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Adequacy of anti-tuberculosis drug prescriptions in Viet Nam

N. B. Hoa,[1] J. M. Lauritsen,[2,3] H. L. Rieder[4,5]

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Setting: National Tuberculosis Program, Viet Nam, 2008.
Objectives: To determine drug prescription adherence to national guidelines, to examine factors associated with an erroneous dosage of rifampin (RMP) and to evaluate the impact of an insufficient RMP dosage on treatment outcome.
Methods: A representative sample of 30 treatment units was randomly selected. All patient treatment cards enrolled in these units were obtained, and data were double-entered and validated before calculating the adequacy of the individual drug prescriptions.
Results: Of 3412 tuberculosis treatment cards, 3225 (94.5%) had information on treatment regimen and the patient's weight. Treatment was successful in 89.4%. Prescriptions of tablets/vials conforming to recommendations were found for respectively 91.2%, 89.9%, 92.3% and 94.6% of the patients for RMP/isoniazid, pyrazinamide, ethambutol and streptomycin. Patients in the 25–39 kg weight bracket received insufficient dosages. This was almost entirely attributable to patients at the end of the weight bracket. Nevertheless, no significant association was found between treatment failure and death, body weight and insufficient RMP dosage.
Conclusions: Adherence to national recommendations was high. RMP was given in insufficient dosage for patients at the end of a weight range bracket, but the underdosage was small and did not measurably affect treatment outcome.

Viet Nam ranks twelfth among the 22 high tuberculosis (TB) burden countries.[1] To ensure correct treatment and adequate supplies of essential materials, quarterly reports on case finding and treatment outcome are provided. An individual patient treatment card contains primary information about the patient, including the patient's body weight and drug prescription, which is transferred to a TB case register.[2] The TB treatment card in the Viet Nam National Tuberculosis Program (NTP) adheres to the guidelines of the International Union Against Tuberculosis and Lung Disease (The Union),[2] adapted for local use.[3]

A study conducted simultaneously in Kenya, Nepal and Senegal has shown that prescribed drug dosages were frequently not compatible with national and international recommendations.[4] Similarly, our study of a representative sample of TB management units in Viet Nam aimed to 1) determine the proportion of patients with an anti-tuberculosis drug prescription commensurate with national recommendations, 2) identify factors associated with erroneous prescriptions of the key drug rifampin (RMP), and 3) ascertain whether an error in RMP prescription influenced treatment outcome.

METHODS

Sampling

To obtain as unbiased a sample as possible, each treatment unit in the country that kept the relevant treatment records, i.e., the TB treatment card and the case register, was defined as a cluster. An independent international collaborator randomly selected 30 of the total 668 clusters in Viet Nam. From these units, the numbers of patients recorded in the TB registers in the period from 1 January to 31 December 2008 were counted. The treatment cards of all patients registered in this period in the selected clusters were copied and collected for centralized data entry.

Data entry and validation

The electronic data collection instrument was prepared using EpiData Entry (Version 3.1, freely available at http://www.epidata.dk, EpiData Association, Odense, Denmark). All treatment card information, except for the name and address of the patients, was captured by double entry, the two putatively identical files compared and any discordances identified resolved by verification against the original paper record.

Regimen, drug formulations, and calculation of dosages

In 2008, all patients received a daily intensive phase consisting of isoniazid (H, INH), RMP (R), pyrazinamide (Z, PZA) plus either ethambutol (E, EMB) or streptomycin (S, SM) or both. All drugs were to be given according to three internationally recommended weight brackets, i.e., 25–39, 40–55, and >55 kg, according to which two, three or four tablets of a drug or drug combination were given.

At the time of study, the Viet Nam NTP transitionally used two types of fixed-dose combinations (FDCs), one containing two drugs (150 mg RMP + 100 mg INH per tablet), and the other containing three drugs (150 mg RMP + 75 mg INH + 400 mg PZA per tablet). The two-drug FDC has an unbalanced RMP-to-INH ratio, while the three-drug FDC is formulated to a precise fit of all three drugs.

The treatment card in use during the study year provided fields to enter the number of tablets of RMP+ INH, PZA and EMB, and grams of SM. This card was used irrespective of whether the patient received the two- or three-drug FDC. In the case of the latter, the number of tablets for a patient receiving three tablets, for example, was to be recorded as 3 in the field for RH

AFFILIATIONS
1 National Tuberculosis Program, Hanoi, Viet Nam
2 Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark
3 EpiData Association, Odense, Denmark
4 International Union Against Tuberculosis and Lung Disease, Paris, France
5 Institute of Social and Preventive Medicine, University of Zurich, Zurich, Switzerland

CORRESPONDENCE
Nguyen Binh Hoa
Viet Nam National Tuberculosis Program
463 Hoang Hoa Tham Badinh
Hanoi, Viet Nam
Tel: (+84) 912 008 604
Fax: (+84) 438 326 162
e-mail: nguyenbinhhoatb@yahoo.com

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and 3 in the field for Z. The entries therefore did not help us to determine whether the patient received a two- or a three-drug FDC. Furthermore, patients receiving the two-drug FDC received PZA separately in tablets of 500 mg, while those who were prescribed three-drug FDCs received 400 mg PZA. As a result, the actual dosages of INH and PZA could not be determined correctly.

The treatment card allows the drug dosage to be calculated per kg body weight if 1) the patient's body weight, 2) the number of prescribed tablets, and 3) the drug content of a tablet are all known. The third condition was only met for RMP, EMB and SM.

As a measure of adherence to NTP recommendations, we thus evaluated the proportion of patients with the correct number of prescribed tablets according to their weight brackets. This could be determined for all patients with their initial body weight recorded. For the key drug, RMP, we extended the analysis to a calculation of the adequacy of the dosage per kg of body weight by various patient characteristics to determine more precisely the extent to which the actual prescriptions were compatible with internationally recommended dosage ranges (8–12 mg/kg body weight), factors associated with deviations, and the influence of deviations on treatment outcome.

Data analysis

EpiData Analysis (Version 2.2, EpiData Association) was used for all analyses. We determined 1) the compatibility of all drug prescriptions with NTP recommendations, 2) the compatibility of RMP dosage with international recommendations by various patient characteristics, and 3) the influence of insufficient dosage on treatment outcome, adjusted for the factor identified in univariate analysis to be a predictor for an excessively low dosage.

In the first step, we determined the proportion of patients receiving a number of tablets (or mg in the case of SM) of each drug commensurate with NTP recommendations according to the patient's body weight bracket. Second, for RMP only, we determined the number of prescribed mg/kg body weight and the proportions of patients receiving the correct dose (8–12 mg/kg), or insufficient or excessive dosage. We used univariate analysis to determine the relevant proportions for body weight group, age group, sex, disease type and treatment outcome. Finally, we used a stratified analysis to evaluate the effect of an insufficient RMP dosage on treatment outcome and adjusted for the most prominent factor found in univariate analysis.

Hypothesis testing was performed using the χ^2 test for the difference in proportions. For categorical variables, proportions with 95% confidence intervals (CIs) were determined. For the stratified analysis, we used the Mantel-Haenszel technique to determine crude, stratified and adjusted odds ratios (ORs).

Definitions of TB patient categories and treatment outcomes followed international recommendations.[5] Patients were classified as new pulmonary smear-positive, retreatment smear-positive, new pulmonary smear-negative, and extra-pulmonary. Non-reportable categories, such as 'transferred in', 'others', and 'missing information on outcome', were assigned a single summary category 'all other'. Treatment outcome was classified into the six mutually exclusive categories: successful (treatment cured/completed), death, failure, default, transferred out, and missing information.

Ethics approval

Due to the retrospective, record-based nature of the study and patient anonymity, only administrative approval was required; this was obtained from the director of the Viet Nam NTP. Ethics approval for the study was obtained from The Union Ethics Advisory Group.

RESULTS

A total of 3412 TB treatment cards were collected from 30 randomly selected treatment units. Of these, 3383 (99.2%) gave the patient's weight and 3272 (95.9%) mentioned the treatment regimen. A total of 3225 (94.5%) TB treatment cards contained information on both weight and regimen and were thus available for analysis.

Patient characteristics

Of the 3225 patients, 2067 (64.1%) were male, 973 (30.2%) female, and 185 (5.7%) had no information on sex; 2578 (79.9%) had pulmonary TB, 615 (19.1%) extra-pulmonary TB, and 32 (1.0%) had no information on disease site (Table 1). The mean body weight was 47.9 kg (95%CI 47.6–48.2) for male and 42.4 kg (95%CI 41.9–42.9) for female patients.

Proportions of patients with the correct number of anti-tuberculosis drug tablets

The proportion of patients with correct, insufficient and excessive numbers of anti-tuberculosis drugs, according to the NTP guidelines, are summarized in Table 2. The proportions with a correct prescription of tablets/vials were respectively 91.2%, 89.9%, 92.3%,

TABLE 1 Characteristics of tuberculosis patients as recorded in the tuberculosis treatment card, by sex and age, National Tuberculosis Program, Viet Nam, 2008

Characteristic	New pulmonary smear-positive *n* (%)	Retreatment smear-positive *n* (%)	Extra-pulmonary *n* (%)	New pulmonary smear-negative *n* (%)	All other/ transfer in *n* (%)	Total *n* (%)
Total	1687	274	615	470	179	3225
Sex						
Male	1146 (67.9)	204 (74.5)	300 (48.8)	304 (64.7)	113 (63.1)	2067 (64.1)
Female	456 (27.0)	56 (20.4)	273 (44.4)	138 (29.4)	50 (27.9)	973 (30.2)
Not recorded	85 (5.0)	14 (5.1)	42 (6.8)	28 (6.0)	16 (8.9)	185 (5.7)
Age group, years						
0–14	2 (0.1)	0	20 (3.3)	1 (0.2)	1 (0.6)	24 (0.7)
15–24	174 (10.3)	9 (3.3)	98 (15.9)	55 (11.7)	14 (7.8)	350 (10.9)
25–34	304 (18.0)	36 (13.1)	167 (27.2)	88 (18.7)	20 (11.2)	615 (19.1)
35–44	322 (19.1)	53 (19.3)	98 (15.9)	62 (13.2)	20 (11.2)	555 (17.2)
45–54	353 (20.9)	79 (28.8)	105 (17.1)	88 (18.7)	45 (25.1)	670 (20.8)
55–64	198 (11.7)	37 (13.5)	44 (7.2)	64 (13.6)	29 (16.2)	372 (11.5)
⩾65	331 (19.6)	60 (21.9)	79 (12.8)	112 (23.8)	47 (26.3)	629 (19.5)
Not registered	3 (0.2)	0	4 (0.7)	0	3 (1.7)	10 (0.3)

TABLE 2 Proportion of patients with correct, insufficient, and excessive dosages of anti-tuberculosis drugs prescribed according to Viet Nam National Tuberculosis Program guidelines, Viet Nam 2008

	Rifampicin+isoniazid % (95%CI)	Pyrazinamide % (95%CI)	Ethambutol % (95%CI)	Streptomycin % (95%CI)
All cases				
Correct	91.2 (90.2–92.1)	89.9 (88.8–90.9)	92.3 (90.2–94.0)	94.6 (93.7–95.4)
Insufficient	6.4 (5.6–7.3)	8.0 (7.1–9.0)	2.8 (1.9–4.3)	2.3 (1.8–2.9)
Excessive	2.3 (1.9–2.9)	2.1 (1.7–2.7)	4.8 (3.5–6.6)	3.1 (2.5–3.8)
Correct number of tablets by sex				
Male	90.8 (89.5–92.0)	89.5 (88.1–90.7)	92.7 (90.1–94.6)	94.0 (92.8–95.0)
Female	92.7 (90.9–94.2)	91.7 (89.8–93.3)	93.6 (89.4–96.2)	96.2 (94.7–97.3)
Correct number of tablets by type of TB				
New	91.0 (89.9–92.0)	89.7 (88.5–90.8)	91.2 (88.1–93.6)	94.6 (93.6–95.4)
Previous treated	92.3 (88.6–94.9)	90.1 (86.0–93.1)	92.5 (88.7–95.1)	95.3 (92.0–97.3)
Correct number of tablets by body weight group, kg				
25–39	88.1 (85.2–90.4)	85.8 (82.8–88.4)	86.6 (80.4–91.1)	94.2 (91.8–95.9)
40–55	92.5 (91.4–93.5)	91.4 (90.2–92.5)	94.0 (91.6–95.8)	95.4 (94.4–96.3)
>55	87.9 (84.1–90.9)	86.5 (82.5–89.7)	92.9 (85.4–96.7)	89.9 (85.9–92.8)

CI = confidence interval.

and 94.6% for RMP+INH, PZA, EMB, and SM. For RMP+INH, PZA and EMB, there were significant differences by body weight: patients weighing 40–55 kg more frequently received the correct number of tablets than those weighing 25–40 kg. There were no significant differences by sex or type of TB.

Rifampicin dosage in milligrams per kilogram body weight

Of the 3211 patients for whom the adequacy of RMP dosage could be ascertained, 87.4% received a dosage within the internationally recommended range (Table 3). An excessive dosage was rare (0.7%), but close to 12% received an insufficient dosage. There

TABLE 3 Proportion of patients with correct, insufficient, excessive dosages of rifampin in Viet Nam, 2008

	Correct (8–12 mg/kg)		Too low (<8 mg/kg)		Too high (>12 mg/kg)		Total
Patient characteristic	*n* (row %)	95%CI	*n* (row %)	95%CI	*n* (row %)	95%CI	*n* (%)
All cases	2806 (87.4)	86.2–88.5	381 (11.9)	10.8–13.0	24 (0.7)	0.5–1.1	3211 (100.0)
Body weight group, kg							
<25	4 (30.8)	12.7–57.6	4 (30.8)	12.7–57.6	5 (38.5)	17.7–64.5	13 (0.4)
25–39	361 (61.9)	57.9–65.8	206 (35.3)	31.6–39.3	16 (2.7)	1.7–4.4	583 (18.2)
40–55	2138 (94.3)	93.2–95.2	127 (5.6)	4.7–6.6	3 (0.1)	0.0–0.4	2268 (70.6)
>55	303 (87.3)	83.4–90.4	44 (12.7)	9.6–16.6	0	—	347 (10.8)
Age group, years							
0–14	14 (60.9)	40.8–77.8	5 (21.7)	9.7–41.9	4 (17.4)	7.0–37.1	23 (0.7)
15–24	321 (92.0)	88.6–94.4	28 (8.0)	5.6–11.4	0	—	349 (10.9)
25–34	542 (88.7)	86.0–91.0	68 (11.1)	8.9–13.9	1 (0.2)	0.0–0.9	611 (19.0)
35–44	494 (89.5)	86.7–91.8	54 (9.8)	7.6–12.5	4 (0.7)	0.3–1.8	552 (17.2)
45–54	593 (88.9)	86.3–91.1	69 (10.3)	8.3–12.9	5 (0.7)	0.3–1.7	667 (20.8)
55–64	308 (83.2)	79.1–86.7	57 (15.4)	12.1–19.4	5 (1.4)	0.6–3.1	370 (11.5)
⩾65	524 (83.3)	80.2–86.0	100 (15.9)	13.2–19.0	5 (0.8)	0.3–1.8	629 (19.6)
Not registered	10 (100.0)	72.2–100.0	0	—	0	—	10 (0.3)
Sex							
Female	841 (86.6)	84.3–88.6	119 (12.3)	10.3–14.5	11 (1.1)	0.6–2.0	971 (30.2)
Male	1810 (88.0)	86.6–89.4	235 (11.4)	10.1–12.9	11 (0.5)	0.3–1.0	2056 (64.0)
Not registered	155 (84.2)	78.3–88.8	27 (14.7)	10.3–20.5	2 (1.1)	0.3–3.9	184 (5.7)
Disease type							
Smear-positive pulmonary, new	1468 (87.4)	85.7–88.9	205 (12.2)	10.7–13.9	7 (0.4)	0.2–0.9	1680 (52.3)
Smear-positive, retreatment	236 (86.4)	81.9–90.0	36 (13.2)	9.7–17.7	1 (0.4)	0.1–2.0	273 (8.5)
Extra-pulmonary	529 (86.6)	83.6–89.1	74 (12.1)	9.8–14.9	8 (1.3)	0.7–2.6	611 (19.0)
Smear-negative pulmonary, new	411 (87.6)	84.3–90.3	53 (11.3)	8.7–14.5	5 (1.1)	0.5–2.5	469 (14.6)
All other	162 (91.0)	85.9–94.4	13 (7.3)	4.3–12.1	3 (1.7)	0.6–4.8	178 (5.5)
Treatment outcome							
Cured/completed	2516 (87.6)	86.4–88.8	336 (11.7)	10.6–12.9	19 (0.7)	0.4–1.0	2871 (89.4)
Died	95 (81.2)	73.2–87.2	18 (15.4)	10.0–23.0	4 (3.4)	1.3–8.5	117 (3.6)
Failed	37 (92.5)	80.1–97.4	3 (7.5)	2.6–19.9	0	—	40 (1.2)
Defaulted	24 (85.7)	68.5–94.3	4 (14.3)	5.7–31.5	0	—	28 (0.9)
Transferred	54 (96.4)	87.9–99.0	2 (3.6)	1.0–12.1	0	—	56 (1.7)
Not registered	80 (80.8)	72.0–87.4	18 (18.2)	11.8–26.9	1 (1.0)	0.2–5.5	99 (3.1)

CI = confidence interval.

were significant differences by body weight: of the 70.6% of patients in the 40–55 kg weight bracket, 94.3% received the correct dose. Importantly, only 61.9% of the 583 patients in the 25–39 kg weight bracket received the correct dose, and 35.3% received an insufficient dosage. Notably, 195 of these 583 patients weighed 38–39 kg, the end range of the weight bracket (receiving 7.89 and 7.69 mg/kg, respectively). Excluding these patients, the proportion with an insufficient dosage fell to 6.7% and the proportion with the correct dose increased to 89.2%. Apart from the small number of children, age had no significant influence on appropriateness of prescription. Neither patient sex nor type of disease influenced RMP dose significantly. For all patients taken together, treatment was successful in 89.4%, 3.6% died and 1.2% failed treatment.

Rifampicin dosage and treatment outcome

Body weight was significantly associated with errors in RMP prescription. Most notably, a large number and proportion of patients in the 25–39 kg weight bracket received an insufficient dosage. We therefore evaluated the influence of RMP dosage and body weight on adverse treatment outcomes. As a major concern is an insufficient dosage that may result in treatment failure or death, we contrasted successful treatment outcome (cure and completion) with failure and death combined, and excluded all other outcomes. To prevent excessively small cell counts, we also excluded the few patients with body weight < 25 kg. A total of 2985 patients thus remained for this sub-analysis (Table 4).

The crude OR of death or treatment failure compared to treatment success by an insufficient vs. correct rifampicin dosage was 1.14. The OR varied a great deal between different weight strata, but the 95%CIs did not differ from unity. The adjusted OR was considerably lower (0.75) than the crude OR, but the difference was not statistically significant. While body weight was thus associated with an insufficient dosage of RMP, it did not influence treatment outcome.

DISCUSSION

We evaluated the adequacy of prescriptions of anti-tuberculosis drugs in a nationally representative sample of treatment records, a concern that has been addressed in several other settings.[4,6,7]

TABLE 4 Association of RMP dosage and treatment outcome, adjusted for body weight, Viet Nam, 2008

Weight and RMP dosage	Death or failure	Cured or completed	Total	OR	95%CI
All weight groups	152	2846	2998		
RMP too low	20	333	353	1.14	0.70–1.86
RMP correct	132	2513	2645		
Crude OR				1.14	0.70–1.86
Adjusted OR*				0.75	0.44–1.26
Stratified by weight					
25–39 kg					
RMP too low	16	181	197	0.82	0.44–1.53
RMP correct	33	305	338		
40–55 kg					
RMP too low	2	114	116	0.37	0.09–1.53
RMP correct	91	1932	2023		
>55 kg					
RMP too low	2	38	40	1.82	0.37–8.87
RMP correct	8	276	284		

*OR adjusted for body weight groups using the Mantel-Haenszel technique.
RMP = rifampin; OR = odds ratio; CI = confidence interval.

Recommendations by the World Health Organization (WHO) about the acceptable dosage range for each drug, and agreements with the industry in the formulation of tablet content, allow NTPs to prescribe a given number of tablets according to a small number of weight brackets. If the tablet content and the formulations are uniform and kept to the necessary minimum across a country, errors can be further minimized. Uniformity also allows verification of the appropriateness of prescription practices through back-calculation.

The results of our study indicate good adherence to NTP recommendations. The analysis of RMP dosage specifically showed, however, that RMP was prescribed in an insufficient dosage for more than one third of patients with a body weight of <40 kg. The internationally recommended weight bracket for two tablets (300 mg RMP) goes up to 39 kg, which is insufficient. If the bracket ends at 37 kg, then only 7% instead of the observed 35% would have received too low a dose. This example shows that adherence to NTP recommendations can be excellent, but if international recommendations for weight brackets are in conflict with the acceptable range, even strict adherence to national recommendations will result in errors. However, given the wide therapeutic range of RMP, the relatively small underdosage is unlikely be of clinical importance. We found no association between insufficient dosage and adverse treatment outcome. A change in the weight brackets is not an easy matter, as it also affects PZA. Lowering the bracket for the next higher number of tablets would result in an overdosage of PZA if the content of 400 mg per tablet were maintained.

In summary, the results of our study indicate that medical officers generally adhere to national recommendations and that the large majority of patients receive adequate dosages. Most importantly, insufficient dosages of the key drug RMP were infrequent, except for the errors resulting from correct prescription for patients at the end range of the lower weight bracket, which cannot easily be corrected. Treatment success was high in our study (close to 90%), exceeding the WHO target, and higher than those reported from many other settings.[8–12]

The study shows the key importance of the selection of uniform, properly formulated drugs and drug combinations, and the difficulty in defining appropriate weight brackets that are compatible with drug formulations. The currently recommended three-drug FDC is a reasonably good compromise and reduces both inherent prescription errors from inappropriate formulations and potential confusion resulting from the availability of different formulations. That errors also occurred where the drug formulation was not at fault emphasizes the need for continued evaluation of drug prescription practices, and corrective action if deviations from agreed standards are identified. At the end of 2009, the Viet Nam NTP changed to the four WHO-recommended weight brackets for adult FDC tablets (25–39, 40–55, 56–70, >70 kg), and revised the treatment card accordingly.[13] An ideally correct solution to balance the underdosing of INH and RMP with overdosing of PZA for patients weighing 38–39 kg has not been found with the current drug formulation.

This study has several limitations. First, our information was derived from the TB treatment card and we were thus unable to properly assess the occurrence of adverse drug events among patients in relation to prescription practices. Another important limitation of our study lies with the information that is provided on the treatment card. For example, the treatment card provides no information on relevant comorbidities, such as renal insufficiency or chronic liver disease, which may affect dosage prescription.

CONCLUSION

We found that adherence to national recommendations for anti-tuberculosis drug prescriptions was satisfactory and that it varied little by drug. The apparent problem of imbalanced combination tablets has meanwhile been remedied. It is encouraging to note that the most pressing concern of an insufficient dosage of RMP is a relatively minor issue in the Viet Nam NTP. Nevertheless, the changes in drug formulations that have since taken place and turnover in staff underline the need for continued attention to be paid to prescription practices.

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Contexte : Programme National de Tuberculose, Viet Nam 2008.
Objectifs : Déterminer dans quelle mesure les prescriptions médicamenteuses adhèrent aux directives nationales, examiner les facteurs associés avec un dosage erroné de rifampicine (RMP) et évaluer l'impact d'un dosage insuffisant de RMP sur les résultats finaux du traitement.
Méthodes : On a sélectionné au hasard un échantillon représentatif de 30 unités de traitement. Toutes les cartes de traitement des patients recrutés dans ces unités ont été recueillies, leurs données entrées en double et validées avant le calcul de l'adéquation des prescriptions individuelles des médicaments.
Résultats : Sur 3412 cartes de traitement de tuberculose, les informations sur le régime de traitement et le poids du patient étaient présentes dans 3225 (94,5%). Le traitement a été couronné de succès dans 89,4% des cas. On a observé des prescriptions de comprimés ou de vials conformes aux recommandations dans 91,2%, 89,9%, 92,3% et 94,6% des cartes respectivement pour la RMP/isoniazide, le pyrazinamide, l'éthambutol et la streptomycine. Les patients dans la classe de poids de 25 à 39 kg ont reçu un dosage insuffisant. Ceci est presque entièrement attribuable aux patients situés à l'extrémité de cette marge de poids. Néanmoins, on n'a observé aucune association significative entre l'échec et le décès, le poids corporel et un dosage insuffisant de RMP.
Conclusions : L'adhésion aux recommandations nationales est marquée. La RMP a été administrée à un dosage insuffisant pour les patients situés à la fin d'une zone de poids, mais ce sous-dosage était peu marqué et n'a pas affecté de manière mesurable les résultats finaux du traitement.

Marco de referencia: El Programa Nacional contra la Tuberculosis de Viet Nam, en el 2008.
Objetivos: Determinar la conformidad de las recetas de medicamentos antituberculosos con las recomendaciones nacionales, a fin de examinar los factores que se asocian con una dosificación errónea de rifampicina (RMP) y evaluar la repercusión de una dosis demasiado baja de este medicamento en el desenlace terapéutico.
Métodos: Se escogió de manera aleatoria una muestra representativa conformada por 30 unidades de tratamiento. Se obtuvieron las tarjetas de tratamiento de todos los pacientes inscritos en estas unidades y se introdujeron en duplicado los datos y se validaron antes de calcular la adecuación de las recetas individuales.
Resultados: De las 3412 tarjetas de tratamiento antituberculoso que se examinaron, 3225 (94,5%) contenían información sobre la pauta terapéutica y el peso del paciente. El tratamiento fue exitoso en 89,4% de los casos. Se observó una concordancia de las recetas con las recomendaciones nacionales en materia de comprimidos o ampollas en 91,2% para RMP e isoniazida, 89,9% para pirazinamida, 92,3% para etambutol y en 94,6% para estreptomicina. Los pacientes con un peso corporal entre 25 y 39 kilos recibieron una dosificación demasiado baja, lo cual correspondió casi exclusivamente de los pacientes en el extremo de este intervalo ponderal. Sin embargo, no se encontró una asociación estadísticamente significativa entre el fracaso, la mortalidad, el peso corporal y una dosis demasiado baja de RMP.
Conclusiones: La conformidad de las recetas de medicamentos antituberculosos con las recomendaciones nacionales fue alta. La RMP se administró en dosis demasiado bajas a los pacientes que se encontraban en el extremo de un intervalo ponderal, pero esta infradosificación no fue excesiva y no ocasionó ninguna repercusión detectable en los desenlaces terapéuticos.

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Contact: pha@theunion.org
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