

Dear Dr Redfield (CDC), and the WH Covid task force:

I wrote on 12/31/20 because I was concerned about following the ACIP proposal for vaccine rollout versus prioritizing those who are the most at risk of death. The latter is what I thought CDC was going to do, since summer.

When I initially wrote, a simple model showed about 60,000 more lives would be lost following the ACIP proposal, versus prioritizing primarily the older age groups which are at much higher risk.

I am writing again as I did not fully model the effects of needing 2 doses versus 1. With the 2-dose model, the difference is more like 90,000 lives using the weekly death rate from Dec. As updated today to use the most current weekly death toll, difference in plans is now 107,000 (1/9/21). Prior results are in Appendix D.

The difference between plans is only getting worse the longer it takes to vaccinate and the more spread and death rates rise from the new mutation. There is evidence of both happening.

In addition, although I keep hearing experts say the new mutation is not anymore lethal, and perhaps overall numbers show that, it definitely looks to me like it has skewed even more towards killing the elderly than the original virus which means even more stress on hospital capacity and more unnecessary deaths by withholding the vaccine from the elderly².

Here is death rate expansion from end of September thru 12/09 using weekly CDC deaths by age. Not sure if due to new mutation or not, but the death rates are going up faster in elderly.

| Table showing Death rate increase since end of Sept by age | | | | | | |
|---|-------------|--------------|--------------|--------------|-------------|--|
| Age: | 0-24 | 25-44 | 45-64 | 65-74 | 75+ | |
| Annualized D/100k³ | | | | | | |
| 5-Dec | 0.25 | 3.45 | 28.63 | 44.57 | 139.67 | |
| 26-Sep | 0.17 | 1.85 | 12.13 | 15.17 | 36.97 | |
| 29-Aug | 0.20 | 2.18 | 16.60 | 20.80 | 48.90 | |
| Increase since Sep | 42% | 87% | 136% | 194% | 278% | |
| Increase since Aug | 23% | 58% | 72% | 114% | 186% | |

The elderly's death rates going up faster, is widening the death gap between them and those getting the vaccine. Not only that, but it is accelerating the strain on hospital capacity, which then prevents the rest of the population from getting their other health conditions addressed. Ironically, leaving this situation

¹ Original letter was dated 12/31 and showed likely 60000 difference using ACIP order versus age. 01/09/21 sent this letter. 01/10/21 Updated model and this letter to use most recent weekly death count. 1/13/21 In footnote added CDC link with a hospitalization and death comparison between age groups and minor edits.

² For additional reference see CDC guidelines comparing the hospitalization and deaths by age group. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/older-adults.html>

³ Average of 3 weeks of weekly D/100k ending on date shown. Data is from death certificates to CDC which can be delayed 1 to 8 weeks. Left off 4 weeks, but last weeks shown for 2020 could be a little incomplete yet. So, actual percentages are likely higher, but the death rates are increasing each week despite as of yet incomplete death counts, so used these to give best picture.

of the elderly go and supposedly protecting the younger essential workers, may sound good to some, but in reality it is looking like a detriment and causing more deaths all around: allowing Covid deaths for the elderly to continue, which directly in turn exacerbates and continues to allow preventable “other-than Covid” unnecessary deaths in the younger people.

There is already evidence that younger people have an excess death rate over 2019, from other causes, as much or more up to 2x more than from Covid⁴. Is this due to lockdowns, needed to lowering hospital overwhelm and the extreme death rates? And/or having to put off other health procedures due to lack of hospital capacity for other things, as it is being used for Covid patients?

I respectfully suggest, it may be time to revisit if current prioritization is really necessary. Because it is not the best choice for overall preservation of life, the health system nor does it even appear better for the lives of younger adults.

It is the doctors’ oath to first prevent harm. Going forward with the ACIP plan, allowing so much more death than necessary seems antithetical to that, to the core mission of the CDC and to just plain humanity.

Surely, this is one area where politics should take second seat. There are better options for priority order than the ACIP plan. I urge the CDC and governors to seek them, evaluate, and chose one.

Below, several options are outlined and nominal expected deaths compared.

⁴ For more data/information on age, see the Covid dashboard at <http://bysam4us.com>, and go to Graphs>Death rates by Age, http://bysam4us.com/Covid/cvd_Age.html (capitalization in url matters). There is a table on that page which shows % excess deaths from 2019 by age group and the % excess deaths due to Covid.

Original letter dated 12/31/20 (versions⁵) updated with results of 2-dose model.

Please see the updated tables of results and the added table showing rates and deaths per week for the first 10 weeks. Other minor edits are in the text.

Recent ACIP allocation proposal changed the expected priority of vaccination. I ran thru a model to compare the new ACIP priority order with what I thought was going to be the CDC approach. All else being equal:

ACIP Plan approx 248,000 Deaths

Original CDC plan (by AGE): 141,000

If governors go with ACIP proposal:
About 107,000 more lives lost using new ACIP plan

The ACIP plan calls for delaying the vaccine to seniors, who have the highest death rates, to give priority to vaccinating almost 100 million younger (<55 yrs old), less at risk, health care, frontline and essential workers. This delay will prolong high hospitalization and deaths for months, likely longer, if the vaccine roll-out is slower than desired (as it is) and/or the mutated faster spreading virus takes a hold (which it is).

Thinking a little ahead, having that high risk population unprotected could be a systemic risk as well, as we start seeing the new faster spreading strain of the virus here in US. The >75 year age group followed by the 65-74 group have the highest associated hospitalization rates when they get the virus. While the faster spread dynamics will affect all who are not immune, these senior groups, left unprotected, could well put the, already over strained, hospital capacity into crisis.

I urge those in authority to review the ACIP decision, specifically the part reprioritizing millions of younger essential workers over seniors, in light of death difference. If using the ACIP would likely result in even a fraction of that number extra deaths, then would also urge an adjustment to the plan!

Florida apparently decided against using the new ACIP priority and has started to vaccinate those over 65 now. That looks like a good choice to me and maybe some ideas below could make the approach even more effective.

The reprioritization appears to have come in under the added social justice goals of “Promoting justice” and “Mitigating health inequities” (See Appendix A). Some things like calling for outreach, and on-site vaccination of essential workers and making sure communities with limited health care access get the vaccine fell under these added goals as well. These are all good. No negative consequences in these.

¹ 1/10/21 Updated model and results to current weekly death toll as of 1/9/21. Prior results in Appendix D
1/8/20 Updates to account for 2dose model. Prior results assuming doses were vaccine per person as opposed to does are in Appendix C
1/1/20 Added additional options to show results for the BEST and CASES plans using the priority AGE which moves essential workers into prior phase than their age, instead of using the more strict descending rate plan (RATE). See BwAGE and CwAGE.
1/2/20, 1/3/20 various edits
12/31/20 Original letter sent alerting to 60000 more deaths under ACIP than using age.

Re-prioritization though is whole different story as is the level of consideration due to the potential consequences.

In this letter are some ideas and sample results using different priority orders. The results show the effect of priority order, and highlight the magnitude of difference the order of vaccination will make in numbers of deaths that will take place before getting to herd immunity.

In this letter is also an idea/suggestion to use natural immunity. That approach will result in even less deaths and faster results than priority order change alone.

At the end of this letter, are some implementation notes and suggestions.

If you want to skip ahead to conclusions, maybe skip thru a couple pages to see the result table, and then find the label ****HERE**** below.

The model starts with ACIP phases, vaccine rollout amounts per week and current weekly deaths. It applies the vaccine by week to the phases in order. Each week the model applies the doses available that week to the population in the phase, lowering the death rate in that group for the next week. It also adjusts death rates overall assuming minor additional immunity in population will lower proportionally the spread rate and thus the death rate overall. Once all are vaccinated in a phase it moves onto the next phase and so on. Many vaccination orders were compared.

The model assumes all else being unchanged during the time. So these should be considered “nominal” results. This is high level rough model and also not a prediction of actual results that are influenced by human behaviors and reactions to environments changing. It is intended to help get a feel for the sensitivity of the priority decision in isolation from other factors. The numbers are probably in the ballpark, but I would use the numbers more in their relative-ness rather than absolute terms.

Obviously the best order to get through this with as little death as possible, and as fast as possible, is to vaccinate those who have the highest death rates first, then in order by rate from there.

This is what I thought the CDC approach was going to be, with the addition of vaccinating healthcare workers early on to ensure we keep the hospitals running and maybe prioritize some front-line workers along with or shortly after seniors. Did not think CDC envisioned that front line workers would significantly delay seniors.

I knew the results of making that priority change would not compare well in relative deaths, but after viewing the results of running the numbers, even I was struck by the magnitude.

A few things caused me to reevaluate the wise-ness of vaccinating younger people before seniors, even if they are healthcare or frontline workers. So much so, took a step back and really looked at the numbers and situation, now that things have changed with a vaccine available. That led me re-evaluate overall approach to the problem. Seeing the results in the tables below changed my mind, from prolonging in survival mode, to using the vaccine aggressively, effectively and all out, while lowering death rates ASAP. Not sure, but maybe seeing these options would change others minds as well. See ****Is it time to change modus operandi?***** below.

Below is a table of some major alternatives in priority order, some sub-setting frontline and essential workers by age, to attain better results.

Note the addition of an idea to use natural immunity. It has been mentioned but have not heard any tangible move to actually use this fact yet from CDC, and not sure why not. Maybe did not think would make much difference? It is only my opinion, but made more difference than I thought it would, and it would be easy and virtually cost nothing to implement (CASES). Another option that would allow us to use more natural immunity would cost a little more by allowing people to get serologically tested (BEST). Given we need to ration vaccine at the moment; I would suggest using it to augment the acquired natural immunity rather than redundantly vaccinate people who are already almost surely immune for now. They can get vaccinated later if it makes sense then. See BEST and CASES in the following table.

Under plan, by week 29, theoretically we can have vaccinated approx 72% of population; the end point is week 38, all vaccinated if all vaccine is distributed, *and administered*, according to schedule in the ACIP presentation. This can be cut short by a month and a half if we use vaccine to augment rather than redundantly vaccinate those with natural immunity.

Things will change but all else being equal, the following table, I think, fairly represents the fundamental underlying effect priority order will have, at least in relative terms.

When the deaths per week goes below 5000, we will be back to rate during summer and I am thinking can probably lift lock downs most places. This is could be major milestone goal. I added the week where <1000 deaths per week as another milestone.

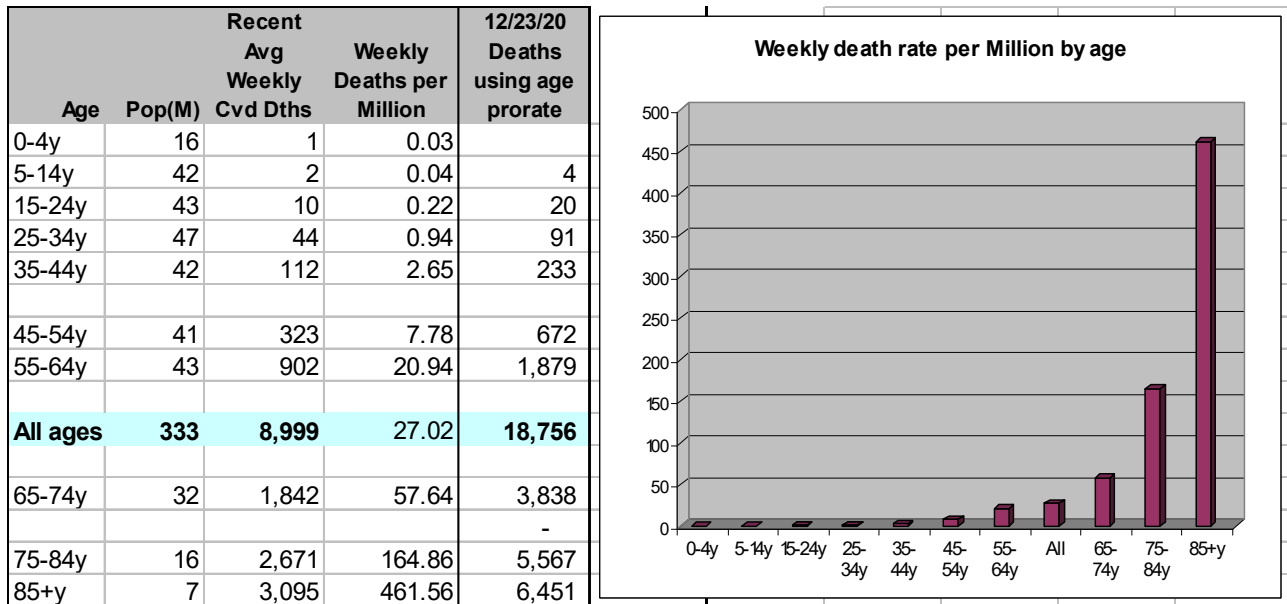
| Plan | Description of alternate tactical priority plans | Wk D/wk <5000 | Wk D/wk <1000 | D/wk Wk 8 | D/wk Wk 16 | D/wk Wk 24 | Deaths | Delta Lives Saved | Lives saved |
|-------|--|---------------|---------------|-----------|------------|------------|----------------|-------------------|-------------|
| ACIP | Current ACIP proposal. | 15 | 25 | 14,520 | 4,293 | 1,085 | 247,593 | | |
| ADJ | Adjust ACIP: Swap high death group, 65-74, with lower risk frontline workers. Older (>55yr) frontline workers remain in 1b | 13 | 24 | 10,138 | 2,225 | 945 | 197,674 | 49,918 | 49,918 |
| ADJ75 | ACIP except: move 75+ into phase 1. Health care workers in 1 but younger wait til after 75+ | 15 | 25 | 7,162 | 4,192 | 1,078 | 174,942 | 22,733 | 72,651 |
| AGE | Vaccinate primarily by age, including ADJ75+. Frontline workers in prior phase than their age | 12 | 22 | 5,949 | 1,986 | 370 | 140,746 | 34,196 | 106,847 |
| RATE | Strict order by death rate except HCP would have priority to vaccinate, if they want to, after the 75+ | 12 | 17 | 5,949 | 1,018 | 217 | 133,402 | 7,344 | 114,191 |

| | | | | | | | | | |
|-------|--|----|----|-------|-------|-----|----------------|----------|----------------|
| BEST | RATE plus take advantage of current natural immunity. Ask those who had the virus or ever tested positive for antibodies to voluntarily wait. Maximizes impact of available vaccine | 7 | 15 | 4,237 | 590 | 45 | 97,414 | 35,988 | 150,179 |
| CASES | Same as BEST but do not try to find asymptomatic cases. If impractical to allow mass serologic testing. | 10 | 16 | 5,310 | 816 | 134 | 119,541 | (22,127) | 128,052 |
| BwAGE | BEST with AGE order. (delta shown is from AGE) | 7 | 18 | 4,237 | 1,210 | 45 | 101,883 | 38,862 | 145,709 |
| CwAGE | CASES with AGE order | 10 | 21 | 5,310 | 1,697 | 169 | 125,647 | (28,233) | 121,946 |

For detail of priority order see Appendix B

| Tactic: Instill immunity to lower spread to avert deaths | | | | | | | BEST Plan | |
|---|--|--|---------------|---------|------------------------|---------------------|----------------------|-------|
| %Pop needed immunity | | | Week attained | | Estm left to get there | | Week attained | |
| Herd immunity if need 70% pop | | | 233 | 29 | 174 | | 22 | |
| Herd immunity if need 90% pop | | | 300 | 36 | 240 | | 29 | |
| vs focus on averting deaths directly (AGE/BEST) rather than on both (ACIP) | | | | | | | | |
| <i>Note, immunity builds at same rate as above tactic</i> | | | | | | | | |
| <i>choice of plan determines how much death happens before we get there</i> | | | | | | | | |
| Death Rate | | | Week Attained | | | Difference in weeks | | |
| Deaths in week 12/23 | | | 22,235 | ACIP | AGE | BEST | AGE | BEST |
| Reduce death rate by 70% | | | 6,671 | 14 | 7 | 5 | -7.0 | -9.0 |
| Reduce death rate by 90% | | | 2,224 | 22 | 16 | 13 | -6.0 | -9.0 |
| less than | | | 1,000 | 25 | 22 | 15 | -3.0 | -10.0 |
| Diff in Vaccine used | | | | | | | | |
| Vaccine used for 70% death rate reduction | | | | 192 | 80 | 58 | -112 | -134 |
| Vaccine used for 90% death rate reduction | | | | 352 | 234 | 158 | -118 | -194 |
| Deaths to herd immunity | | | | | | | Difference in Deaths | |
| | | | ACIP | AGE | BEST | AGE | BEST | |
| Estimated deaths to 70% herd immunity | | | 246,127 | 140,708 | 97,230 | -105,419 | -148,897 | |
| | | | | | | -43% | -60% | |
| Estimated deaths to 90% herd immunity | | | 247,542 | 140,745 | 97,412 | -106,798 | -150,130 | |
| | | | | | | -43% | -61% | |

Age seems to be, by far, the biggest risk factor, overshadows even co-morbidities. To get a feel for the vast differences by age here is the table of death rates by age.



The breakdown by age comes from the CDC Covid data trackers for averaged for weeks 10/17/20 through 11/21/20 as of 12/29/20. I used these over those in the ACIP because the relativity between ages has changed somewhat since the beginning due to different treatments and current may be slightly more reflective of state for going forward.

I am not sure if the ACIP quite had felt sense of the vastness of difference in death risk by age, so wanted to highlight visually and in numbers here. Plus it may be hard to see the full impact of the rate, so that is why I included the overall nominal death numbers by plan.

The high disparity in death rate by age is what causes such difference in overall deaths in the plans. For those younger than 55, the death rate is below the average and above that age it rises pretty quickly. Ages 75+ is off the scale, so I tried moving up before HCP. It made huge difference. There is not a huge population there so could get vaccinated in a week or two, I ended up putting 75+ first before younger healthcare workers. That alone made the largest difference of all the single “what ifs” I tried. And I tried quite a few.

One exception though to HCP moving perhaps later are the LTC healthcare workers and other staff. I do think they need to be vaccinated immediately to stop that vector of spread into the LTC.

It does make more sense to give more weight to being frontline versus not. However, I do not think the younger workers are dying at rates near seniors nor are we in extreme risk of not functioning except for hospital system. All the plans prioritize the healthcare workers in some manner. If there was no end in sight I would lean more towards the ACIP plan to help ease the burden on that group for the long haul. After looking at the numbers though, I do not think we are in a long haul situation anymore and that caused a shift in perspective and focus. Started looking at how quickly we could get through this and also reduce our risk from the incoming mutation.

Supply chains are functioning, not without some risk, but functioning. If someone gets the virus they will miss work but their risk of dying is very low, except for seniors and older workers. We have been functioning now for 9 months, so I don’t think the “put your mask on first before saving others” at this

point is exigent. By using that rule of thumb to mitigate social justice and show appreciation to the frontline workers we all feel, as opposed to using the rule only in an applicable situation, namely a situation when “needed to continue functioning” (which current situation does not really fall into, IMO), the ACIP, perhaps inadvertently, ended up advocating for a change in plan that ironically will result and perhaps allow even greater harm and risk to our system.

The ACIP plan allows the high hospitalization of seniors to continue, which means hospitals strained. General population is locked down to prevent that and protect against death which of course is happening in intolerable rates in seniors, and to some extent but order of magnitude less in other age groups. The lockdowns have cascaded into family and livelihood insecurity and not being able to take care of oneself or family nor able to pay bills, rents etc. Then, if they are homeowners, or the landlords missing those rents, they too are becoming more at risk of defaulting on loans as are the corporation and business that rely on consumers who are locked down; so far have averted massive defaults but they lurking out there and once the forbearance cracks, the flood will threaten the financial system; the fighting of the virus but more so the holding back of the resultant financial tidal wave incurred by the solution, “lockdown!”, has brought our whole economic and social systems to the brink. We are stretched as never before and the negative effects from the “solutions” upon solutions to problems created by the prior solutions are almost beyond comprehension; as are the trillions of dollars in deficit spending. I think we can/need to start doing a more judicious job of distributing deficit money and limited vaccine. We are giving both these to everyone when it is not needed by everyone.

The way I see it at this point, is that we are now more in a crisis of time and hospital capacity, than supply chains functioning. The latter have been working through the pandemic and still working. So it might make sense to use the vaccine to have the most impact on the virus effects on our system and cut our risk in a way that will benefit everyone, versus selectively protecting vast numbers of younger people in the system, that really don’t need protection all that much.

That approach may sound like essential workers would lose something from the benefits they were all in mindset to receive after seeing the ACIP plan, but actually I think they may benefit more within a few weeks with this other approach. See points 4, as well as some minor benefits to the younger groups in 2, 3, 5 and 7 below.

Besides the significant death averted by using an alternative plan, there are a couple of additional reasons why it would be good to get the vulnerable protected earlier than later:

- 1) less hospitalization stress
- 2) More hospital beds and doctors available for the rest of the population.
- 3) The sooner we can get hospitalization and deaths down again to tolerable levels, the sooner lockdowns will be lifted.
- 4) Working age people and school age people (0 to 54 year olds) appear to be experiencing large rates of excess deaths. Actually multiple times the excess death due to Covid. (if you do not know this from other sources, here is a table built from CDC data http://bysam4us.com/Covid/cvd_Age.html).

Perhaps it would be *better* for their well-being and health to get Covid down as fast as possible and the lockdowns off, versus, protecting them against the virus and letting, anxiety, depression, and, societal harm and dysfunction go on longer.

- 5) Younger and to large extent middle aged people do not have much risk, so forcing them to go into lockdown, destroying their livelihoods and putting their own families at risk to save others

(strangers) is unfair in itself. It is a moral ask when the people needing protection cannot protect themselves. Many/most are going along for this reason (Thank you America), but not surprisingly this is getting less as time goes on. Once the vulnerable are vaccinated though that burden can be eased and the decision to take a risk is ethically back with the individual where it naturally belongs. Personal decision making is always better than government's. Government can only do broad general rules that do not account for the many combinations of situations that people face in their actual lives. Case in point, lockdowns took and are taking an axe to all aspects of people's lives, instead of a scalpel.

- 6) If we were not locked down, people could work again. And then massive bailouts would not be needed. People could pay their rents, buy food etc. And we could avert massive numbers of families becoming homeless. This issue should not be overlooked. I think we as a country really need to do everything in our power to stop the lockdowns ASAP. Getting the hospitalization rate down to tolerable level is probably the major thing holding that up. Again, vaccinate seniors first.
- 7) I just don't think it is practical or helpful to think we can and to try to forcibly to hold down the people much longer, especially the younger folks. Many are already out there without masks or social distancing, spreading more. Altruism can only go so far for so long. The intractable truth is they are not at risk and not directly experiencing the negative consequences of their behavior, which is what provides the greatest impetus for people to alter their behavior. I think we need to come to terms with the fact that relaxation of social distancing is only getting worse. We have tried everything: pleading, lockdowns, bubbles, masks, did I mention pleading?, etc. All failing to stop the spread adequately to protect the vulnerable. The biggest moral issue with this behavior at the moment is that the elderly and vulnerable cannot protect themselves any more than they are. This means greater urgency to quickly allow the elderly and vulnerable to protect themselves now. Please do not withhold the vaccine from those that need it most.
- 8) The new strain of this virus, may not be more deadly, however, it will speed up the death rate per population. Thus will become a multiplier on the death difference as we roll out the vaccine. If we do not lower the high rate group with the vaccine quickly, it will likely cause the overall hospitalizations to double. Many places are already under strain. Again, more urgency to get hospitalization and death rates down fast before that strain starts to make inroads here. Only a matter of time. We have a chance to get ahead of it by vaccinating out the highest rate groups from its reach. Let's do it.
- 9) There is no longer even a grain of truth in the popular underground (and not so underground) rationalization that people will all get this and efforts are just delaying deaths so why bother and maybe it was thought order doesn't matter. We now have a vaccine, so delayed deaths are no longer just deaths postponed, they are more likely lives saved.

I was going to go into a couple of the negative consequences of putting that ACIP plan out there, but won't waste that time. I hope the above is enough.

**** Is it time to change modus operandi? ****

If I may be so bold as to say at this point... It is time to ring the bell! All the plans above are finite and get us to end of pandemic. Maybe time to consider getting out of survival thinking and into action mode.

By that I mean, rather than focusing on making it marginally better for essential workers and ethic groups for the long haul, as the ACIP plan did, let's realize we do not have to have a long haul ahead of us – finally, we are at that point.

It is only a matter of execution and numbers to get out of this. The one big area of challenge will be to convince people to get this, but I suspect once moving, many will get on board and there will not be enough holdouts to seriously impair our getting to the end. Even if they do not get the vaccine, the consequences will more be their own, as others who do not want to take the risk can protect themselves without their help.

The tactical choices we make at this moment, for the rollout, will only determine how long and how many lives will be lost before getting there, not if we get there.

The system has been functioning; it can function for another three months. It will get much easier and less anxiety for all when we can get the people and the economy out of lockdown, so would suggest we work towards that with haste.

****HERE****

If we go hard at the BEST plan we can be under a thousand deaths per week (not per day, per week) by week 15 (optimal/nominal). Not sure if feasible to add serologic testing to the vaccination protocol, but does look like it will make noticeable difference in time and deaths. Next best is CASES. That does not add that extra test: more redundant vaccination and a little longer. If use the AGE order instead of the best RATE order, to give some priority to frontline workers, the goal post would move out to week 17 and 21, respectively.

I think the AGE order, which gives some limited priority to frontline workers, is a better choice than strict age (RATE). Because frontline workers likely have slightly increased death rate than general population, reality would turn out better in the AGE order than what model is showing so likely is more of a push with RATE than shown. Plus it would be good to vaccinate them for all the other reasons in the ACIP.

So would lean towards the BwAGE (BEST with AGE order). This plan also uses natural immunity in the population to maximize the vaccine's impact. It would allow people to find out if they have the antibodies indicating they have immunity for now. I know several people who would really like to know and I think would be actually grateful if they could wait on the vaccine. Maybe too by then scientists might know more about how long immunity lasts.

The week estimates probably will be a little longer but hopefully not that much. My experience is that people, once they have in their sights a clear goal with no "miracles [yet to] happen here", they are very resourceful and can adjust and make it happen extremely well. We have what we need and what needs to get done is entirely within scientific soundness and capability at hand.

On the other end of the scale is the ACIP plan, This would nominally need an additional two+ months to be down to 1000 deaths/wk, out to week 25; with an additional 145 thousand deaths, more than double (2.5x) the death toll under BwAGE.

Maybe someone could take look at this? and do their own numbers.

Despite the discouragement that "darker days are still ahead", I cannot but wonder if that is predicated on the ACIP roll out plan. After seeing alternative numbers, if we put efforts into lowering death now, I think we really can be beyond the worst. The results in this table are probably offset by a couple of weeks: 2 weeks for vaccine to build antibodies and also takes a couple of weeks for death rate lowering to be seen. By using the suggested plan BwAGE I think we could see death rate significantly start to go

Do not over hype or promise! Put the pessimistic messages that prepare people for the worst aside for the time being. Give some idea of time but make large enough range, as nothing ever goes as planned as nor as quickly in real life. And finally, keep people engaged by publishing vaccine counts administered and number to goal frequently. Don't rely on media to do this, make it coordinated lead effort.

Approach to rollout:

Personally I think it is more important to get the vaccine to people as quickly as possible over making sure each person is in their proper spot in line before starting next. Using a simple age priority is simple and understandable and does not require a lot of time directing and arbitrating.

To handle co-morbidities or people who are in risk contact situations a lot, I'd say make it generally available but allow people to jump a step ahead based on their assessment of their risk.

Do not engage in things that prevent people from getting it like we are now... only limiting to certain people until 30 Million doses are delivered to the select groups. That likely will take long as only can do so many at once in one area.

The reason I highlighted that, is what I am seeing at the moment. The Phase I venues are not taking and administering the vaccine fast enough to keep up with the current distribution flow. We are already way behind available versus administered and wasting time with many doses in limbo. Not sure why. Waiting for someone to request...?

Nonetheless, may I suggest some tactics (only suggestions): keep the pressure on vaccinating HCP, those over 50, and for sure all at the LTC facilities, but take the doses *not* immediately on-deck in Phase 1 venues, onsite HCP and LTC, and direct them into the public channels in the meantime. Make effort to vaccinate the 75+ age group now as a priority within seniors. When the Phase 1 venues are ready, they get priority of next delivery. In meantime, health care workers and seniors can access public channels as well.

Fill the pipeline so no stoppage: let people get on list at local pharmacy or wherever, and the pharmacy can maintain list in priority order with the second dose being first priority when we get there. Pharmacy will know how much it needs in the next week or so and a centralized distribution logistical center can work with that information to efficiently allocate and/or deliver. Pharmacies then just keep pulling from the list non-stop for the next 12-15 weeks.

Let's do it!

Sincerely,
Annette Swank

PS. Model is in a spreadsheet. If anyone would like a copy just let me know. It is not hard though to mock up so I suggest an independent model/check. I formatted the early week by week numbers in this update.

Website where latest version of letter may be viewed: http://bysam4us.com/Covid/cvd_Blog.html

Appendix A

ACIP presentation can be found at:

The Advisory Committee on Immunization Practices' Updated Interim Recommendation for Allocation of COVID-19 Vaccine — United States, December 2020”

Early Release / December 22, 2020 / 69

https://www.cdc.gov/mmwr/volumes/69/wr/mm695152e2.htm?s_cid=mm695152e2_x

“Although there is no national surveillance for COVID-19 among frontline or other essential workers, reports of high incidence and outbreaks within multiple critical infrastructure sectors illustrate the COVID-19 risk in these populations and the disproportionate impact of COVID-19 on **workers who belong to racial and ethnic minority** groups. During March–June, for example, the Utah Department of Health reported 1,389 COVID-19 cases associated with workplace outbreaks in 15 industry sectors, accounting for 12% of all COVID-19 cases in Utah during the same period (5). In addition, despite representing 24% of Utah workers in all affected sectors, Hispanic and non-White workers accounted for 73% of COVID-19 cases in workplace-associated outbreaks (5). Among 23 states reporting COVID-19 outbreaks in meat and poultry processing facilities during April and May, **16,233 outbreak-associated cases** were reported from 239 facilities, including **86 COVID-19–related deaths** (6). The percentage of workers with COVID-19 ranged from 3% to 25% per facility, and among cases with information on race and ethnicity reported, 87% occurred among workers from racial or ethnic minority groups (6).”

Appendix B: Priority order and phase composition used in the sample alternative models shown in results tables above.

| Phs | ACIP order | Category | Pop (M) | Rate | D/M wk | Deaths per week | Phs | ACIP order | RATE Phases | Pop (M) | Rate | D/M wk | Deaths per week |
|-----|-------------------|-----------------|---------|----------|--------|-----------------|-----|-------------------|--------------------|---------|----------|--------|-----------------|
| 1 | 1.1 | hc health care | 21.0 | 18-64 | 7 | 304 | 1 | 1 | ltc | 3.0 | ltc | 308 | 1,925 |
| 1 | 1.2 | ltc | 3.0 | ltc | 308 | 1925 | 1 | 2.3 | >75 | 18.5 | 75+ | 252 | 9705 |
| 2 | 2.2 | frontline >75 | 0.5 | 75-84y | 165 | 172 | 1 | 2.2 | frontline >75 | 0.5 | 75-84y | 165 | 172 |
| 2 | 2.2 | frontline >65 | 2.9 | 65-74y | 58 | 348 | 1 | 3.6 | essential >75 | 0.5 | 75-84y | 165 | 172 |
| 2 | 2.2 | frontline 55-64 | 5.0 | 55-64y | 21 | 218 | 2 | 2.2 | frontline >65 | 2.9 | 65-74y | 58 | 348 |
| 2 | 2.2 | frontline co-mo | 12.8 | 18-54 co | 4 | 107 | 3 | 3.4 | 65-74 | 24.0 | 65-74y | 58 | 2883 |
| 2 | 2.2 | frontline 18-54 | 8.8 | 18-54 | 2 | 40 | 3 | 3.6 | essential >65 | 4.0 | 65-74y | 58 | 481 |
| 2 | 2.3 | >75 | 18.5 | 75+ | 252 | 9705 | 4 | 2.2 | frontline 55-64 | 5.0 | 55-64y | 21 | 218 |
| 3 | 3.4 | 65-74 | 24.0 | 65-74y | 58 | 2883 | 4 | 3.6 | essential 55-64 | 9.1 | 55-64y | 21 | 397 |
| 3 | 3.5 | co <64 | 48.5 | 18-54 co | 4 | 407 | 4 | 4.7 | other 55-64 | 26.9 | 55-64y | 21 | 1172 |
| 3 | 3.6 | essential >75 | 0.5 | 75-84y | 165 | 172 | 3 | 1.1 | hc | 21.0 | 18-64 | 7 | 304 |
| 3 | 3.6 | essential >65 | 4.0 | 65-74y | 58 | 481 | 5 | 2.2 | frontline co-mo | 12.8 | 18-54 co | 4 | 107 |
| 3 | 3.6 | essential 55-64 | 9.1 | 55-64y | 21 | 397 | 5 | 3.5 | co <64 | 48.5 | 18-54 co | 4 | 407 |
| 3 | 3.6 | essential co-mo | 25.7 | 18-54 co | 4 | 216 | 5 | 3.6 | essential co-mo | 25.7 | 18-54 co | 4 | 216 |
| 3 | 3.6 | essential 18-54 | 17.7 | 18-54 | 2 | 80 | 6 | 2.2 | frontline 18-54 | 8.8 | 18-54 | 2 | 40 |
| 4 | 4.7 | other 55-64 | 26.9 | 55-64y | 21 | 1172 | 6 | 3.6 | essential 18-54 | 17.7 | 18-54 | 2 | 80 |
| 4 | 4.7 | other 18-54 | 25.4 | 18-54 | 2 | 115 | 6 | 4.7 | other 18-54 | 25.4 | 18-54 | 2 | 115 |
| 4 | 4.8 | 0-18 | 78.8 | 0-18 | 0 | 13 | 7 | 4.8 | 0-18 | 78.8 | 0-18 | 0 | 13 |
| | | | | | | 18754 | | | | | | | |
| Phs | AGE phases | | Pop (M) | Rate | D/M wk | Deaths per week | Phs | AGE phases | | Pop (M) | Rate | D/M wk | Deaths per week |
| 1 | 1.2 | ltc | 3.0 | ltc | 308 | 1925 | 4 | 2.2 | frontline co-mo | 12.8 | 18-54 co | 4 | 107 |
| 2 | 2.2 | frontline >65 | 2.9 | 65-74y | 58 | 348 | 4 | 2.2 | frontline 55-64 | 5.0 | 55-64y | 21 | 218 |
| 2 | 2.2 | frontline >75 | 0.5 | 75-84y | 165 | 172 | 4 | 3.6 | essential co-mo | 25.7 | 18-54 co | 4 | 216 |
| 2 | 2.3 | >75 | 18.5 | 75+ | 252 | 9705 | 4 | 3.6 | essential 55-64 | 9.1 | 55-64y | 21 | 397 |
| 2 | 3.6 | essential >75 | 0.5 | 75-84y | 165 | 172 | 5 | 2.2 | frontline 18-54 | 8.8 | 18-54 | 2 | 40 |
| 3 | 1.1 | hc | 21.0 | 18-64 | 7 | 304 | 5 | 3.5 | co <64 | 48.5 | 18-54 co | 4 | 407 |
| 3 | 3.4 | 65-74 | 24.0 | 65-74y | 58 | 2883 | 5 | 4.7 | other 55-64 | 26.9 | 55-64y | 21 | 1172 |
| 3 | 3.6 | essential >65 | 4.0 | 65-74y | 58 | 481 | 6 | 3.6 | essential 18-54 | 17.7 | 18-54 | 2 | 80 |
| 4 | 2.2 | frontline co-mo | 12.8 | 18-54 co | 4 | 107 | 6 | 4.7 | other 18-54 | 25.4 | 18-54 | 2 | 115 |
| 4 | 2.2 | frontline 55-64 | 5.0 | 55-64y | 21 | 218 | 7 | 4.8 | 0-18 | 78.8 | 0-18 | 0 | 13 |

Appendix C: Original model assuming vaccinating with 1 dose

This understated deaths and time line to immunity as the vaccines we are using at moment require 2 doses. Pfizer recommends its 2nd dose in 3 weeks; Moderna, 4 weeks. These are not hard and fast and may be delayed a little. The 2-dose model assumes those vaccinated 4 weeks prior will use doses from current week, so model will reduce the number of people newly vaccinated for the week by 2nd dose usage.

1/8/2021 letter above shows results from the new 2-dose model. The rollout is substantially lengthened by months.

This appendix captures the original results. Also allows comparison to see what lengthening the rollout does to the numbers.

The rollout timetable used was from the ACIP presentation. It ramped up to 10M doses by week 2.5. I used week 4, since we were already behind. After week 11, plan ramps up to 20M per week. In numbers, the model used: 1, 3, 6, 10, 10... at week 12: 13, 17, 20, 20....

ACIP Plan approx 160,000 Deaths

Original CDC plan (AGE): 100,000

If governors go with ACIP proposal, we will be sacrificing our lives:
About 60,000 more lives lost using ACIP plan

| Plan | Description of alternate tactical priority plans | Wk D/wk <5000 | Wk D/wk <1000 | Deaths | Delta Lives saved | Lives saved |
|-------|--|---------------|---------------|----------------|-------------------|---------------|
| ACIP | Current ACIP proposal. | 11 | 18 | 157,879 | | |
| ADJ | Adjust ACIP: Swap high death group, 65-74, with lower risk frontline workers. Older (>55yr) frontline workers remain in 1b | 9 | 17 | 141,373 | 16,506 | 16,506 |
| ADJ75 | ACIP except: move 75+ into phase 1. Health care workers in 1 but younger wait til after 75+ | 10 | 18 | 119,347 | 22,027 | 38,533 |
| AGE | Vaccinate primarily by age, including ADJ75+. Frontline workers in prior phase than their age | 7 | 16 | 98,057 | 21,289 | 59,822 |
| RATE | Strict order by death rate except HCP would have priority to vaccinate, if they want to, after the 75+ | 7 | 13 | 94,416 | 3,641 | 63,463 |
| BEST | RATE plus take advantage of current natural immunity. Ask those who had the virus and others testing positive for antibodies to voluntarily wait. Maximizes impact of available vaccine | 6 | 12 | 73,028 | 21,388 | 84,851 |
| CASES | Same as BEST but do not try to find asymptomatic cases. Was thinking there may be doubt or push back that we could do this testing in practice. | 7 | 13 | 86,464 | (13,436) | 71,415 |
| BwAGE | BEST with AGE order (delta is from AGE) | 6 | 14 | 75,992 | 22,065 | 81,888 |
| CwAGE | CASES with AGE order | 7 | 15 | 89,816 | (16,788) | 68,064 |

For detail of priority order see Appendix B

| Tactic: Instill immunity to lower spread to avert deaths | | | | | | | | |
|---|---------|----------|---------------|--------|--------|----------------------|---------|--|
| %Pop needed immunity | | | Week attained | | | | | |
| Herd immunity if need 70% pop | | | 233 | 19 | | | | |
| Herd immunity if need 90% pop | | | 300 | 22 | | | | |
| vs focus on averting deaths directly (AGE/BEST) rather than on both (ACIP) | | | | | | | | |
| <i>Note, immunity builds at same rate as above tactic</i> | | | | | | | | |
| <i>choice of plan determines how much death happens before we get there</i> | | | | | | | | |
| Death Rate | | | Week Attained | | | Difference in weeks | | |
| | Current | 18,756 | ACIP | AGE | BEST | AGE | BEST | |
| Reduce death rate by 70% from today | | 5,627 | 11.0 | 7.5 | 5.5 | -3.5 | -5.5 | |
| Reduce death rate by 90% from today | | 1,876 | 16.0 | 13.0 | 10.0 | -3.0 | -6.0 | |
| | | <1000/wk | 18.0 | 16.0 | 12.0 | -2.0 | -6.0 | |
| Diff in Vaccine used | | | | | | | | |
| Vaccine used for 70% death rate reduction | | | 90 | 55 | 45 | -35 | -45 | |
| Vaccine used for 90% death rate reduction | | | 160 | 107 | 80 | -53 | -80 | |
| Deaths to herd immunity | | | | | | Difference in Deaths | | |
| | | | ACIP | AGE | BEST | AGE | BEST | |
| Estimated deaths if 70% herd immunity | | | 157,034 | 98,034 | 72,930 | -59,000 | -84,104 | |
| | | | | | | -38% | -54% | |
| Estimated deaths if 90% herd immunity | | | 157,807 | 98,056 | 73,026 | -59,750 | -84,781 | |
| | | | | | | -38% | -54% | |

Appendix D – Original using December weekly deaths

12/22/20 week deaths: 18756⁶

Text above was updated to 1/9/21 weekly deaths: 222,235

Prior to update:

ACIP Plan approx 210,000 Deaths

Original CDC plan (by AGE): 120,000

If governors go with ACIP proposal, we will be sacrificing our lives:

About 90,000 more lives lost using new ACIP plan

| Plan | Description of alternate tactical priority plans | Wk D/wk <5000 | Wk D/wk <1000 | D/wk Wk 8 | D/wk Wk 16 | D/wk Wk 24 | Deaths | Delta Lives Saved | Lives saved |
|------|--|---------------|---------------|-----------|------------|------------|----------------|-------------------|-------------|
| ACIP | Current ACIP proposal. | 14 | 24 | 12,248 | 3,622 | 915 | 208,853 | | |
| ADJ | Adjust ACIP: Swap high death group, 65-74, with lower risk frontline workers. Older (>55yr) frontline workers remain in 1b | 12 | 23 | 8,552 | 1,877 | 797 | 166,745 | 42,108 | 42,108 |

⁶ Originally used county sums of cases and deaths for the model. These did not have unassigned counties counts. Subsequently updated to use full US counts on 1/10/21. The 1/9/21 number is prior day's full count.

| | | | | | | | | | |
|-------|--|----|----|-------|-------|-----|---------------|----------|----------------|
| ADJ75 | ACIP except: move 75+ into phase 1. Health care workers in 1 but younger wait til after 75+ | 14 | 24 | 6,041 | 3,536 | 909 | 147,570 | 19,176 | 61,283 |
| AGE | Vaccinate primarily by age, including ADJ75+. Frontline workers in prior phase than their age | 9 | 21 | 5,018 | 1,676 | 312 | 118,724 | 28,846 | 90,129 |
| RATE | Strict order by death rate except HCP would have priority to vaccinate, if they want to, after the 75+ | 9 | 16 | 5,018 | 859 | 183 | 112,529 | 6,195 | 96,324 |
| BEST | RATE plus take advantage of current natural immunity. Ask those who had the virus or ever tested positive for antibodies to voluntarily wait. Maximizes impact of available vaccine | 6 | 15 | 3,788 | 542 | 55 | 86,534 | 25,995 | 122,319 |
| CASES | Same as BEST but do not try to find asymptomatic cases. If impractical to allow mass serologic testing. | 7 | 15 | 4,570 | 708 | 121 | 102,771 | (16,236) | 106,082 |
| BwAGE | BEST with AGE order. (delta shown is from AGE) | 6 | 17 | 3,788 | 1,118 | 55 | 90,581 | 28,143 | 118,272 |
| CwAGE | CASES with AGE order | 7 | 20 | 4,570 | 1,473 | 170 | 108,086 | (21,551) | 100,768 |

For detail of priority order see Appendix B

| Tactic: Instill immunity to lower spread to avert deaths | | | | | | | BEST Plan | | |
|---|--|--|---------------|---------|------------------------|---------------|----------------------|---------------------|--|
| %Pop needed immunity | | | Week attained | | Estm left to get there | | Week attained | | |
| Herd immunity if need 70% pop | | | 233 | 29 | 183 | | 23 | | |
| Herd immunity if need 90% pop | | | 300 | 36 | 249 | | 30 | | |
| vs focus on averting deaths directly (AGE/BEST) rather than on both (ACIP) | | | | | | | | | |
| <i>Note, immunity builds at same rate as above tactic</i> | | | | | | | | | |
| <i>choice of plan determines how much death happens before we get there</i> | | | | | | | | | |
| | | | Death Rate | | | Week Attained | | Difference in weeks | |
| Deaths in week 12/23 | | | 18,756 | ACIP | AGE | BEST | AGE | BEST | |
| Reduce death rate by 70% | | | 5,627 | 14 | 7 | 5 | -7.0 | -9.0 | |
| Reduce death rate by 90% | | | 1,876 | 22 | 16 | 13 | -6.0 | -9.0 | |
| less than | | | 1,000 | 24 | 21 | 15 | -3.0 | -9.0 | |
| Diff in Vaccine used | | | | | | | | | |
| Vaccine used for 70% death rate reduction | | | | 192 | 80 | 58 | -112 | -134 | |
| Vaccine used for 90% death rate reduction | | | | 352 | 234 | 158 | -118 | -194 | |
| Deaths to herd immunity | | | | | | | Difference in Deaths | | |
| | | | ACIP | AGE | BEST | AGE | BEST | | |
| Estimated deaths to 70% herd immunity | | | 207,617 | 118,692 | 86,389 | -88,924 | -121,228 | | |
| | | | | | | -43% | -58% | | |
| Estimated deaths to 90% herd immunity | | | 208,811 | 118,723 | 86,533 | -90,087 | -122,277 | | |
| | | | | | | -43% | -59% | | |

| | Comparative Nominal Deaths per week | | | | | | | | | | |
|--------------|-------------------------------------|---------------|---------------|---------------|--------------------------|----------------|----------------|----------------|----------------|----------------|--|
| Week-> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| V per wk-> | 1 | 3 | 6 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| 2nd dose | | | | | 1 | 3 | 6 | 10 | 9 | 7 | |
| Vaccinated-> | 1 | 4 | 10 | 20 | 29 | 36 | 40 | 40 | 41 | 44 | |
| ACIP | 18,707 | 18,522 | 18,104 | 17,361 | 16,013 | 14,493 | 13,063 | 12,248 | 11,797 | 11,135 | |
| ADJ | 18,707 | 18,522 | 18,104 | 17,361 | 15,401 | 12,428 | 9,726 | 8,552 | 8,094 | 7,080 | |
| ADJ75 | 18,488 | 17,424 | 15,029 | 10,771 | 6,879 | 6,500 | 6,274 | 6,041 | 5,859 | 5,688 | |
| AGE | 18,433 | 17,025 | 14,972 | 11,259 | 7,028 | 5,829 | 5,324 | 5,018 | 4,840 | 4,595 | |
| RATE | 18,488 | 17,424 | 15,029 | 10,771 | 6,518 | 5,829 | 5,324 | 5,018 | 4,840 | 4,595 | |
| BEST | 15,647 | 14,583 | 12,188 | 7,898 | 5,177 | 4,572 | 4,077 | 3,788 | 3,625 | 3,394 | |
| CASES | 17,455 | 16,390 | 13,996 | 9,738 | 5,969 | 5,372 | 4,870 | 4,570 | 4,396 | 4,156 | |
| BwAGE | 15,592 | 14,198 | 12,212 | 8,499 | 5,222 | 4,572 | 4,077 | 3,788 | 3,625 | 3,394 | |
| CwAGE | 17,400 | 15,992 | 13,969 | 10,255 | 6,283 | 5,372 | 4,870 | 4,570 | 4,396 | 4,156 | |
| | | | | | Cumulative Deaths | | | | | | |
| ACIP | 18,707 | 37,229 | 55,333 | 72,694 | 88,707 | 103,200 | 116,263 | 128,512 | 140,308 | 151,444 | |
| ADJ | 18,707 | 37,229 | 55,333 | 72,694 | 88,095 | 100,523 | 110,249 | 118,801 | 126,895 | 133,974 | |
| ADJ75 | 18,488 | 35,911 | 50,940 | 61,712 | 68,590 | 75,090 | 81,364 | 87,405 | 93,264 | 98,951 | |
| AGE | 18,433 | 35,458 | 50,430 | 61,690 | 68,717 | 74,547 | 79,871 | 84,889 | 89,729 | 94,324 | |
| RATE | 18,488 | 35,911 | 50,940 | 61,712 | 68,230 | 74,059 | 79,383 | 84,402 | 89,241 | 93,836 | |
| BEST | 15,647 | 30,230 | 42,418 | 50,316 | 55,493 | 60,065 | 64,142 | 67,931 | 71,555 | 74,949 | |
| CASES | 17,455 | 33,845 | 47,841 | 57,579 | 63,548 | 68,920 | 73,790 | 78,360 | 82,756 | 86,912 | |
| BwAGE | 15,592 | 29,790 | 42,003 | 50,502 | 55,724 | 60,297 | 64,374 | 68,162 | 71,787 | 75,181 | |
| CwAGE | 17,400 | 33,392 | 47,360 | 57,616 | 63,899 | 69,271 | 74,141 | 78,711 | 83,107 | 87,263 | |