for UTI would not be cost-effective in the long run, according to our cost-effectiveness analysis, and it also would be highly risky from a public health perspective. Resistance to
antibiotics would most probably increase over time, due to misdiagnosis by consumers, and leave them with fewer treatment options in the future," explained Betsy Foxman, associate professor of epidemiology. UTIs are generally self-limiting in otherwise healthy women who are experiencing no fever or back pain, Foxman added.

Foxman and her colleague, Nicole Rubin, a U-M graduate from the School of Public Health, now with the Lewin Group in Sausalito, Calif., report their analysis in the November issue of the Journal of Clinical Epidemiology. UTI antibiotic treatments are not currently available over the counter. Urinary symptoms account for 6 million to 7 million doctor visits a year, making it one of the most common problems seen for primary care physicians.

"Of those, 3.6 million are actual, diagnosed cases," Rubin said. "Another 2.7 million are triggered by other conditions, such as chlamydia, vaginal yeast infection and genital herpes."

The cost-effectiveness analysis, which was based on a 20- year time horizon, included the costs of doctor visits and the costs of both over-the-counter and prescription medical treatments. It also assessed the benefits of reduced symptom days.

The U-M analysis found: if over-the-counter treatment were available in a pack that would include both a dipstick diagnostic test and antibiotics, the national costs for UTI-associated doctor visits would decline $31.4 million a year, from $157.1 million to doctor visits would be offset by an increase of $55.6 million in treatment costs, from the current $23.6 million a year for prescriptions to $79.1 million a year for the over-the-counter packs.

"Over a 20-year time horizon, discounted 5 percent annually for the declining value of the dollar, the additional treatment costs would amount to more than $300 million," Rubin said.

What about the costs in human discomfort and suffering?

"Earlier over-the-counter treatment would produce a reduction in the number of symptom days, ranging from 52.1 million days to 78.2 million days a year," Foxman said. "However, the reduced symptom days would be purchased at a significant social and health cost tomorrow in terms of antibiotic resistance," she stressed. "As a society we must weigh the benefits of increased access to a treatment that reduces the impact of the disease in the individual consumer against the risks of shortening the time that these antibiotics remain effective. Antibiotic resistance can sweep geographic areas seemingly overnight."
More than 200 medications that were prescription-only just 10 years ago are now sold over the counter due to rising demand among consumers to have more control over their own health care. Among them were vaginal yeast infection antymycotics.

Sales rose 800 percent for yeast infection medications during the five years after the Food and Drug Administration approved over-the-counter access in 1990. The soaring sales suggest "overuse," according to the U-M researchers, and "physicians are consequently concerned about growing resistance to the yeast infection medications."

Easy access to over-the-counter UTI treatments would have another disturbing consequence for public health, according to Rubin. "Serious health conditions such as chlamydia and other sexually transmitted diseases would go undetected and untreated until more serious infection occurs."

"For all these reasons, we recommend against offering UTI antibiotics over-the-counter. Instead, to save costs, we suggest that less expensive practitioners, such as nurse practitioners or physician assistants, treat routine UTI cases," Foxman said. Also, for commonly recurring cases, physicians might consider installing a nurse telephone line to conduct a careful screening and reauthorize three-day prescriptions. "These techniques would avoid making antibiotics available indiscriminately over-the-counter while helping to reduce health care costs," Rubin said.

Antibiotics without a prescription
http://www.coreynahman.com/antibiotics.html

Introduction:
We wanted to determine if it was possible to obtain antibiotics without a prescription and how people do it. In the United States, there are 4 ways to obtain antibiotics without a prescription: buy them in a pet store, drive down to Mexico, buy them in an ethnic market/convenience store or buy them on the internet.

Pet Store
Here is a loophole I learned about when I began training as a pharmacist thirty years ago. If you walk into aquarium section of any well stocked pet store and you may be surprised to learn 2 things:
(A) Fish diseases are treated with human antibiotics.
(B) You don't need a prescription to purchase antibiotics for fish.

We visited 6 pet stores in the New York City Area - 2 national chains, a regional chain and 3 independently owned pet shops. Both national chain pet stores we visited had antibiotics for sale. Most of the formulations were available as liquid gel drops or powders that are difficult for people to take. However we were able to obtain tablets of triple sulfa (a cocktail of 3 broad spectrum sulfa antibiotics) and tetracycline tablets on the websites of these chains. The regional chain pet store and all three mom and pop pet stores sold tetracycline, erythromycin and ampicillin in tablet and capsule form. On the internet, it was easy to find amoxicillin, ampicillin, tetracycline, cephalaxin, metronidazole and erythromycin for sale without a prescription by searching Google for the term "fish antibiotics". It is a bad idea for people to take veterinary medicines but chemically the drugs are the same as what you find in a human pharmacy. According to anecdotal reports the fact that one can obtain antibiotics in this manner is common knowledge among branches of the armed forces.

Internet
Importing non-prescription antibiotics over the internet into the United States is a low priority for the authorities compared to narcotics and controlled substances. When was the last time you read about someone being arrested for importing Cipro or Augmentin into the USA? Here's how it works: As long as the pharmacy is located in a country that does not require a doctor's prescription for a drug, they are happy to sell you whatever you need (other than controlled substances) without a prescription. You might be bending the law, but the authorities look the other way. We don't recommend you do this but if you do, the key is to buy from a trustworthy pharmacy. Word of mouth is the best way to choose one. Otherwise you must screen them carefully.

Bodega
Many ethnic grocery/convenience stores such as bodegas (small grocery/convenience stores found in Latino neighborhoods), sell antibiotics. Since I live in New York City, we conducted our experiment in Washington Heights, a vibrant immigrant community with a large Spanish speaking population. Our undercover investigator (a middle aged woman) went into several bodegas and explained that she had a sore throat and needed antibiotics. Two out of seven stores had antibiotics for sale. One store had "Gimalxina", a brand name for amoxicillin. She bought 20 capsules for $10.00. Another store had generic ampicillin and tetracycline for $0.60 per pill. They also had other medicines for sale (such as diuretics and birth control pills but that's another story). People who buy medicine from ethnic markets are usually
poor and originate from cultures where buying antibiotics over-the-counter is the norm. A 2002 NY Times article indicated that Chinese and Russian immigrants easily purchase antibiotics and other prescription drugs in small markets.

Mexico:
Selling prescription medicines to Americans is a huge industry in Mexico. The main shopping streets in border towns such as Tijuana and Nagales are lined with pharmacies. We took a bus from downtown San Diego across the border to Tijuana, Mexico. There, we were able to buy 14 tablets of brand-name Cipro 500 mg (ciprofloxacin) for $35.00 US. 96 capsules of Amoxicillin 500mg went for $18.95. Levaquin was harder to find but we were able to buy 15 tablets of the generic for about $25.00. South of the border you can walk into any drugstore and buy antibiotics over-the-counter. It's just like buying Tylenol or Advil. No prescriptions are needed and nobody asks any questions. So, if you live within driving distance of the Mexican border (like in San Diego, or El Paso) this is a piece of cake.

Why do people feel they need antibiotics without a prescription? Why not do what everyone else does - go to the doctor, get a prescription and take it to the drugstore?

There are many reasons people don't want to obtain antibiotics the traditional way:
Persistent Infections - such as urinary tract infections. You feel burning discomfort down there with an urgency to urinate and you know right away what you have because you get it all the time. It is a pain in the neck having to run to the doctor for an expensive examination when you know what you have and what you need.

Skin Conditions - People who suffer from acne or rosacea often take antibiotics propholactically to prevent flare-ups. They prefer to buy a large quantity of medicine for a cheap price rather than visiting dermatologist every time they need a refill.

Poverty, Lack of Insurance, Cultural Norms - many people (such as undocumented immigrants) work for small businesses. They get zero benefits. They can't afford the doctor and they can't afford American drug prices. Often, they come from cultures where prescriptions are not required for antibiotics.

Why Is Buying Prescription Drugs Without A Prescription Dangerous? If you get your antibiotics without going to a doctor and getting a prescription, you can get yourself in trouble:
Misdiagnosis
Antibiotics are not a cure-all. They are only effective against bacterial illnesses. They are not effective against viral illnesses.

Antibiotics are designed to combat specific ailments. For instance, penicillins (a family of drugs with names ending in "-cillin" such as penicillin, amoxicillin, ampicillin) are effective against streptococcal infections, syphilis, and Lyme disease but for community-acquired pneumonia, bacterial diarrhea, mycoplasmal infections or gonorrhea you would be better off using a quinolone (a family of drugs with names ending in "-oxacin such as levofloxacin (Levaquin) or Ciprofloxacin(Cipro). A doctor is an expert in knowing which antibiotic to use for specific ailments. If an untrained person uses the wrong antibiotic his condition may get worse and he may wind up in the hospital.

Side Effects
Antibiotics can cause side effects. If you take an antibiotic that you are allergic to you could develop an anaphylactic reaction, go into shock and die. Other antibiotic side effects include nausea and diarrhea, abdominal pain, liver toxicity, brain and kidney damage or even pseudomembranous colitis.

Interactions (Drug, Food, Alcohol)

Certain antibiotics should not be mixed with other drugs, foods or alcohol. Mixing cephlosporins (such as cephalexin) with alcohol could cause nausea or abdominal cramps. Drinking grapefruit juice with erythromycins or taking erythromycin with theophylline (a drug used for respiratory ailments) can cause fatal heart arrhythmias. There are many other interactions that doctors know about but you don't.

Resistance
No-prescription antibiotics are likely to be misused leading to drug resistance. Drug resistant germs are difficult to treat and have spread into the community wreaking havoc on our healthcare institutions.

Conclusion
Buying antibiotics without a doctor's prescription is easy. The drugs are inexpensive. This is a potentially dangerous practice but it is unlikely to stop because it is a low priority for law enforcement institutions.