

Week 1 Review

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Lecture 1: Introduction to Biostatistics

- Population vs. Sample
- Inference

Lecture 1: Introduction to Biostatistics

- Problems Unique to Biostatisticians:
 - 1. Survival Analysis
 - 2. Clinical Trials (see exercise on next slide)
 - What is our **Population**?
 - Who is in our **Sample**?
 - 3. Survey Sampling (see exercise on next, next slide):
 - What is our **Population**?
 - Who is in our **Sample**?

Exercise 1: Clinical Trial

BACKGROUND

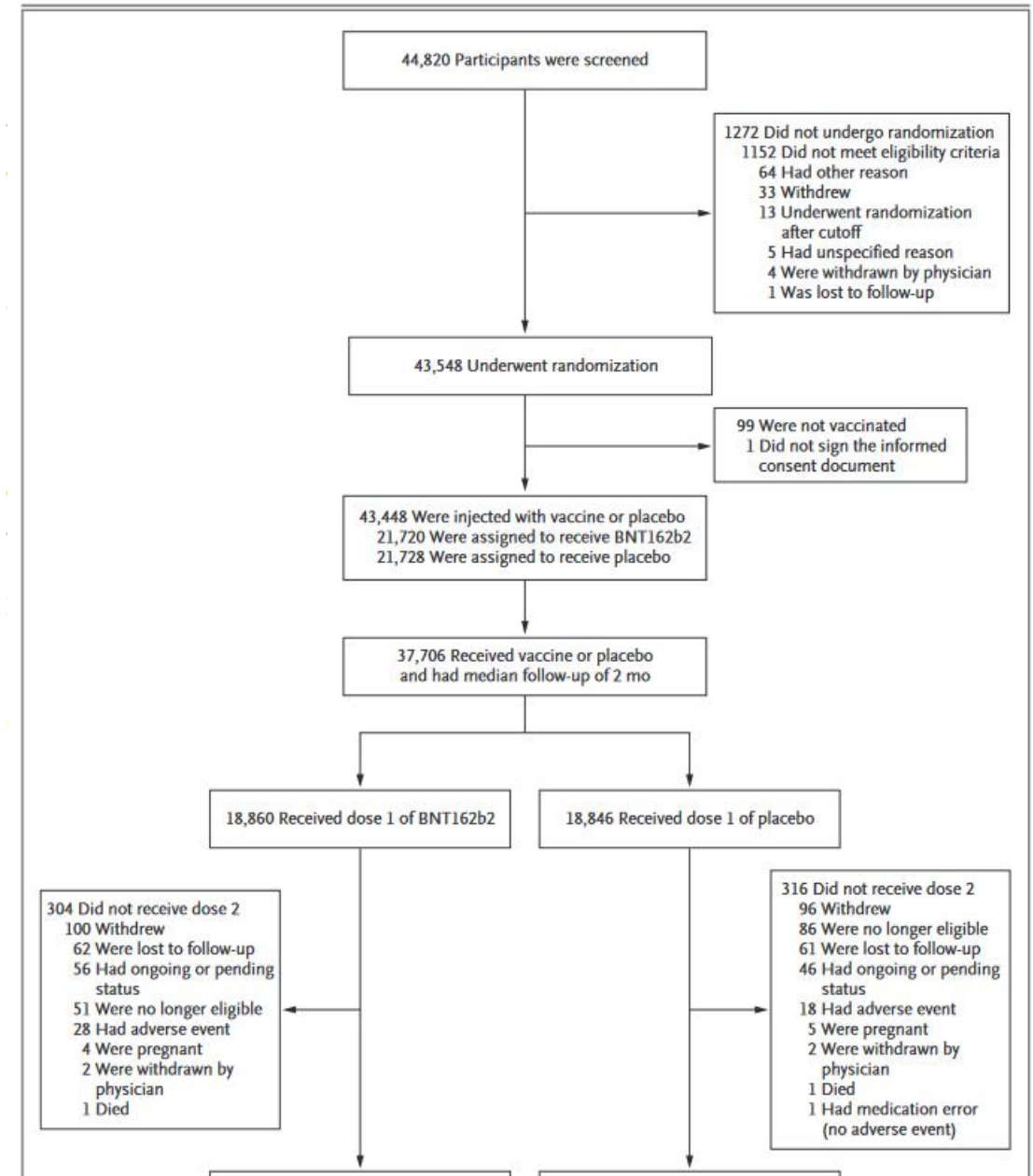
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and the resulting coronavirus disease 2019 (Covid-19) have afflicted tens of millions of people in a worldwide pandemic. Safe and effective vaccines are needed urgently.

METHODS

In an ongoing multinational, placebo-controlled, observer-blinded, pivotal efficacy trial, we randomly assigned persons 16 years of age or older in a 1:1 ratio to receive two doses, 21 days apart, of either placebo or the BNT162b2 vaccine candidate (30 μ g per dose). BNT162b2 is a lipid nanoparticle–formulated, nucleoside-modified RNA vaccine that encodes a prefusion stabilized, membrane-anchored SARS-CoV-2 full-length spike protein. The primary end points were efficacy of the vaccine against laboratory-confirmed Covid-19 and safety.

RESULTS

A total of 43,548 participants underwent randomization, of whom 43,448 received injections: 21,720 with BNT162b2 and 21,728 with placebo. There were 8 cases of Covid-19 with onset at least 7 days after the second dose among participants assigned to receive BNT162b2 and 162 cases among those assigned to placebo; BNT162b2 was 95% effective in preventing Covid-19 (95% credible interval, 90.3 to 97.6). Similar vaccine efficacy (generally 90 to 100%) was observed across subgroups defined by age, sex, race, ethnicity, baseline body-mass index, and the presence of coexisting conditions. Among 10 cases of severe Covid-19 with onset after the first dose, 9 occurred in placebo recipients and 1 in a BNT162b2 recipient. The safety profile of BNT162b2 was characterized by short-term, mild-to-moderate pain at the injection site, fatigue, and headache. The incidence of serious adverse events was low and was similar in the vaccine and placebo groups.



Exercise 2: Survey Sampling

The U.S. Census

Table 1. Demographic Analysis Estimates of Net Coverage Error in the 2020 Census for the Population Ages 0 to 4 by State

State FIPS Code	State Name	DA Population Estimate	2020 Census Count	Net Coverage Error Estimate
01	Alabama	297,751	286,529	-3.77
02	Alaska	50,255	48,104	-4.28
04	Arizona	419,488	392,370	-6.46
05	Arkansas	189,309	179,575	-5.14
06	California	2,319,173	2,137,439	-7.84
08	Colorado	325,309	314,580	-3.30
09	Connecticut	181,819	176,831	-2.74
10	Delaware	54,992	51,230	-6.84
11	District of Columbia	44,083	37,095	-15.85
12	Florida	1,143,120	1,030,284	-9.87
13	Georgia	651,900	614,218	-5.78
15	Hawaii	85,659	77,352	-9.70
16	Idaho	114,638	114,128	-0.44
17	Illinois	738,282	705,616	-4.42
18	Indiana	420,162	408,828	-2.70
19	Iowa	195,743	190,064	-2.90
20	Kansas	185,068	179,446	-3.04
21	Kentucky	274,385	264,254	-3.69

<https://www.census.gov/data/tables/2020/demo/popest/2020-state-county-da-tables.html>

Lecture 2: Types of Data

- Data Taxonomy

- (1) Qualitative

- Continuous

- Discrete

- (2) Quantitative

Lecture 2: Types of Data

- Stevens' Scale of Data Classification

	Categorical	Order	Add/Subtract	Mult./Divide	Examples
Nominal					
Ordinal					
Interval					
Ratio					

Lecture 3: Introduction to Sampling

- Rationale:
- Types of Samples:
 - Probability (Random) Sampling
 - Non-Probability Sampling (*know examples of non-probability samples*)

	When/Why do this type of sampling	How to conduct this type of sampling	How to select participants	Examples
Simple Random Sampling (SRS)				
Stratified Random Sampling				
Cluster Random Sampling				
Systematic Random Sampling				