Trends in Antibiotic Utilization in Vancouver Associated With a Community Education Program on Antibiotic Use

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ABSTRACT

Objective: “Do Bugs Need Drugs” (DBND) is a community education program that was implemented in British Columbia (BC) in September 2005 to decrease inappropriate antibiotic use. This study conducted descriptive analyses of the association between DBND and changes in overall, pediatric, drug-specific, and indication-specific antibiotic utilization rates in Vancouver, BC.

Methods: Utilization data on all oral solid and liquid antibiotics classified as “antibacterials for systemic use” were obtained from BC PharmaNet for the years 1996 to 2008. Utilization data were linked to physician billing data to allow indication-specific analyses. Following conversion to the defined daily dose (DDD), the Holt-Winters exponential smoothing method was used to project expected antibiotic use in the period after implementation based on use prior to implementation. Differences between expected and observed utilization rates were calculated.

Results: Overall antibiotic use has stabilized in recent years (16.2 DDD/1000 population/day in 2008). Fluoroquinolone use remains high (1.5 DDD/1000 population/day), as does the steadily increasing use of newer macrolides (1.1 to 2.7 DDD/1000 population/day between 1996 and 2008). Encouraging declines in overall and indication-specific prescription rates among children were observed. Following 3 years of DBND activities, antibiotic use was 5.8% lower than expected and the number of prescriptions dispensed to children was 10.6% lower than expected.

Conclusions: This ecological study reports improvements in antibiotic use that occurred simultaneously to the delivery of the DBND program in Vancouver. However, we did not find a lowering of all targeted classes. Policy directives limiting the use of certain antibiotics may be required.

Key words: Antibiotics; intervention studies; pediatrics; macrolides

La traduction du résumé se trouve à la fin de l'article.

Can J Public Health 2010;101(4):304-8.

Despite the well-established concept that inappropriate antibiotic use facilitates the emergence of resistant bacteria, the misuse and overuse of these pharmaceuticals remains a serious problem worldwide.¹ In British Columbia (BC), increasing trends in resistance correlated to the use of certain classes of antibiotics have been recorded since 1998.^{2,3} Measures such as training on appropriate antibiotic use for clinicians and antibiotic stewardship have been shown to decrease the prevalence of resistant bacteria, possibly by alleviating the selective pressure placed on bacteria.⁴⁻⁶

Since the emergence of community-associated resistant organisms, emphasis has been placed on increasing education and awareness for clinicians and the public regarding appropriate antibiotic use and antibiotic resistance issues through community-based initiatives. The “Do Bugs Need Drugs?” (DBND) program was implemented in BC in September 2005 with the objective of using education as a tool for decreasing inappropriate antibiotic use and preventing the spread of both infections and antibiotic resistant microorganisms. The aim of the community arm of DBND is to emphasize the importance of proper handwashing, explain the difference between viruses and bacteria, and alert the public to the consequences of resistant bacteria. The program also targets prescribing professionals with a focus on reducing unnecessary prescribing for upper respiratory tract infections. DBND is a multifaceted initiative designed to capitalize on what is currently known about efficient health promotion: knowledge uptake and behaviour change is maximized by using active strategies to promote clear consistent messaging to relevant audiences.⁷⁻⁹

The audience and geographic reach of each program component and its impact on knowledge and short-term behaviour is evaluated on a yearly basis (BC Centre for Disease Control, unpublished data). The current study is an extension of this evaluation and aims to investigate the relationship between DBND and population-level changes in antibiotic utilization patterns in Vancouver, where the program was deployed to its fullest.

METHODS

Intervention

The DBND program consists of several independent components, as described on the program's website (<http://www.dobugsneed-drugs.org>). Although not all components were initiated simultaneously, in January 2006 the first provincial television campaign was launched. This campaign is considered the effective beginning of the program, given that television is the most efficient method of advertising in terms of geographical and target audience reach.^{9,10} Designating January as the first post-intervention month also facil-

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Acknowledgements: We thank the Michael Smith Foundation for Health Research for funding the tracking of drug use in British Columbia and the British Columbia College of Pharmacists for providing antibiotic utilization data. We thank Mei Chong and Rachel McKay for assistance with data analysis.

Conflict of Interest: None to declare.

Table 1. Average Daily Antibiotic Utilization Rates in Vancouver by Year*

ATC Class (ATC Code)†	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Antibacterials for systemic use (J01)	20.6	19.4	18.6	18.3	17.1	17.0	16.2	16.1	15.5	16.5	16.2	16.3	16.2
Tetracyclines (J01A)	3.6	3.5	3.5	3.4	3.2	3.1	2.8	2.7	2.6	2.7	2.7	2.7	2.8
Penicillins (J01C)	7.8	7.2	6.6	6.4	5.7	5.7	5.4	5.3	4.9	5.3	5.0	5.0	5.0
Extended spectrum (J01CA)	6.3	5.7	5.3	5.2	4.6	4.6	4.3	4.2	3.9	4.2	4.0	4.0	3.9
β-lactamase sensitive (J01CE)	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
β-lactamase resistant (J01CF)	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2
Combinations, β-lactamase inhibitors (J01CR)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5
Other β-lactams (J01D)	1.9	2.0	2.0	2.0	1.8	1.8	1.7	1.7	1.7	1.9	1.9	1.9	1.8
Cephalosporins (J01DC)	1.0	1.1	1.1	1.1	0.9	0.8	0.8	0.7	0.6	0.7	0.6	0.6	0.6
Sulfonamides and trimethoprim (J01E)	2.2	2.0	1.9	1.8	1.6	1.4	1.3	1.1	1.1	1.0	1.0	1.1	1.1
Trimethoprim and derivatives (J01EA)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Short-acting sulfonamides (J01EB)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	—	—	—	—	—	—	—
Intermediate-acting sulfonamides (J01EC)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	—	—	—	—	—	<0.1	<0.1
Combination sulfonamide/trimethoprim (J01EE)	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.0
Macrolides and lincosamides (J01F)	3.5	3.0	2.9	2.9	2.9	2.9	2.9	3.0	2.9	3.4	3.2	3.3	3.3
Macrolides (J01FA)	3.4	2.9	2.7	2.8	2.7	2.7	2.7	2.8	2.7	3.1	2.9	3.0	3.0
Lincosamides (J01FF)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Quinolones (J01M)	1.1	1.1	1.1	1.2	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.5
Fluoroquinolones (J01MA)	1.1	1.1	1.1	1.2	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.5
Other quinolones (J01MB)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	—	—	—

* Rates expressed in DDD/1000 population/day

† ATC=Anatomical Therapeutic Chemical

itates the comparison between pre (January 1996 to December 2005) and post (January 2006 to December 2008) utilization trends by eliminating the effect of seasonal variation.

Data sources

Drug utilization data from January 1996 to December 2008 were obtained from the BC PharmaNet database. This database collects information on all antibiotics dispensed through community pharmacies in BC. All oral solid and liquid antibiotics under the heading of “antibacterials for systemic use” in the Anatomical Therapeutic Chemical (ATC) classification system were included in the dataset. Information on patient age and sex, geographical location of the pharmacy, antimicrobial agent prescribed, and the date, dose, and quantity dispensed was available. Under-reporting and misclassification in this type of administrative database is minimal.¹¹

Antibiotic utilization rates for adults were expressed in defined daily doses (DDD) per 1000 population per day. The DDD is the international standard unit of measurement developed by the World Health Organization and is a measure of the “average maintenance dose per day for a drug used in its main indication in adults”.¹² All data pertaining to children less than 15 years of age were expressed as prescriptions per 1000 population per day, as the DDD is not accurate for children whose antibiotic dosing is dependent on weight. Population statistics were obtained from BC Stats.¹³

The Medical Service Plan database contains information on patient age and sex, date of visit, physician reimbursement claims,¹⁴ physician specialty, and geographic location of the physician's office. The Medical Service Plan and BC PharmaNet databases were linked by a third party for the years 1996 to 2007. Specifically, antibiotic prescriptions were linked to the most recent physician visit during the 5 days preceding the date of dispensing of the prescription, as previously described.¹⁵ Any prescriptions that could not be linked to a visit were removed from the analysis. All personal identifiers were removed prior to receipt of the final dataset.

Choice of populations, drugs, and indications of interest

Overall antibiotic utilization rates represent population-level utilization patterns, and were thus of interest. Particular attention was paid to the utilization patterns of fluoroquinolones and newer

Figure 1. Average daily antibiotic utilization rates in British Columbia, Vancouver, and Richmond

Note: The vertical line indicates the implementation of the “Do Bugs Need Drugs?” program.

Source: BC PharmaNet

Figure 2. Average daily prescription rates for otitis media, acute pharyngitis, and acute bronchitis among children

Note: The vertical line indicates the implementation of the “Do Bugs Need Drugs?” program.

Source: BC PharmaNet

Table 2. Annual Difference between Expected and Observed Average Daily Overall Antibiotic Utilization Rates and Prescription Rates among Children in Vancouver

Year	Overall Antibiotic Use			Prescription Rates among Children		
	Expected	Observed	% change	Expected	Observed	% change
2006	3.8×10^6	3.6×10^6	-4.1	4.5×10^4	4.2×10^4	-6.4
2007	3.9×10^6	3.7×10^6	-5.1	4.4×10^4	4.0×10^4	-10.3
2008	4.1×10^6	3.7×10^6	-8.1	4.3×10^4	3.7×10^4	-15.3
Overall	1.2×10^7	1.1×10^7	-5.8	1.3×10^5	1.2×10^5	-10.6

Figure 3. Observed and expected average daily overall antibiotic utilization rates (A.) and prescription rates among children (B.) in Vancouver

Note: The vertical line indicates the implementation of the "Do Bugs Need Drugs?" program.

Source: BC PharmaNet

macrolides (azithromycin and clarithromycin), as these antibiotic classes are specific program targets. Changes in overall and indication-specific pediatric prescribing patterns were analyzed as several DBND initiatives are geared towards children or their parents. Pediatric prescribing patterns for acute bronchitis, otitis media, and acute pharyngitis were investigated as antibiotics are commonly prescribed for these predominantly viral upper respiratory tract infections.

Statistical analysis

The multiplicative Holt-Winters exponentially smoothing trend method, which takes into account monthly fluctuations, a relatively consistent seasonal pattern over time, and a long-term trend in the data, was used to predict daily antibiotic utilization rates on a monthly basis from January 2006 to December 2008.¹⁶ The

parameters of the model were optimized to best represent the repeating seasonal pattern and long-term trend seen from January 1996 to December 2005. The predicted rates, which correspond to what would have been expected in the absence of the DBND program, were compared to those observed for the 36 months after DBND implementation. The difference between expected and observed antibiotic use was calculated. All statistical analyses were conducted in SAS, version 9.1 for Windows.

The data used in this study are not a random sample but include all ambulatory prescriptions dispensed in BC. Consequently, we do not report statistical measures reflecting sampling variability (e.g., p-values and confidence intervals).

RESULTS

Trends in yearly antibiotic utilization rates

The use of oral systemic antibiotics steadily declined in Vancouver during the late 1990s, reaching its lowest level in 2004 (15.5 DDD/1000 population/day). Despite an increase in 2005, utilization rates have stabilized in recent years. Antibiotic utilization rates in Vancouver have been lower than the provincial average since 2003. Nevertheless, these rates remain higher than in other cities in BC, such as Richmond (Figure 1).

From 1996 to 2005, fluoroquinolone use increased by 0.5 DDD/1000 population/day. However, the use of these pharmaceuticals decreased in recent years (from 1.6 to 1.5 DDD/1000 population/day between 2006 and 2008). Fluoroquinolone utilization rates are primarily driven by the use of ciprofloxacin, which increased 50% during the past 13 years. Macrolide utilization rates continue to rise due to the increase in the use of newer macrolides (clarithromycin and azithromycin; 1.1 to 2.7 DDD/1000 population/day between 1996 and 2008). Erythromycin use has steadily declined since 1996 (2.2 to 0.3 DDD/1000 population/day between 1996 and 2008).

The use of penicillins decreased during the end of the 1990s and into the 2000s, reaching a plateau in 2004. Penicillins continue to be the most frequently used class of antibiotics. Also apparent is the decline in use of tetracyclines and sulfonamide and trimethoprim combinations. Table 1 summarizes the changes in antibiotic utilization rates in Vancouver by ATC class, between 1996 and 2008.

Trends in yearly pediatric prescription rates

Overall prescription rates for children decreased by 2.1 prescriptions/1000 population/day between 1996 and 2008. This decline was primarily driven by a drop in amoxicillin use (1.00 prescriptions/1000 population/day) and erythromycin use (0.49 prescriptions/1000 population/day). For the indications of acute bronchitis, acute pharyngitis, and otitis media, prescription rates among children decreased by 0.15, 0.13, and 0.25 prescriptions/1000 population/day, respectively, between 1996 and 2007 (Figure 2).

Amoxicillin remains the most prescribed antimicrobial for all three indications, followed by clarithromycin for acute bronchitis, penicillin V for acute pharyngitis, and azithromycin for otitis media.

Expected versus observed utilization rates

Monthly observed and expected antibiotic utilization rates among the Vancouver population and prescription rates among children, from January 2004 to December 2008, are depicted in Figures 3A and 3B, respectively. Annual difference between observed and expected rates from January 2006 to December 2008 are presented in Table 2. During the three years following program implementation, cumulative observed antibiotic use was 5.8% lower than expected (11,078,750 DDD instead of 11,760,530), whereas the observed number of cumulative prescriptions dispensed to children was 10.6% lower than expected (118,218 prescriptions instead of 132,239).

DISCUSSION

The overall consumption of antibiotics has stabilized; however, the use of specific classes of antibiotics, namely fluoroquinolones and newer macrolides, continues to rise. This trend is of concern as evidence suggests that certain agents within these classes may be more efficient at inducing bacterial resistance and multidrug resistant organisms.¹⁷⁻¹⁹ Among children, encouraging declines in overall and indication-specific prescription rates were observed. However, clarithromycin and azithromycin prescription rates have increased slightly in recent years. This trend may have important consequences with respect to antibiotic resistance among children.^{15,18,20}

Overall monthly utilization and prescription rates from January 2006 to December 2008 were below those expected based on past secular trends. These results demonstrate DBND's potential influence on antibiotic utilization patterns, especially in the long term. In fact, we observed an improvement in the rate of change of utilization rates among all antibiotic targets of the program, which is an important impact measure.²¹ That is, the rate of increase of inappropriate prescribing was not as steep following the initiation of DBND compared to before. However, rapid changes in antibiotic use, such as those associated with policy directives like formulary restrictions, were not observed.²²

Because BC PharmaNet is the only comprehensive central prescription network in North America, our study is unique in reporting population-level antibiotic trends. The complete listing of all antibiotics used in the community in Vancouver allowed the analysis of changing utilization trends to be conducted using precise measures of utilization. Furthermore, a key aspect of this study was the ability to assess changes in utilization patterns by indication through the linkage of the BC PharmaNet and Medical Service Plan databases. This linkage allowed us to address the difficult question as to whether appropriate antibiotic use is increasing, such as the use of first-line agents.

Our study has several limitations. Due to the ecological nature of this project, we are unable to separate potential causal impacts of program implementation from natural secular trends. This limitation is common among population-level interventions that lack an appropriate control group.²³ It is thus possible that the documented improvements in antibiotic use would have occurred even without DBND. Second, it is currently not mandatory for physicians to record medications provided directly to patients during an office,

clinic, or emergency visit. Medications dispensed within hospital facilities or used for treatment of sexually transmitted infections are also not recorded in BC PharmaNet, although we do not believe that these factors have significantly changed before and after the intervention. Furthermore, sexually transmitted infections were not a main target of DBND, nor have they been shown to heavily impact utilization at a population level.

A review of the recent medical literature and discussions with practicing physicians indicated that no major changes in professional practice guidelines impacting antimicrobial use occurred simultaneously to DBND implementation. There was also no change in the formulary status of any important antimicrobial agents during the implementation period of DBND, removing the listing or de-listing of drugs from insurance plans as a potential confounder of this study. However, the impact of independent initiatives aimed at similar goals as DBND may have affected antibiotic utilization rates.

In conclusion, our study reports improvements in the overall use of antibiotics in Vancouver following the implementation of DBND. While a lowering of rates of all program targets was not observed, we hypothesize that this can be achieved through consistent and repeated implementation of current initiatives and expansion of the program to include educational sessions focused on other indications for which antibiotics are commonly misused, such as urinary tract infections. Future studies are required to assess long-term impacts of the program and similar initiatives, like the stabilization of bacterial resistance rates. Finally, implementation of policy restricting the use of certain antibiotics should be considered.

REFERENCES

1. Department of Communicable Disease Surveillance and Response. WHO Global Strategy for Containment of Antimicrobial Resistance. Geneva, Switzerland: World Health Organization, 2001.
2. Rasool N, Fuertes E, Vrbova L, Patrick DM. Antimicrobial Resistance Trends in the Province of British Columbia. Vancouver, BC: BC Centre for Disease Control, 2008.
3. Patrick DM, Hutchinson J. Antibiotic use and population ecology: How you can reduce your "resistance footprint". *CMAJ* 2009;180(4):416-21.
4. Ball P, Cars O, File TM, Garau J, Klugman K, Low DE, et al. Antibiotic therapy of community respiratory tract infections: Strategies for optimal outcomes and minimized resistance emergence. *J Antimicrob Chemother* 2002;49:31-40.
5. Fishman N. Antimicrobial stewardship. *Am J Med* 2006;119(6):S53-S61.
6. Paskovaty A, Plomm JM, Myke N, Seo SK. A multidisciplinary approach to antimicrobial stewardship: Evolution into the 21st Century. *Int J Antimicrob Agents* 2005;25:1-10.
7. Arnold SR, Straus SE. Interventions to improve antibiotic prescribing practices in ambulatory care. *Cochrane Database Syst Rev* 2005;4:CD003539.
8. Ranji SR, Steinman MA, Shojania KG, Gonzales R. Interventions to reduce unnecessary antibiotic prescribing. A systematic review and quantitative analysis. *Med Care* 2008;46(8):847-62.
9. Finch RG, Metlay JP, Davey PG, Baker LJ. Educational interventions to improve antibiotic use in the community: Report from the International Forum on Antibiotic Resistance (IFAR) Colloquium, 2002. *Lancet Infect Dis* 2002;4:44-53.
10. Goossens H, Guillemot D, Ferech M, Schlemmer B, Costers M, van Breda M, et al. National campaigns to improve antibiotic use. *Eur J Clin Pharmacol* 2006;62:373-79.
11. Levy AR, O'Brien BJ, Sellors C, Grootendorst P, Willison D. Coding accuracy of administrative drug claims in the Ontario Drug Benefit Database. *Can J Clin Pharmacol* 2003;10:67-71.
12. WHO Collaborating Centre for Drug Statistics Methodology, Oslo. ATC/DDD Index, 2009. Available at: <http://www.whocc.no/atcddd/indexdatabase/> (Accessed January 10, 2009).
13. British Columbia Stats. Population Demographics, 2009. Available at: <http://www.bcstats.gov.bc.ca/data/pop/popstart.asp> (Accessed December 10, 2008).
14. International Classification of Diseases, 9th Revision, Clinical Modification. American Medical Association, 1997.

15. Marra F, Patrick DM, Chong M, Bowie WR. Antibiotic use among children in British Columbia, Canada. *J Antimicrob Chemother* 2006;58:830-39.
16. Kalekar PS. Time Series Forecasting Using Holt-Winters Exponential Smoothing. Kanwal Rekhi School of Information Technology, 2004.
17. Marcusson LL, Frimodt-Moller N, Hughes D. Interplay in the selection of fluoroquinolone resistance and bacterial fitness. *PloS Pathog* 2009;5:e1000541.
18. Kastner U, Guggenbichler JP. Influence of macrolide antibiotics on promotion of resistance in the oral flora of children. *Infect Control Hosp Epidemiol* 2001;29(5):251-56.
19. Karlowsky JA, Hoban DJ, DeCorby MR, Laing NM, Zhanel GG. Fluoroquinolone-resistant urinary isolates of *Escherichia coli* from outpatients are frequently multidrug resistant: Results from the North American Urinary Tract Infection Collaborative Alliance-Quinolone Resistance Study. *Antimicrob Agents Chemother* 2006;50(6):2251-54.
20. Kozyskyj AL, Carrie AG, Mazowita GB, Lix LM, Klassen TP. Decrease in antibiotic use among children in the 1990s: Not all antibiotics, not all children. *CMAJ* 2004;171(2):133-36.
21. MacDougall C, Polk RE. Antimicrobial stewardship programs in health care systems. *Clin Microbiol Rev* 2005;18:638-56.
22. Marra F, Patrick DM, White R, Ng H, Bowie WR, Hutchinson JM. Effect of formulary policy decisions on antimicrobial drug utilization in British Columbia. *J Antimicrob Chemother* 2005;55(1):95-101.
23. Nebot M. Health promotion evaluation and the principle of prevention. *J Epidemiol Community Health* 2006;60:5-6.

Received: November 25, 2009
Accepted: March 8, 2010

RÉSUMÉ

Objectif : Le programme d'éducation communautaire « Do Bugs Need Drugs » (DBND) mis en œuvre en Colombie-Britannique (C.-B.) en septembre 2005 vise à réduire l'utilisation inappropriée des antibiotiques. Nous avons mené des analyses descriptives de l'association entre ce programme et les changements dans les taux d'utilisation des antibiotiques (taux globaux, pédiatriques, par médicament et par indication thérapeutique) à Vancouver, en C.-B.

Méthode : Nous avons obtenu auprès du réseau pharmaceutique de la C.-B., BC PharmaNet, des données sur tous les antibiotiques oraux sous forme solide et liquide classifiés comme « antibactériens pour un usage systémique » entre 1996 et 2008. Les données d'utilisation ont été maillées aux données de facturation des médecins pour permettre une analyse par indication thérapeutique. Après conversion des données en doses quotidiennes définies (DQD), nous avons employé la méthode de lissage exponentiel Holt-Winters pour projeter l'utilisation escomptée des antibiotiques durant la période post-mise en œuvre d'après leur utilisation antérieure à la mise en œuvre. Nous avons calculé l'écart entre les taux d'utilisation escomptés et observés.

Résultats : L'utilisation globale des antibiotiques s'est stabilisée ces dernières années (16,2 DQD/1000 hab./jour en 2008). L'utilisation de fluoroquinolone demeure élevée (1,5 DQD/1000 hab./jour), et l'utilisation des nouveaux macrolides s'accroît de façon soutenue (1,1 à 2,7 DQD/1000 hab./jour entre 1996 et 2008). Nous avons observé des baisses encourageantes dans les taux de prescription globaux et par indication pour les enfants. Après trois années d'activité du programme DBND, l'utilisation des antibiotiques était 5,8 % plus faible que prévu et le nombre d'ordonnances délivrées aux enfants était 10,6 % plus faible que prévu.

Conclusion : Cette étude écologique fait état d'améliorations dans l'utilisation des antibiotiques simultanément avec la prestation du programme DBND à Vancouver. Nous n'avons toutefois pas constaté une baisse dans toutes les catégories ciblées. Des directives limitant l'utilisation de certains antibiotiques pourraient être nécessaires.

Mots clés : antibiotiques; études interventionnelles; pédiatrie; macrolides

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International Travel and Health 2010

Situation as of January 1st, 2010 [32.50]

This book explains how travellers can stay healthy and provides WHO guidance on vaccinations, malaria chemoprophylaxis and treatment, personal protection against insects and other disease vectors, and safety in different environmental settings. It covers all the principal risks to travellers' health, both during their journeys and at their destinations. It describes all relevant infectious diseases, including their causative agents, modes of transmission, clinical features and geographical distribution, and provides details of prophylactic and preventive measures.

Features of this new edition include:

- vaccine-preventable disease descriptions combined with vaccine recommendations
- new information for travellers with HIV/AIDS
- updated vaccine recommendations and schedules
- updated country list with malaria and yellow fever information
- new and updated maps showing disease distribution
- expanded information relating to mass gatherings.

Voyages internationaux et santé 2010

Situation au 1^{er} janvier 2010 [32,50 \$]

Cet ouvrage explique comment rester en bonne santé lors d'un voyage et indique les recommandations de l'OMS concernant les vaccinations, la chimioprophylaxie et le traitement antipaludiques, les moyens de protection individuelle contre les insectes et autres vecteurs de maladies et la sécurité dans divers environnements. Tous les principaux risques sanitaires auxquels les voyageurs sont exposés pendant le voyage et à destination sont passés en revue. Toutes les maladies infectieuses entrant en ligne de compte sont décrites, de même que leurs agents étiologiques, leur mode de transmission, leurs caractéristiques cliniques, leur répartition géographique et les mesures prophylactiques et préventives.

Les points saillants de cette nouvelle édition sont les suivants :

- description des maladies évitables par la vaccination doublée de recommandations concernant la vaccination ;
- nouvelles informations à l'intention des voyageurs VIH-positifs ;
- actualisation des recommandations concernant la vaccination et des calendriers vaccinaux ;
- liste actualisée des pays avec informations sur le paludisme et la fièvre jaune ;
- cartes inédites ou actualisées montrant la répartition des maladies ;
- supplément d'information sur les rassemblements de masse.