Advance Journal of Food Science and Technology 10(11): 821-825, 2016
DOI: 10.19026/ajfst.10.2268
ISSN: 2042-4868; e-ISSN: 2042-4876
© 2016 Maxwell Scientific Publication Corp.
Submitted: May 7, 2015 Accepted: July 26, 2015 Published: April 15, 2016

Research Article

Allocation Concealment Methods of Alternative Vaccines in Double-blinded Vaccine Plants and Foods Trials

[1, 2]Kong Yujia, [1]Xia Jielai and [1]Wang Ling
[1]Department of Health Statistics, Faulty of Preventive Medicine, Fourth Military Medical University, Xi'an 710032,
[2]School of Public Health, Weifang Medical College, Weifang 261053, China

Abstract: In this study, specific steps are described of concealment allocation methods in double-blinded vaccine plants and foods trials. What is more, comparison among them is also conducted. Damage of injected vaccines during the transportation and storage is common which affects the food vaccination program in plants and foods trials. Thus, there is necessary to prepare a number of alternative vaccines before plants and foods trials. Appropriate amount and method of concealment allocation is important to assure the efficacy of blind and control the cost in double-blinded plants and foods trials. Although two direct allocation methods have been generally used, indirect and online real-time concealment allocation methods are proposed for well comprehensive performance.

Keywords: Concealment allocation methods, food vaccine, plants and foods trials

INTRODUCTION

The packaging of injective vaccine is often damaged during the process of transportation or storage, which directly affected the enrollment of subjects and subsequent injection program (Begg *et al*., 1996; Doig and Simpson, 2005). Therefore, a certain amount of alternative vaccines must be prepared to deal with such situation. A proposed method can also reduce the expulsion rate in plants and foods trials as much as possible (Schulz and Frimes, 2002). Appropriate sample size and methods are important in the injective vaccine plants and foods trials, which are not only associated with validity of allocation concealment and double-blinding in plants and foods trials, but also associated with experimentation cost (Cai *et al*., 2006). Concealment allocation and blind can effectively control the bias of plants and foods trials and have been the important safeguard measures in double-blinded plants and foods trials (Gotzsche, 1996; Mother *et al*., 2001).

MATERIAL AND METHODS

Direct concealment allocation: Assuming the sample size is N and the number of immunization is K in the case of injected vaccine double-blinded plants and foods trials. So far, two direct concealment allocation methods are normal in vaccine plants and foods trials with alternative vaccines. There are two common direct concealment allocation methods, which are equal proportion allocation and unequal proportion allocation (Chow and Shao, 2004).

Equal proportional method is a concealment allocation method, which prepared k alternative vaccines for each experimental vaccine. The value of k ranges from 1 to K. In particularly, equal proportional method is called as completely equal proportion concealment allocation method when the value of k is K. All the experimental vaccines and alternative vaccines are concealment allocated and blinded together. When there is a broken vaccine, corresponding alternative vaccines are used. This method is easy to conduct but is the most expensive. However, unless K alternative vaccines are prepared with experimental vaccines for each subject, there is still possibility of inadequate alternative vaccines for the number of broken vaccines cannot be known beforehand. As shown in Fig. 1.

Unequal proportional method is also a direct allocation method when the amount of alternative vaccines (M) is less than the total sample size of vaccine plants and foods trial. As shown in Fig. 2. The concealment allocation and blind are conducted separately in experimental vaccines and alternative vaccines. When there is a broken vaccine in the plants and foods trial, alternative vaccine is used according to certain associated rules. This method is more effective and low-cost compared with equal proportional method. When actual broken vaccines are no more than alternative vaccines, broken vaccines can be completely substitute and unequal proportional method is generally

Corresponding Author: Xia Jielai, Department of Health Statistics, Faulty of Preventive Medicine, Fourth Military Medical University, Xi'an 710032, China, Tel.: +86 29 84774861
This work is licensed under a Creative Commons Attribution 4.0 International License (URL: http://creativecommons.org/licenses/by/4.0/).

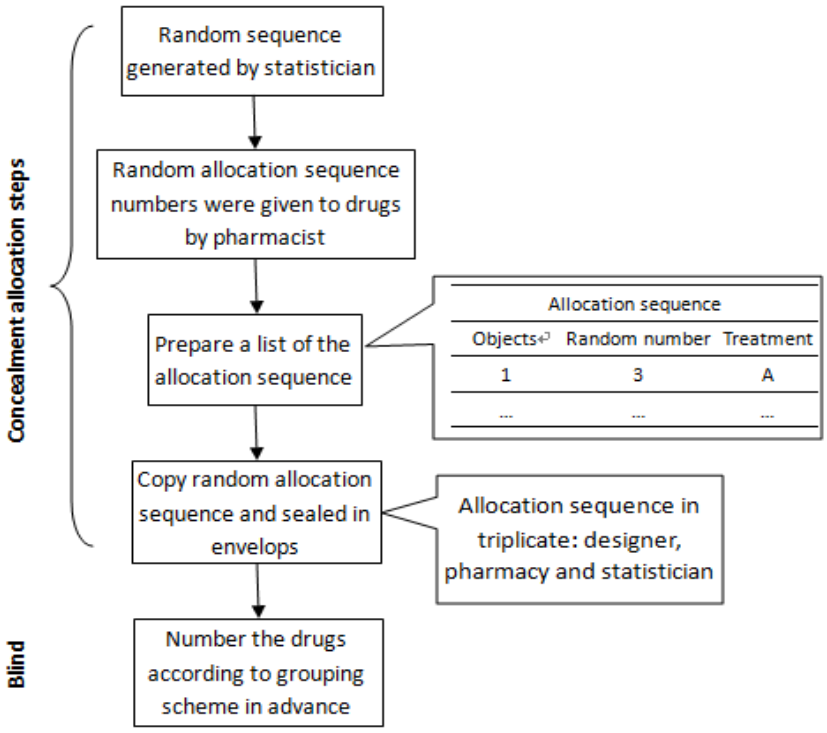


Fig. 1: Concealment allocation and blinding procedure

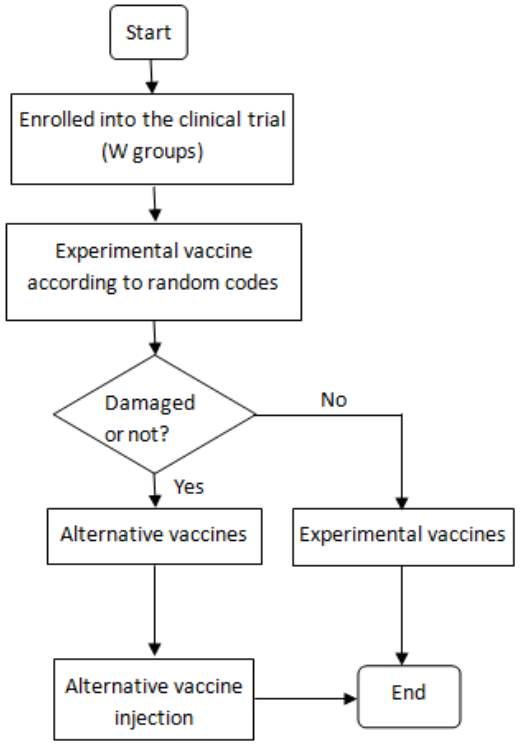


Fig. 2: Flow chart of direct concealment allocation method (e.g. K = 1)

proposed. Different from normal double-blinded plants and foods trials, in those trials with unequal concealment allocation method, specific steps and effectiveness are worthy questioned for separately allocation and blind. As shown in Fig. 3.

Direct concealment allocation method is an unequal proportion method which is generally adopted. To concretely explain the detailed steps, two treatment groups in the ratio of 1:1 of vaccine and placebo are used as example. The number of concealment groups usually multiples the number of treatment groups. Firstly, in this instance, two actual treatment groups are divided into four concealment groups. Then alphabet from A to D is allocated to these four groups. Thirdly, blind code from A to D and specific treatment are sealed in the emergency envelopes. When a vaccine is broken during the plants and foods trials, corresponding alternative vaccine is used according to emergency envelope.

Numbers of concealment groups should be much larger than the number of treatment groups, because the possibility of blind code revealed could be reduced after opening several emergency envelopes. However, the possibility of blind code revealed can only be reduced instead of avoided. What's more, with the increasing number of unpacked emergency letters, it is hard to assure the validity of concealment allocation. To deal with the deficiency of direct concealment allocation, other concealment allocation methods are put forward. As shown in Fig. 4.

Indirect concealment allocation: Indirect concealment allocation method is also an unequal proportion allocation method. For instance, there are two

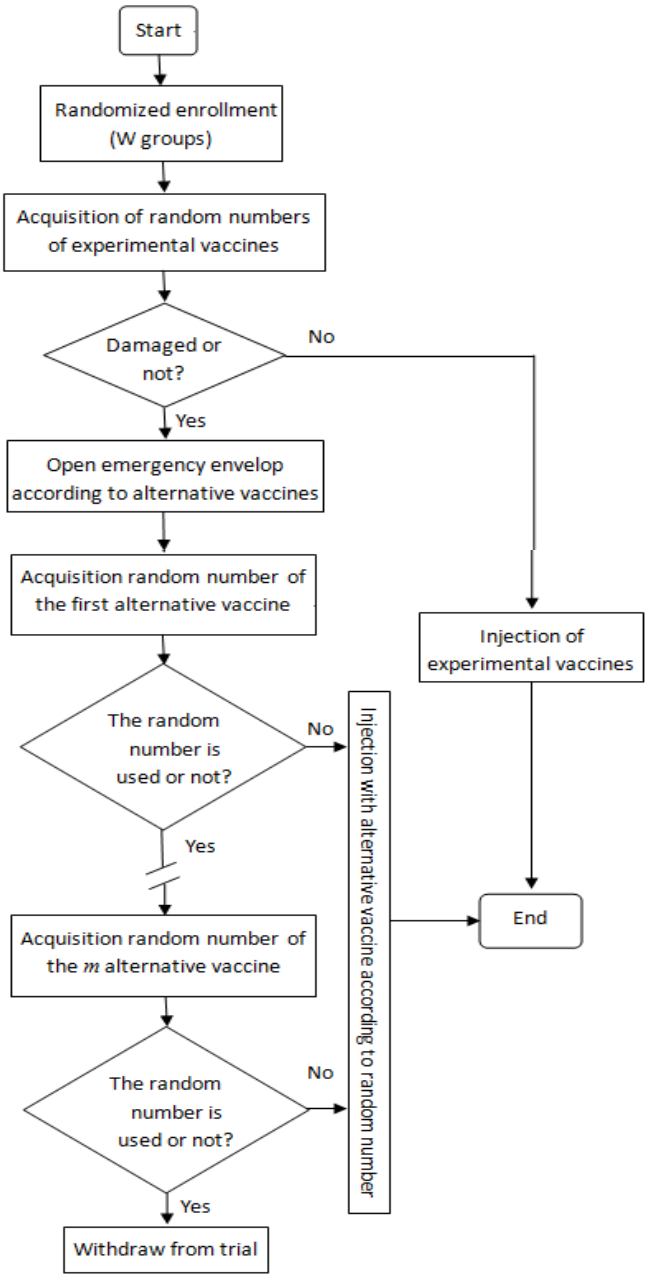
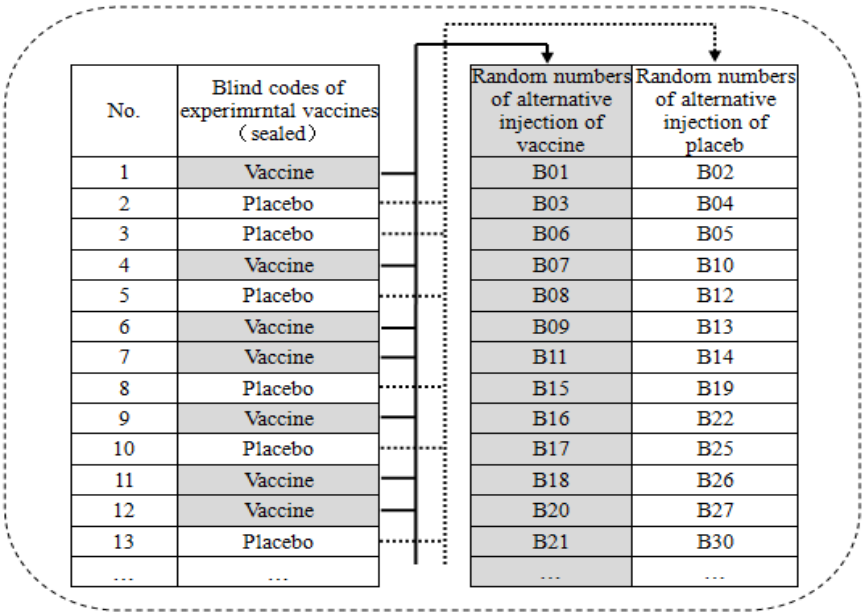


Fig. 3: Flow chart of indirect concealment allocation method with replacement

experimental groups in a ratio of 1:1 of two treatments. Firstly, a number of M alternative vaccines are independently concealment allocated and randomized with random numbers range from B1 to BM. Secondly, sample random sampling with replacement, in which there is a number of m cases, from two treatment groups are repeated N/2 times. The resulting random numbers of alternative vaccine correspondent to experimental vaccine eventually showed in a random sequence table with N rows and m columns, in which, the value of m ranges from 1 to M. Then, blind codes of experimental and alternative vaccines are sealed up. A random sequence table with N rows and m columns is made from emergency letter of alternative vaccine, in which m is the number of emergency envelop correspondent to each random number. Random sampling with replacing is adopted. Sequentially unpack emergency envelopes and get corresponding random code of alternative dosage when there is a broken vaccine.

Indirect concealment allocation method is a modified of unequal proportion concealment in direct methods. Random numbers are used instead of group codes, which contribute to largely reduce the possibility of guessing the treatment and assure the validity of trial concealment allocation. However, no matter in which



No.	Blind codes of experimrntal vaccines (sealed)	Random numbers of alternative injection of vaccine	Random numbers of alternative injection of placeb
1	Vaccine	B01	B02
2	Placebo	B03	B04
3	Placebo	B06	B05
4	Vaccine	B07	B10
5	Placebo	B08	B12
6	Vaccine	B09	B13
7	Vaccine	B11	B14
8	Placebo	B15	B19
9	Vaccine	B16	B22
10	Placebo	B17	B25
11	Vaccine	B18	B26
12	Vaccine	B20	B27
13	Placebo	B21	B30
...	...	...	...

Fig. 4: Blind in online real-time concealment allocation method

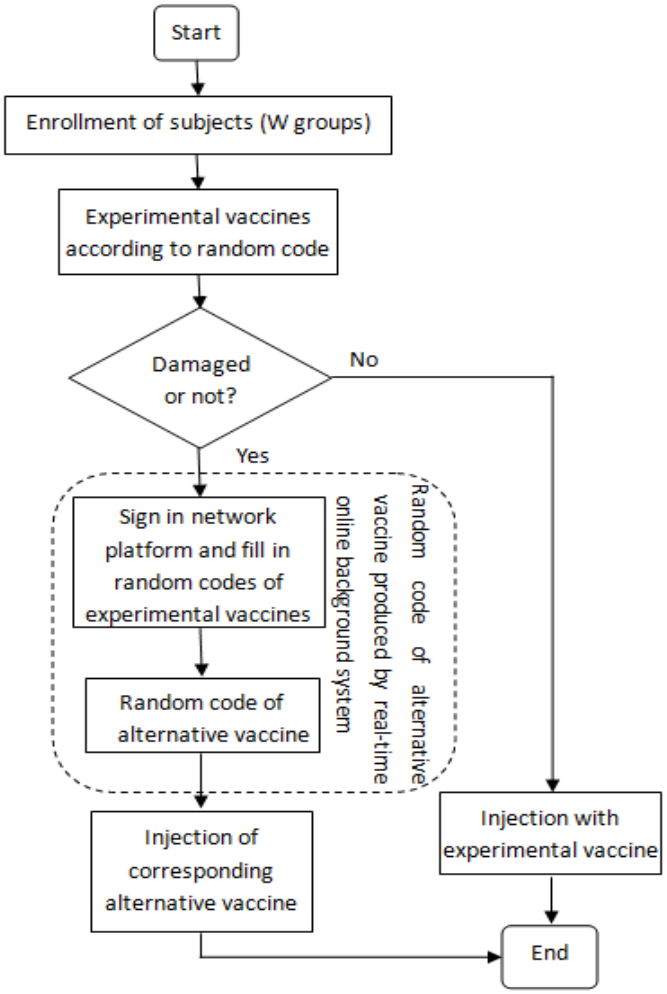


Fig. 5: Flow chart of online real-time concealment allocation method

method mentioned above allocation is intervened. That is, group and random code of alternative vaccine should be allocated to experimental vaccine before plants and foods trial; what is more, the alternative vaccines cannot be supplied timely when the alternative vaccines are insufficient. And sometimes, even there is still corresponding alternative vaccine remained, emergency envelop might provide incorrect information. Hence, online real-time concealment allocation method based on network informatization is an option.

RESULTS AND DISCUSSION

A third-party system network web built in advance is necessary in this method. Real-time allocation is defined as a method with which the number of alternative vaccine of corresponding treatment group timely produced by background system online. The researchers only get random numbers instead of treatment group. The actual treatment groups of alternative vaccines are imported into the system in advance, while the blind state is maintained during the entire trials. For example, there are two treatment groups in a ratio of 1:1. Firstly, concealment allocation and randomization of experimental and alternative vaccines are separately conducted. Random numbers of experimental vaccines range from 1 to N and those of alternative vaccines ranged from B1 to BM. Real-time concealment allocation method is shown in Fig. 5. Blind codes of treatment groups are sealed after encryption and imported into system. Secondly, when there is a broken vaccine, blind code of unused alternative vaccine according to the random code of experimental vaccine is provided from background system to enrollees.

Compared with other methods, online real-time concealment allocation method can deal with alternative vaccine wasting caused by predistribution. The supplement of alternative vaccines can at any time when there is not insufficient alternative vaccine. This is the most economical and most effective unequal proportion concealment allocation method. The alternative vaccine can be timely supplemented according to information from network system. The efficacy of concealment allocation is guaranteed.

CONCLUSION

In conclusion, when only consider the effectiveness of concealment allocation, equal proportional concealment allocation is the most optional but cost-effective choice. Considering that the damage rate is generally less than 3%, equal proportion allocation methods certainly result in huge waste. It is not recommended especially there are a large number of samples. In unequal proportional allocation methods, the efficacy of indirect concealment method is similar with that of online real-time distribution method. On the view of sensitivity of alternative vaccine allocation, online real-time allocation method is the most optimal, for high availability, flexible additional, the most economical and efficient. Online real-time concealment allocation method provides a quick, cheap and reliable method. Considering the comprehensive views, equal proportional allocation method is the worst choice and online real-time concealment allocation method is the preferred method.

ACKNOWLEDGMENT

Kong Yujia and Wang Ling contributed equally to this study. Xia Jielai (jielaixia@yahoo.com, Tel: +86 29 84774861) and Wang Ling (wl.medstat@gmail.com) are both correspondent authors. This study was supported by the National Natural Science Foundation of China (grant numbers 81273176, 81302509).

REFERENCES

Begg, C., M. Cho, S. Eastwood, R. Horton, D. Moher, I. Olkin *et al*., 1996. Improving the quality of reporting of randomized controlled trials. The CONSORT statement. JAMA, 276(8): 637-639.

Cai, H., J. Xia, D. Xu, D. Gao and Y. Yan, 2006. A generic minimization random allocation and blinding system on web. J. Biomed. Inform., 39: 706-19.

Chow, S.C. and J. Shao, 2004. Analysis of clinical data with breached blindness. Stat. Med., 23: 1185-93.

Doig, G.S. and F. Simpson, 2005. Randomization and allocation concealment: A practical guide for researchers. J. Crit. Care, 20: 187-193.

Gotzsche, P.C., 1996. Blinding during data analysis and writing of manuscripts. Control Clin. Trials, 17(4): 285-290.

Mother, D., K.F. Schulz and D.G. Altman, 2001. The SONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. Ann. Intern. Med., 134(8): 657-662.

Schulz, K.F. and D.A. Frimes, 2002. Blinding in randomized trials: Hiding who got what? Lancet, 359: 696-700.