In the version of this article initially published, the optimality proof of the constrained algorithm for drug choice (‘Constrained (cost-adjusted) algorithm for drug choice’, Methods) was valid only for $N_{Resistances} = 2$. To prove for any $N_{Resistances} \geq 2$, similarly, we first assume that there exists an alternative solution K_{alt}^{m} that has the same distribution of drug usage but with a lower overall probability of mismatched treatment. The solutions K_{alt}^{m} and K_{rec}^{m} have the same overall number of uses of each drug $\left\{K_{alt}^{1},\cdots,K_{alt}^{N_{samples}}\right\} = \left\{K_{rec}^{1},\cdots,K_{rec}^{N_{samples}}\right\}$, and therefore $\sum_{m=1}^{N_{samples}} C_{K_{alt}^{m}}^{target} = \sum_{m=1}^{N_{samples}} C_{K_{rec}^{m}}^{target}$. In addition, for any sample m, by definition $Q_{K_{rec}^{m}}^{m} = min_{k}\left(Q_{k}^{m}\right)$, and so $Q_{K_{alt}^{m}}^{m} \geq Q_{K_{rec}^{m}}^{m}$. Finally, as $P_{k}^{m} = Q_{k}^{m} - C_{k}^{target}$ for any sample m and any antibiotic k, we get that the overall probability of mismatched treatment of K_{alt}^{m} is equal or higher than the overall probability of mismatched treatment of K_{rec}^{m}:

$$\sum_{m=1}^{N_{samples}} P_{K_{alt}^{m}}^{m} = \sum_{m=1}^{N_{samples}} \left(Q_{K_{alt}^{m}}^{m} - C_{K_{alt}^{m}}^{target}\right) = \sum_{m=1}^{N_{samples}} Q_{K_{alt}^{m}}^{m} - \sum_{m=1}^{N_{samples}} C_{K_{alt}^{m}}^{target} \geq$$

$$\sum_{m=1}^{N_{samples}} Q_{K_{rec}^{m}}^{m} - \sum_{m=1}^{N_{samples}} C_{K_{rec}^{m}}^{target} = \sum_{m=1}^{N_{samples}} \left(Q_{K_{rec}^{m}}^{m} - C_{K_{rec}^{m}}^{target}\right) = \sum_{m=1}^{N_{samples}} P_{K_{rec}^{m}}^{m}$$

Thus, K_{rec}^{m} is optimal.