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| **Paper** | **Ideas**  **Quotes** | | **outcomes** | | **What I thought** |
| Author (year)  Area of paper  Used in my thesis (Chx.xx) |  | |  | |  |
| Allenby et al 2005  Hierarchical Bayes  Ch 1.3 | Bayes models  - once controversial but is now gaining acceptance  - free computational constraints  - develop more realistic models  - deal with complex problems  - use concept of probability to predict future events  - Bayes' theorem is a device for accounting for uncertainty. by the laws of conditional probability.  - HB estimation methods do not “converge” on a closed-form solution | | Financial | | reason Bayes were **controversial**  - page 2  Reason Bayes **gaining popularity**  - Acceptance of educated guesees, incorporating previous results  - better computing power made calculation possible |
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| Berry & Berry 2004  Hierarchical Bayes | - Proposed a three-stage **hierarchical mixture model** for analyzing of Adverse events in clinical trials.  - Safety assessment is one area where frequentist strategies have been less applicable. Perhaps Bayesian approaches in this area have more promise.”  - The full model allows for borrowing strength both from within and across body systems.  - Types of AEs within the same body system have a greater effect on each other because they are taken to be exchangeable. | | | The probability that a drug has caused a type of AE is greater if its rate is elevated for several types of AEs within the same body system than if the AEs with elevated rates were in different body systems | 1 stage  2 stage  3 stage model |
| Berry et al 2013  Hierarchical Bayes | - The Bayesian hierarchical design is a strong design for addressing possibly differential effects in different groups.  - This approach does not consider the possibility that some of the patient subpopulations respond similarly to therapy.  - The ability to personalize treatment has the potential for huge advantages for patients, but also for drug development.  **Advantages to hierarchical modeling**.  - it provides a formal mechanism for adjusting for the regression effect, also called ‘regression to the mean’. estimates tend to be more **accurate**, closer to the true values.  - hierarchical model reduces the Type I error rate in all groups,  - The Bayesian hierarchical design has increased power. | | - In sum, with the ability to have **greater power** and **lower Type I error** with a **lower mean sample size**, the Bayesian hierarchical design is an important alternative in this Phase II setting. | | Personised medicine, break down population level using hierarchical models  - need to look at subpopulation level |
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| Cavadino 2017  Hierarchical Bayes | here | |  | | See model  See JAGS Code |
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| Gelman 2006  Hierarchical Bayes | - The multilevel model is **highly effective for predictions** at both levels of the model, but could easily be misinterpreted for causal inference.  - Compared to regression model, **always an improvement** (ie modelling more details)  - ability to separately estimate the **predictive effects** of an individual  predictor and its group-level mean, | | estimate the distribution of radon levels in U.S. counties,  see model | |  |
| Ghosh & Steorts 2013 |  | |  | |  |
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| Montgomery 1997  Hierarchical Bayes  Ch reallife data |  | |  | |  |
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| Salway et al 2017  ED | - hospital and ED overcrowding has enjoyed cyclical media attention, but with little done to “fix” the problem.  - More admissions are now unscheduled  - With this mismatch of resources versus need, there should be little surprise that capacity issues would arise.  - overcrowding exists when there is no space left to meet the timely needs of the next patient requiring emergency care.  - Financial needs dictate that hospitals **must run at near full capacity**. As such, one should expect that capacity can be exceeded on a fairly regular basis. Thus, some kind of full capacity protocol (FCP) is needed. | Emergency department (ED) overcrowding causes  - increased waiting times,  - increased ambulance diversion, i  - ncreased length of stay,  - increased medical errors,  - increased patient mortality,  - increased harm to hospitals due to financial losses.  reasons for overcrowding included:  - the poor and uninsured who lack primary care;  - unnecessary visits,  - the safety net,  - surgical scheduling and  - Seasonal illness.  Solutions  - adding beds  - bed management  - Optimizing staffing | | | - More nscheduled, lead to more unpredictability  - Staff orientation should be made according to demand/arrival, not 9-5 weekday-weekend. Extra staff or plan B of relocating staff allow for abnormal arrivals |
| Jun YU 2010 | <https://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=2225&context=soe_research> | |  | |  |
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