Hypertension

1. What is the treatment outcome?

Treating hypertension in the elderly mainly decreases strokes and heart failure exacerbations but not heart attacks. More importantly, there is a clear all cause mortality benefit.

There are several studies focused on hypertension in the elderly. Two are trials, the other a meta-analysis. These trials were not about the acute treatment of malignant hypertension but focused on lowering systolic blood pressure from about 170 to 150 (Hyvet) or 140 to 120 (SPRINT).
Beckett NS, et al. NEJM. 2008. Gueyffier F et al. Lancet. 1999. SPRINT trial group. NEJM Nov 2015.

2. What is the time frame for efficacy?

The time frame for efficacy is in the range of 2-3 years to see this level of benefit.

3. What is the efficacy? (efficacy increases over time)

Outcome	NNT	Expected Events	Duration	RRR
Composite	61	4	3.2 years	25% (Sprint)
CHF	125	2.6	3.2 years	38% (Sprint)
CV death	166	2.3	3.2 years	43% (Sprint)
All cause death	83	4.5	3.2 years	22% (Sprint)
Death	41	5	2 years	21% (HYVET <150)
Stroke	94	3.3	2 years	30% (HYVET)
CHF	53	1.5	2 years	64% (HYVET)
CV Event	30	3	2 years	34% (HYVET)

Composite=MI, ACS w/o MI, CVA, acute decompensated CHF, death from CV causes
Treating a 1000 patients over 3.2 years would prevent 12 deaths, 8 heart failure events and 16 CV events. 42 deaths, 13 heart failure events and 50 CV events will happen anyway. (SPRINT)
Treating a 1000 patients over 2 years would prevent 24 deaths, 10 strokes, 19 heart failure events and 33 CV events. 96 deaths, 23 strokes, 28 heart failure events and 66 CV events will happen anyway. (HYVET)

Secondary stroke prevention

Outcome	NNT	Expected Events	Duration	RRR
Secondary stroke prevention	68	3	4 years	33%

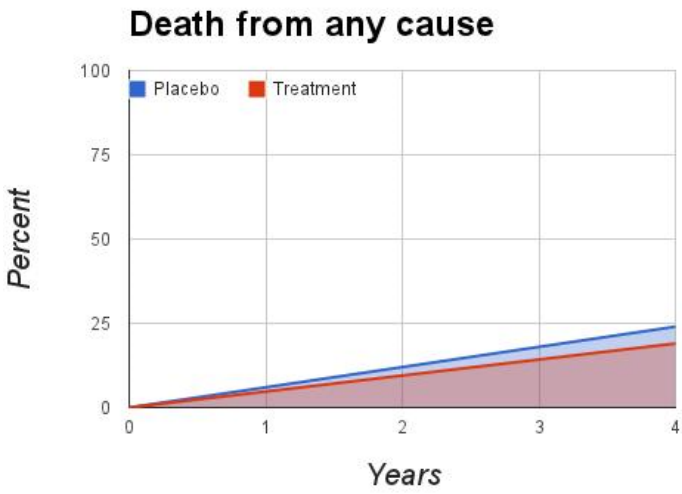
Rashid P, et al. Stroke. 2003;34:2741–2748. (not in elderly)

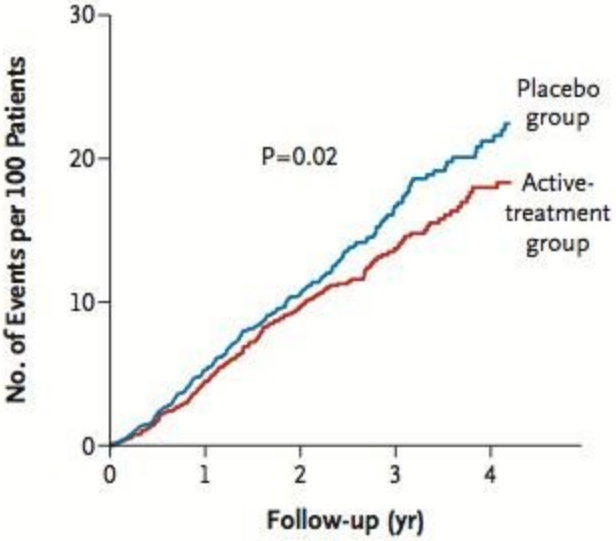
4. What are the risks and side effects?

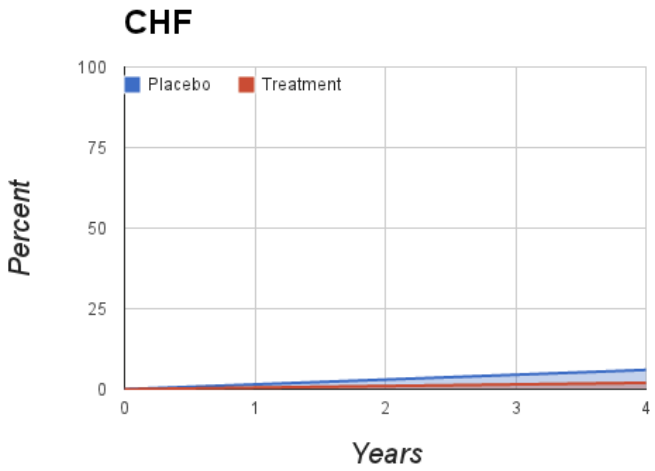
Potential side effects include orthostatic hypotension (up to 20%), hyponatremia (17%), hypokalemia (8%), hyperkalemia (3%), drug interactions, AKI (1%), cough (5-20% of ACE-i), constipation (25% with verapamil). Overall, up to 20% or more of patients may have a side effect depending on agent chosen.

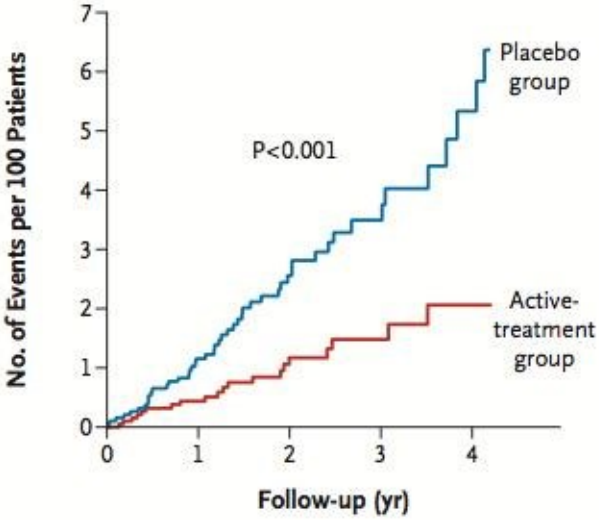
5. Does it achieve a quality of life goal?

There are no immediate palliative effects or functional effects. Quality of life goals are achieved only if a person has an event prevented such as a heart failure exacerbation. So for most people, no QOL goals are achieved. (It's preventative)

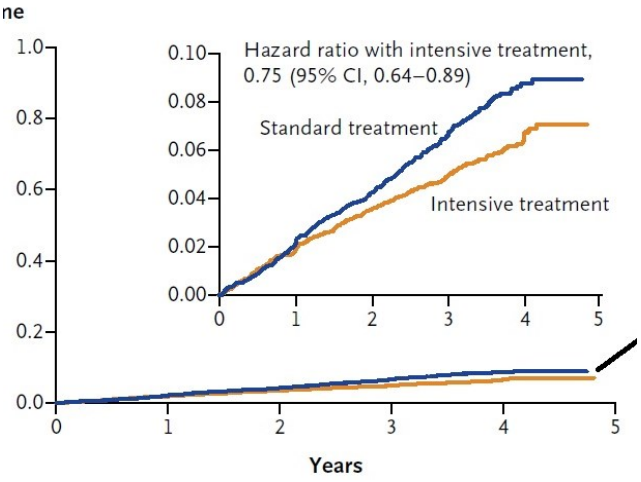




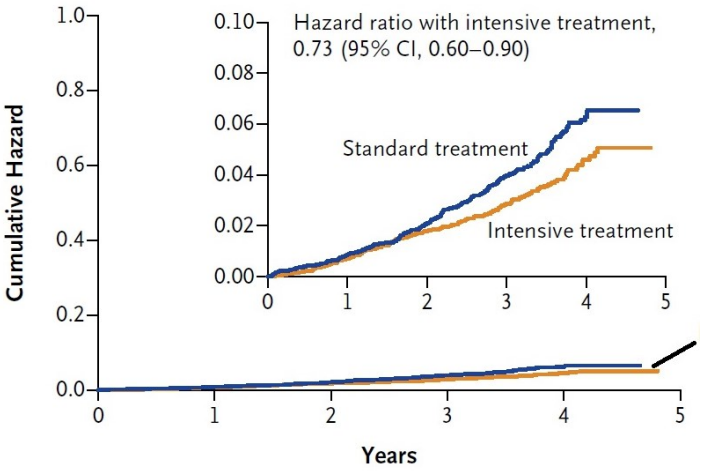




SPRINT-Primary outcome



SPRINT-All Cause mortality



Hyperlipidemia

1. What is the treatment outcome?

Treating hyperlipidemia reduces heart attacks but not strokes or total mortality

While treating high cholesterol in younger adults prevents deaths, strokes and heart attacks, in the PROSPER study, the treatment of hyperlipidemia produced fewer fatal and non fatal myocardial infarctions but not all cause mortality or strokes.

Although several major cholesterol trials included older adults (4S, CARE, LIPID, Heart Protection Study, TNT), there is only one placebo controlled study targeting adults older than 70-the PROSPER study. Sub group analysis of the LIPID study suggests that the relative risk reduction in events is the same for older adults and because older adults have higher absolute risk for CV events, the absolute risk reduction is therefore greater in older adults.

2. What is the time frame for efficacy?

6 months to 2 years for any efficacy.

In the WOSCOPS study, the authors suggested efficacy was seen as early as 6 months. However in both Heart Protection Study that looked specifically at this question, statistically significant separation did not occur until 2 years.

3. What is the efficacy?

Outcome	NNT	Expected Events	Duration	RRR
Death (1)	Not effective			
CVA (1)	Not effective			
MI (fatal/non) (1)	48	6	3.2 years	19%
Primary MI prevention	111	10	3.2 years	10%
Secondary MI prevention* (2)	25	4	3.2 years	25%
Secondary CVA prevention* (3)	52	6.7	4.9 years	15%

*Not in elderly >75.

1. Shepherd J, et al. Lancet. 2002 Nov 23;360(9346):1623-30.
2. Sacks FM, et al. Circulation. 2000; 102:1893–1900.
3. Amarenco P, et al. N Engl J Med. 2006 Aug 10;355(6):549-59.

Treating 1000 adults over 3.2 years would prevent 21 MI's.

For primary prevention, treating 1000 adults over 3.2 years would prevent 9 MI's. 90 will have an MI anyway.

For secondary prevention, treating 1000 adults over 3.2 years would prevent 40 MI's. 120 will have an MI anyway.

5. What are the risks and side effects?

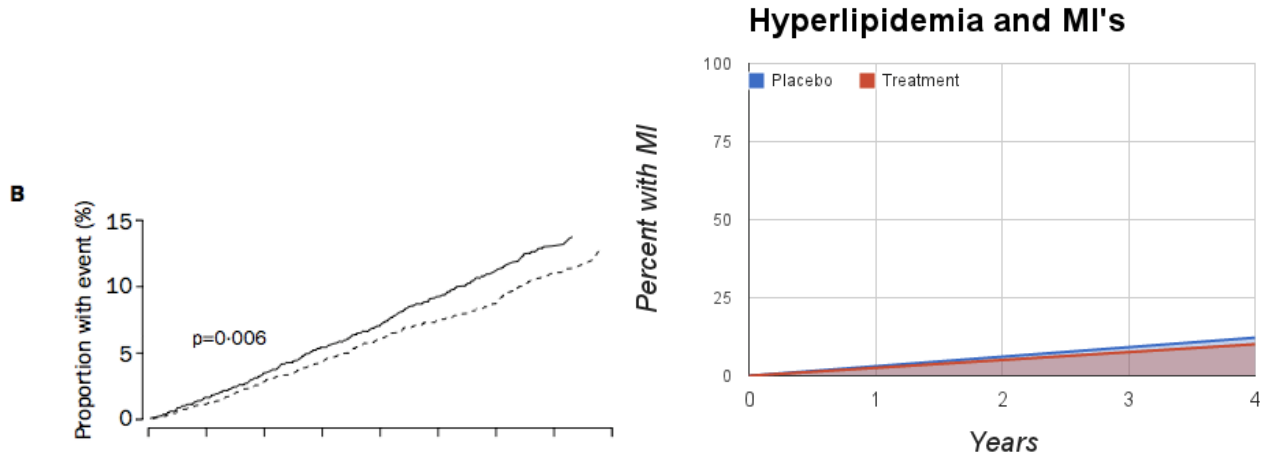
Statins are associated with a 0.5-3.0% risk of persistently elevated transaminases. Unclear if due to the statin.

Muscle aches occur in 2-11% of those on statins. Occurs weeks to months after initiation of statin.

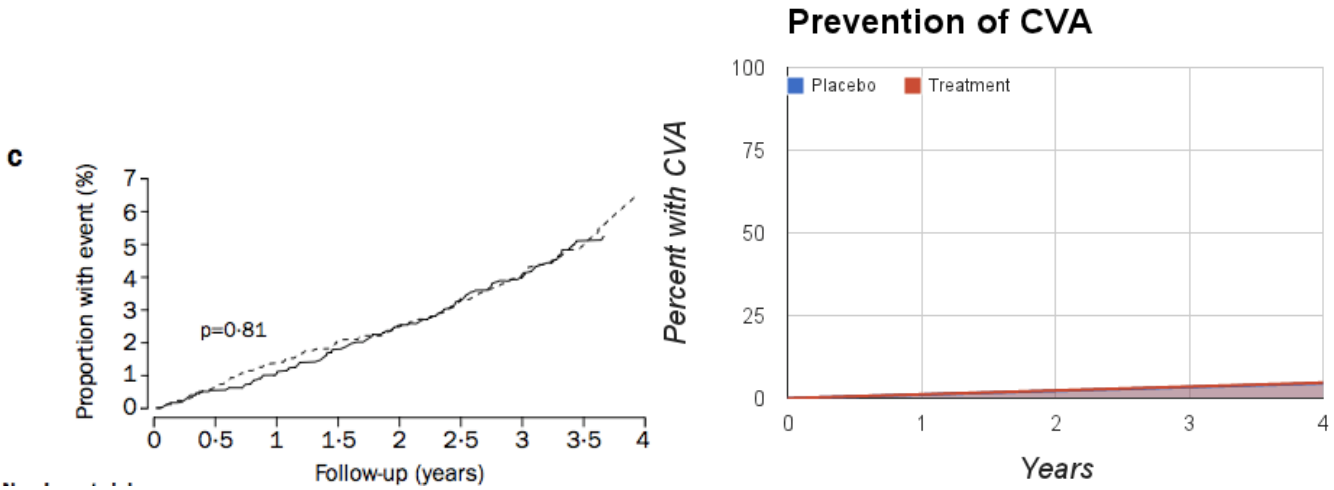
6. Will it achieve a quality of life outcome?

For longevity, probably not. Although with a very robust, healthy individual, possibly. For function or comfort, only if an MI is prevented. Otherwise for most patients, it may increase discomfort from side effects.

To prevent MI's



To prevent CVA's



Shepherd J, et al. Lancet. 2002 Nov 23;360(9346):1623-30.

Diabetes

1. What is the treatment outcome?

Tight control reduces microvascular endpoints (retinopathy, neuropathy and nephropathy) but not macrovascular endpoints (stroke, MI).

Strictly speaking, these outcomes are uncertain in older since these trials were done in younger adults. The UKPDS study was done in newly diagnosed diabetics. The ACCORD study had an average age of 62 (40-79). Because of methodology issues, it is very difficult to know how this applies to a geriatric population. Would tight control be more effective in patients with longer standing diabetes who are at higher risk of macrovascular events? Or less? Observational data says less.

In the UKPDS study, tight control of diabetes (A1C of 7 vs 8) reduced microvascular outcomes-mainly retinopathy-but not macrovascular outcomes (MI, CVA). The ACCORD study looked at an A1C of <6 and found it to be harmful. For retinopathy, the outcome was not blindness but the need for photocoagulation. No benefit for mortality, stroke or myocardial infarction. Myocardial infarction was almost statistically significant in UKPDS at p=.052.

2. What is the time frame for efficacy?

Unfortunately, the studies do not attempt to answer this question. Looking at the graphs, it seems clear that there is no separation of the curve by 9 years. And apparently there is by 10 years. So somewhere between 9-10 years in order to affect proxy markers of clinical outcomes. For clinical outcomes it could be decades

3. What is the efficacy?

Outcome	NNT	Expected Events	Duration	RRR
Microvascular events	35	4	10 years	25%
Macrovascular events*	46	7.5	10 years	13%

*P value = .052. UKPDS Group. Lancet. 1998 Sep 12;352(9131):837-53.

Treating 1000 patients over 10 years would prevent 28 cases of retinopathy. 84 patients will develop retinopathy anyway. After 10 years of tighter control, retinopathy would be delayed about 1.5 years.

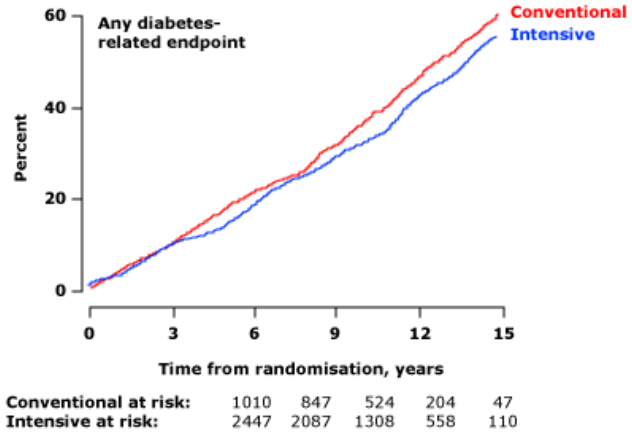
4. What are the risks and side effects?

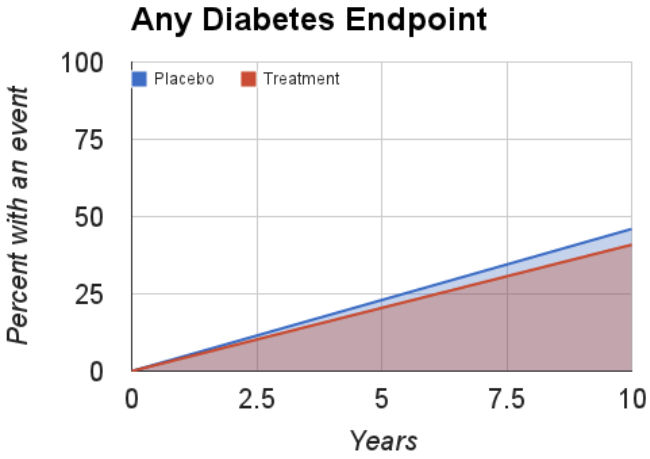
The risks of tight control and hypoglycemia are numerous including death, dementia, falls, institutionalization, hospitalization. These risks are common and often serious. Risk of harm from diabetic treatment are immediate while the benefit may be decades away.

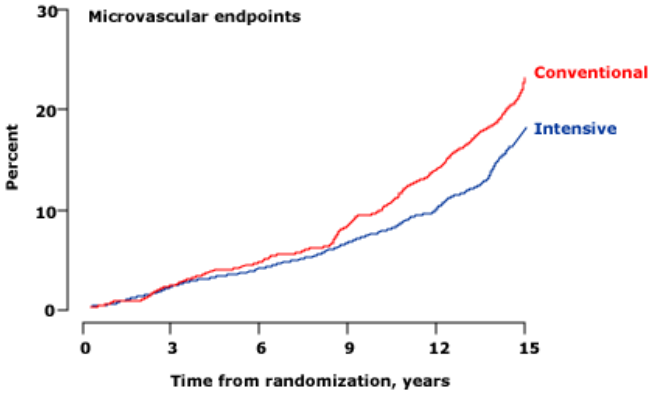
5. Will it achieve a QOL goal?

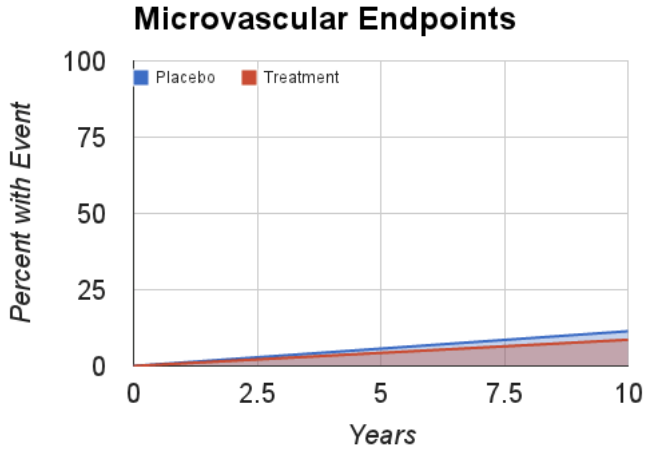
There are no immediate palliative effects or functional effects for tight control of diabetes. The most common outcome prevented in the UKPDS was diabetic retinopathy requiring laser intervention and microalbuminuria, not blindness or new onset dialysis. Quality of life goals are achieved only if a person has an event prevented such as diabetic retinopathy significant enough to prevent vision changes. So for most people, no QOL goals are achieved.

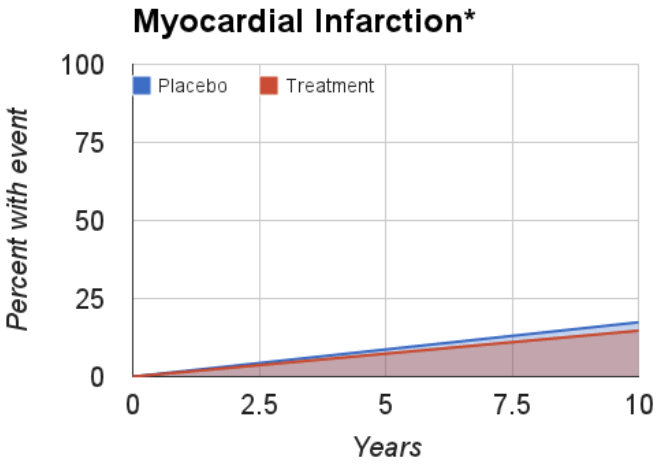
Diabetes











*P value=.052

UKPDS Group. Lancet. 1998 Sep 12;352(9131):837-53.

Systolic Congestive Heart Failure

1. What is the treatment outcome?

Treatment of systolic heart failure both reduces death and hospitalizations for CHF exacerbations. It also improves exercise tolerance

2. What is the time frame for efficacy?

Trials show benefit as early as 3 month duration of treatment for a variety of interventions. Digoxin's benefit almost disappears when hospitalizations that are caused by digoxin toxicity are combined with the benefits from reduced heart failure hospitalizations.

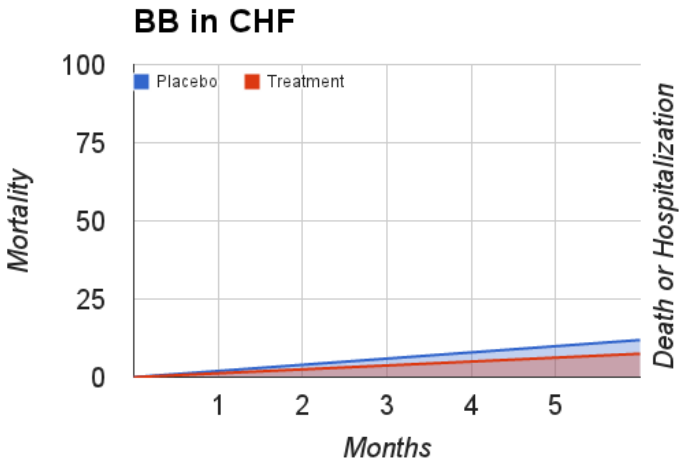
3. What is the efficacy?

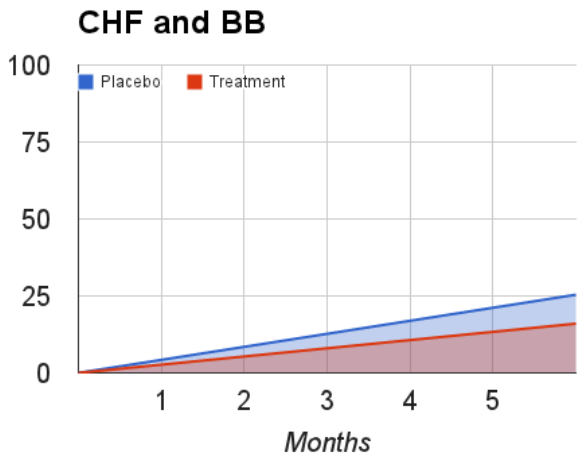
Betablockers

Outcome	NNT	Expected Events	Duration	RRR
Death	38	3.1	7 months	32%
CHF hospitalization	24	2.4	7 months	41%
CHF or Death	15	2.7	7 months	37%

Lechat P, et al. Circulation 1998;98:1184-91.

Treating 1000 patients for 7 months would result in 26 fewer deaths, 42 CHF hospitalizations, 67 combined events. 55 patients would die anyway, 58.8 would have a CHF hospitalization and 114 combined events.



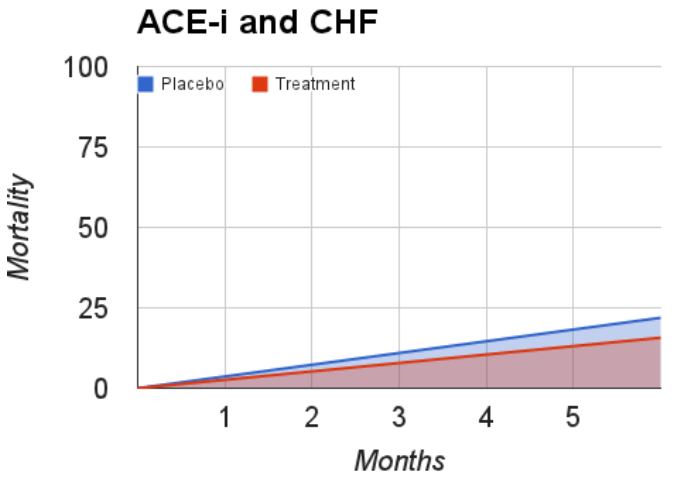


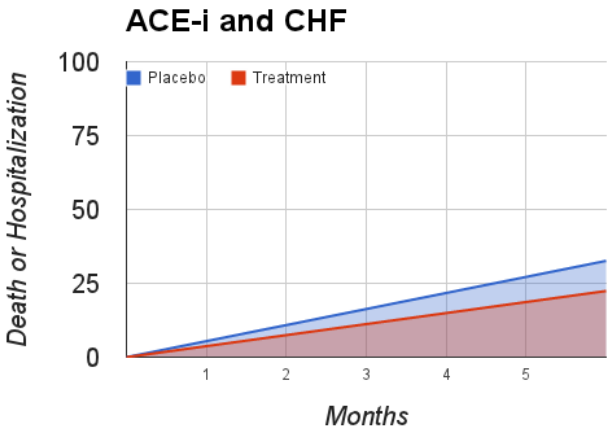
ACE inhibitors

Outcome	NNT	Expected Events	Duration	RRR
Death	17	3.6	3-6 months	23%
Death or hospitalization	10	3.2	3-6 months	35%

Garg R, et al. JAMA1995;274:462.

Treating 1000 patients for 3-6 months would result in 59 fewer deaths, 100 fewer deaths or hospitalizations. Despite treatment, 160 patients would die and 226 people would die or have a hospitalization.



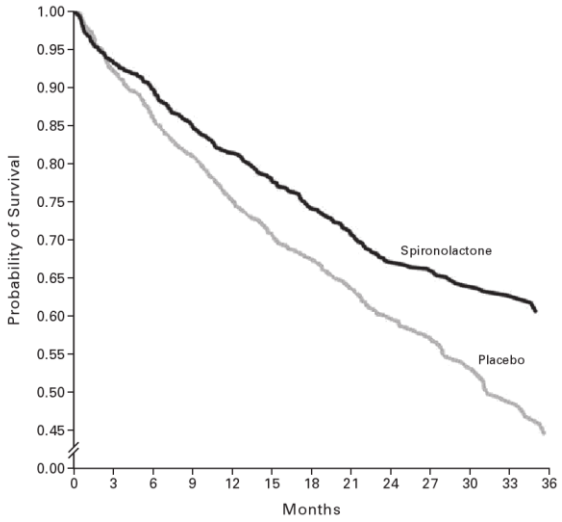


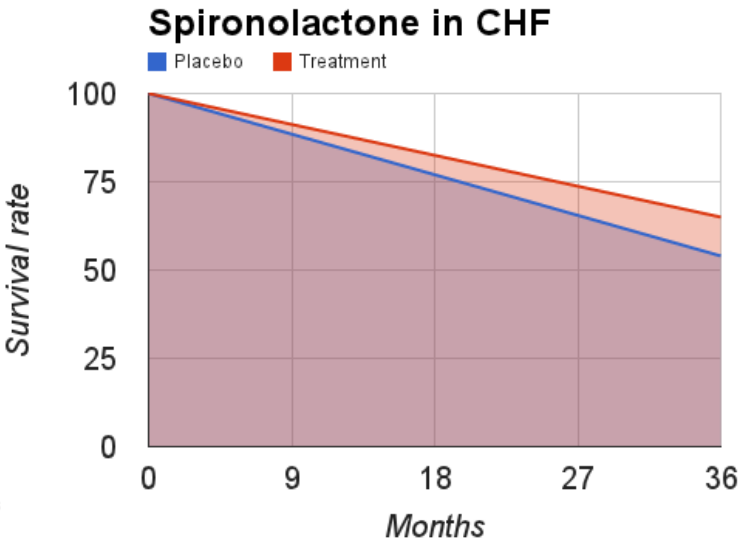
Aldactone

Outcome	NNT	Expected Events	Duration	RRR
Death	9	4	2 years	30%
Hospitalizations	4	3.3	2 years	35%

Pitt B, et al. N Engl J Med 1999;341:709-17.

Treating 1000 patient would result in 111 fewer deaths and 250 fewer hospitalizations. Despite treatment, 333 patients would die and 575 would be hospitalized.





Hydralazine and nitrates

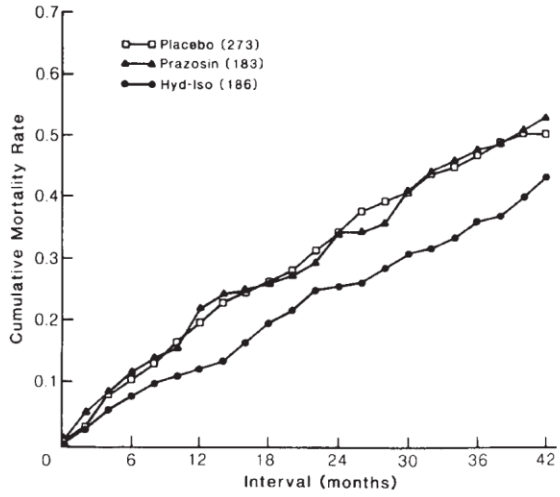
Outcome	NNT	Expected Events	Duration	RRR
Death (1)	14	3	1 year	38%
Death	10	4.3	3 years	23%
Death (2)	25	3	10 months	43%
1st hospitalization(2)	13	3	10 months	33%

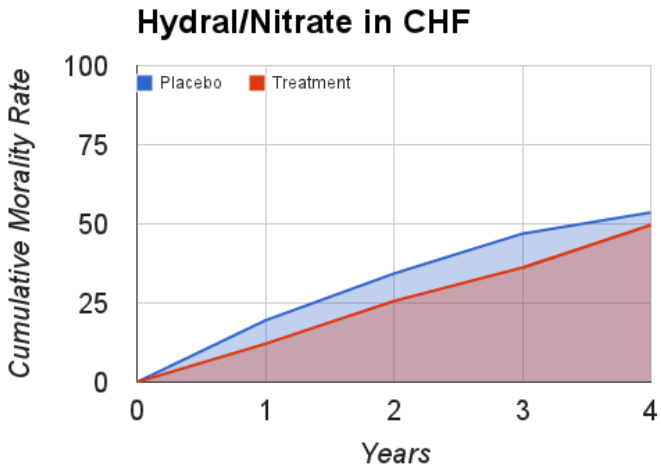
For (2), efficacy started at 6 months.

Treating for 1000 patients over 1 year would prevent 71 deaths and 142 patients would die regardless.

1.Cohn JN, et al. N Engl J Med. 1986 Jun 12;314(24):1547-52.

2. Taylor AL et al. Combination of isosorbide dinitrate and hydralazine in blacks with heart failure. NEJM. 2004 Nov 11;351(20):2049-57.

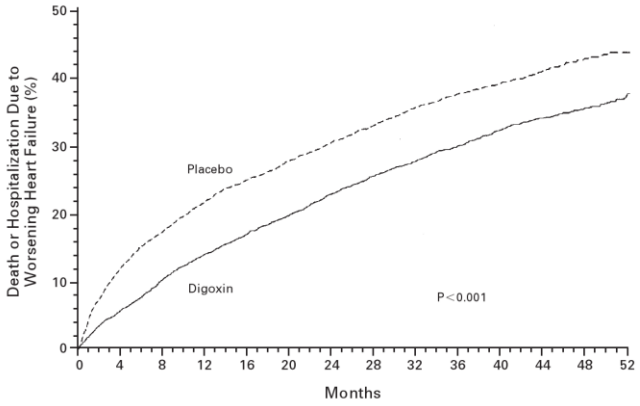


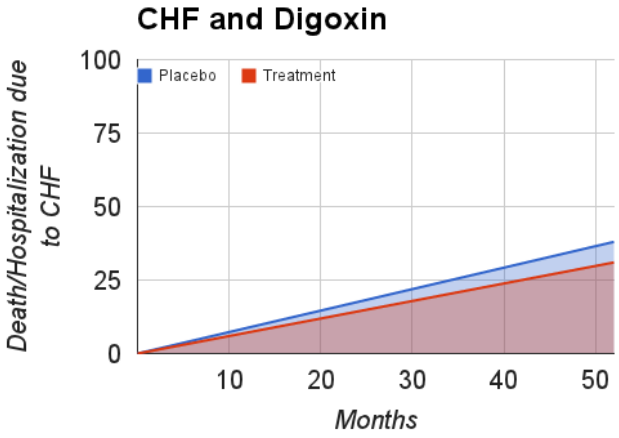


Digoxin

Outcome	NNT	Expected events	Duration	RRR
Hospitalization for CV events	23	13	37 months	13%
Any hospitalization	36	24.2	37 months	8%

The Digitalis Investigation Group. N Engl J Med. 1997 Feb 20;336(8):525-33.





4. What are the risks and side effects?

The risks are related to the individual medications used.

5. Will it achieve a quality of life goal?

Many initial short term studies with ACE-i and BB had exercise tolerance as the primary outcome with morbidity/mortality outcomes as secondary. Exercise tolerance was improved on average as well as dyspnea symptoms. Optimal treatment of systolic heart failure with targeted therapy can achieve both morbidity and mortality goals. This does not apply to diastolic heart failure.

Atrial Fibrillation

1. What is the treatment outcome?

The effect of coumadin in non valvular atrial fibrillation is to prevent embolic strokes and the associated morbidity and mortality.

Hart. Annals of Internal Medicine. 2007

2. What is the time frame for efficacy?

Within a year there is significant treatment benefit.

3. What is the efficacy?

To prevent a stroke

CHADs score	Risk per year	NNT	Expected events	Duration
0	1.9%	83	1.5	1 year
1	2.8%	55	1.5	1 year
2	4%	38	1.5	1 year
3	5.9%	26	1.5	1 year
4	8.5%	17	1.5	1 year
5	12.5%	13	1.5	1 year
6	18.2%	8.5	1.5	1 year

RRR 66%

NOACS vs Warfarin

CHADS	0	1	2	3	4	5	6
NNT	774	525	368	249	173	118	81

NOACS's have a RRR of about 20% compared to warfarin (Ruff. Lancet. March 2014)

4. What are the risks and side effects?

There is an absolute increase of 0.2% per year risk of intracranial hemorrhage. In trials, there is an increase of 0.3% absolute risk of extracranial hemorrhage. In trials looking at harms, major bleeding events occur in 2.5% of patients annually up to 13% in community observational studies annually.

5. Will it achieve a quality of life goal?

Coumadin does not inherently have any palliative or functional benefit. Quality of life goals are achieved only if a person has an event prevented such as a stroke. So for most people, no QOL goals are achieved.

Osteoporosis

1. What is the treatment outcome?

Osteoporosis care is focused on prevention of fractures. It is unlikely to have an effect on mortality. Many of the fractures are asymptomatic.

2. What is the time frame for efficacy?

In trials, efficacy is seen somewhere between 1-4 years. Possibly sooner.
MacLean C, et al. Ann Intern Med. 2008 Feb 5;148(3):197-213.

3. What is the efficacy?

Vertebral Fractures

Medication	NNT	Expected Events	Duration
Risedronate	16	2	1-4 years
Alendronate	15	2.6	1-4 years
Ibandronate	37	2.5	1-4 years
Zoledronic Acid	47-59	2.2	1-4 years
Raloxifene	16	3.3	1-4 years
Teriparatide	5-6	1.5	1-4 years

Non-Vertebral Fractures

Medication	NNT	Expected Events	Duration
Risedronate	34	4.5	1-4 years
Alendronate	36	3	1-4 years
Ibandronate	Not effective		
Zoledronic Acid	37	4	1-4 years
Raloxifene	Not effective		
Teriparatide	29	3	1-4 years

Hip Fractures

Medication	NNT	Expected Events	Duration
Risedronate	96	1.7	1-4 years
Alendronate	81	2.7	1-4 years
Ibandronate	Not studied		
Zoledronic Acid	91*	2.3	1-4 years
Raloxifene	Not effective		
Teriparatide	Not studied		

4. What are the risks and side effects?

About 1-10% of patients will have significant GI side effects that are more common if proper administration precautions are not taken. Other side effects are rare including osteonecrosis, femur fracture, atrial fibrillation.

5. Will it achieve a QOL outcome?

Given that the lifetime prevalence of an osteoporotic fracture is up to 1 in 2 women and 1 in 4 men, there is the potential for significant reduction of morbidity beyond just prevention of hip fractures. Treatment of osteoporosis is targeted mainly at reducing morbidity and secondary at reducing mortality from fragility fractures.

Implantable Cardioverter Defibrillator

1. What is the treatment outcome?

Unknown. Patients older than 75-80 were excluded from most key studies. Efficacy was not found in those with limited GFR (i.e. <35) which is more likely as people age. Efficacy either does not exist or is less with those with an EF>30% or non ischemic cardiomyopathy. Most older adults have diastolic CHF with a preserved EF. One case series found median survival of >4 years in 107 people greater than 80 who had a ICD placed without a control group suggesting that older adults will live long enough to see benefit.

Longevity. Most trials use arrhythmic death as a primary outcome with total mortality as a secondary outcome. ICD's prevent arrhythmic death but not death due to general cardiac causes such as CHF, other non tachyarrhythmias or Pulseless Electrical Tachycardia. Of patients who die with an ICD, most still die of cardiac causes.

2. What is the time frame for efficacy?

Devices have efficacy in as short as a year to find separation between curves. Over time, as total mortality catches up to arrhythmic mortality, there are suggestions that beyond 6 years, there may be a lack of efficacy.

3. What is the efficacy?

Population	NNT	Expected Events	Duration	RRR
Primary prevention	15-18	3-8	5 years	12-30%
Secondary prevention	29	3-4	1 year	25-33%

For primary prevention

For secondary prevention, life was prolonged by 2.1 months at 3 years and by 4.4 months by 6 years.

4. What are the risks and side effects?

Up to half of patients experience elevated anxiety or depression from fear of discharge, device failure, decrease physical activity, negative lifestyle changes (not driving). Of those shocked, 23% dreaded another shock, 5% decided they would rather take their chances than have a shock. 72% tolerated the shocks. No driving is permitted for 6 months after implantation for secondary prevention. 21% of patients may receive a shock in their last 30 days of life, 28% in the last 90 days of life.

5. Will it achieve their QOL goal?

These can be multifunction devices but as a defibrillator, there is no functional or palliative goals that will be met by an ICD.

Shingles Vaccine

1. What is the treatment outcome?

In multiple studies in those >60 years old up to one that included those >80, a fairly consistent relative risk reduction was seen of around 50%.

The goal is a comfort goal. While there is not an immediate palliative benefit, the goal is to prevent shingles in order to prevent severe post herpetic neuralgia.

2. What is the time frame for efficacy?

Time frame for benefit is as soon as 1-3 years.

3. What is the efficacy?

Outcome	NNT	Expected events	Duration	RRR
Shingles	175	2	1 year	51.3%
Shingles	59	2	3 years	51.3%
Post Herpetic Neuralgia	1087 (ARR .92%)	1.5	1 year	66.5%
Post Herpetic Neuralgia	363 (ARR 2.8%)	1.5	3 years	66.5

About 32% lifetime risk. 1 million annually. 10-20% will actually get shingles. Incidence is about 0.36% per year

4. What are the risks and side effects?

48-64% will have a local reaction including erythema, tenderness, hematoma, pain, warmth
1-2% will have fever, diarrhea, flu like syndrome
<1% will have anaphylaxis

5. Will it achieve a quality of life goal?

There are no longevity goals to the vaccine. It will achieve a comfort goal for those who would have gotten shingles but instead have it prevented. It will not achieve a functional goal other than by preventing a disability.

Spiriva for COPD

1. What is the treatment outcome?
Probably. Most studies done in those 60-68.

Comfort but not longevity. The effect achieved is a reduction in COPD related hospitalizations, COPD flares and overall quality of life improvement

2. What is the time frame for efficacy?
As short as a year in studies. Possibly shorter.

3. What is the efficacy?

Outcome	NNT	Expected Events	Duration	RRR
Exacerbations	16	7	1 year	14%
Hospitalization-all cause	Not effective			
Clinically significant improvement	10	3.6	1 year	OR
Preventing clinically significant deterioration	12	4	1	OR

Measured by the St George's Respiratory Questionnaire (SGRQ). Change of 4 is considered clinically meaningful on a 100 point scale.

4. What are the risks and side effects?
There is conflicting data regarding mortality, cardiovascular effects and urinary retention.
5-16% will get dry mouth. 41% may get a URI. 4-5% will get constipated. There are other side effects such as anticholinergic side effects that are possible but not well studied.

5. Will it achieve a quality of life goal?
It seems that using spiriva will improve both function and comfort as measured by quality of life scales but not longevity.

HD in ESRD in NH patients

1. Is it effective?
Unknown. No prospective trials have been done with a placebo controlled arm. All studies in older adults are observational in both community and nursing home patients. Frail patients are excluded from trials in general.

2. Is it effective for a clinical endpoint the patient cares about?
Some observational studies have improvement in longevity, quality of life and increase in socialization at dialysis for community patients. In the main study involving NH patients, there was no placebo arm so efficacy can not be determined.

3. What is the time frame for efficacy?
Unknown (see above)

4. What is the likelihood of efficacy?
Again, it is unknown but in the main study to evaluate the outcomes of new HD in NH patients, a majority of patients (58%) were deceased by 1 year, 29% had significant functional decline and 13% had function maintained. In other words, 87% of patients were either deceased or had a functional decline but 13% were maintained in their function. No mention of improved function was documented.

5. Is it worth the risk of side effects?
Again it is unclear if the poor outcomes reflect underlying disease or are attributable to the dialysis intervention. Observationally, 6 patients had a functional decline or died for every patient that was maintained.
For vascular access,
Fistulas: take 3-6 months to mature, fail to mature in older diabetic patients. Fail 30% of the time by 2 years without interventions. Infections in 2-5% over lifetime of use.
Grafts: Take 4-6 weeks to mature. Fail in up to 80% of the time by 2 years without intervention. With interventions that are 5-6 times that of fistulas, similar patency rates can be achieved. Infections in 10% over lifetime use.
Vascular steal occurs in 5% of either method
Schwab. Vascular access for hemodialysis. Kidney International. 1999.

However side effects that can occur with each treatment of dialysis are as follows:

- Hypotension — 25 to 55 percent of treatments
- Cramps — 5 to 20 percent
- Nausea and vomiting — 5 to 15 percent
- Headache — 5 percent
- Chest pain — 2 to 5 percent
- Back pain — 2 to 5 percent
- Itching — 5 percent
- Fever and chills — Less than 1 percent

6. Will it achieve a quality of life outcome?
Depends. For longevity, some may achieve that goal. However for others it will lead to complications that lead to death. For comfort, it may if a person is actively uremic and having side effects of uremia or being fluid overloaded but the risk during each treatment is as much as 50%. For function, similarly to longevity, in a small percentage of people, that goal will be achieved but more people will likely fail to achieve that goal.

Cardiac Resuscitation-CLEAR

What is the clinical benefit or outcome?

The goal of cardiopulmonary resuscitation is to revive someone who is not breathing and without a pulse. Although the goal would be to return the person to their previous state of health, there are two other outcomes that are more likely even after an initial successful resuscitation that restores breathing and a pulse. The first outcome is death prior to hospital discharge. The second outcome is significantly worse, permanent neurologic function. Regardless of site of care or age, the most likely outcome is that the initial resuscitation is not successful.

What is the efficacy?

Although there is some decline in efficacy due to age alone, other factors are more important. These include the location of the arrest, whether or not it is witnessed, the presenting rhythm, the time to defibrillation and the baseline functional status of the person. So for example, resuscitating ventricular fibrillation is still very effective in older adults whereas resuscitating asystole is largely ineffective in any adult. By decade, success probably declines by a few percentage points. Boyd Em Med Clinics N Am 2012, Tresch Em Med Clin N Am 1998.

For every 100 patients who have cardiopulmonary arrest...

Site of CPR	Does not survive code	Death in hospital	Alive to hospital discharge	Survival to d/c with good neuro outcomes	Survival at 1 year
Inpatient (geriatric specific data)	**50**(1)	**32**	**18** (2) 18% ind from community 9% dependent from NH	**8** (3,4)	**5**
Outpatient (5) For all outpatients	**77**	**15**	**8**	**3** (6)	?
Nursing home (7)	**80-100**	**10-20**	**0-7**	?	?

1. Abbo. JAGS 2013 (23311551) 2. Ehlenbach NEJM 2009 3. 8996043 4. 2751179 5. 20123673 6.23035209 7. 2913781?? 2312998,7730534,9709340,1587977,8426040,8356978

For every patient with good outcome

Site of CPR	Good Outcome	Prolonged death/significantly worse neuro status	Does not survive code (or pronounced in ED)
Inpt	1	5	6-7
Outpatient	1	8	25
NH	1 (or 0)	3-4 (vs infinity)	50 (to infinity)

For nursing homes, 2 studies had 0%, 1 had 2% and two had 5-11%. For the NH with the 11% success rate, ⅓ of patients were pronounced dead at the NH and not included in final outcomes.
Numbers may be very different for those with Class IV heart failure, metastatic cancer, ESRD etc.

What are the potential adverse effects?

1. A prolonged death by a means other than arrhythmia to something that may cause more suffering.
In outpatient cardiac arrests, for every patient discharged alive, 3 will be successfully resuscitated and admitted but die during the hospitalization due to complications of anoxic encephalopathy. These include respiratory failure (59%), or cardiogenic shock (31%), and less commonly, another arrhythmia (10%). Myerburg. American Journal of Medicine 1980. For every successful inpatient cardiac resuscitation who is discharged alive, there will be two patients who will be successfully resuscitated but die during the hospitalization.

2. Traumatic complications of cardiac resuscitation.

Of survivors, about 31% will have rib fractures, 21% will have a sternal fracture, 18% will have mediastinal hemorrhage, 20.4% will have upper airway damage, 30% will have visceral complications including gastric distention and liver or splenic lacerations. Krischer. Chest. 1987.

3. Living with a permanent, significantly worse neurological status.
Outcomes in older adults vary widely from good neurological outcomes that are as high as 80% of survivors to outcomes where 50% are in vegetative states. For outpatients, good neurological outcomes can occur from about 2% of all resuscitations to up to 20% of bystander witnessed vfib arrests. (Good outcomes: Tresch 1989 2913781, Tresch 1994, Longstreth 1990, Berger 1994, 12969608. Bad: Fitzgerald 1996, Murphy 1989, Rea TD 2003, Kitamura T 2012.)
For inpatient cardiac arrest, about 40-80% who survive will have a neurological status similar to their baseline. The other half will be in a vegetative state or severely neurologically impaired and may need institutionalization.

What is the relevance to goals of care?
The aim of having end of life discussions is not necessarily to make all older adults DNR but to make sure the choice selected realistically matches their goals.

Goal	CPR	No CPR
Longevity	Longevity is still a goal Dying peacefully is not a goal Avoiding a prolonged death is not a goal	Longevity is no longer a goal Dying peacefully or naturally is a goal Avoiding a prolonged death is a goal
Comfort	Not a primary goal	Comfort is a primary goal
Function	Low functional requisite for living	High functional requisite for living
Pain tolerance	High tolerance for trauma	Low tolerance for pain and trauma
Risk Tolerance	A bad outcome would be okay because at least an attempt was made for longevity	A bad outcome means the intervention was not worth it.

CPR is a good choice for those who care about longevity more than dying peacefully or being comfortable AND are willing to accept the trauma of CPR AND and are accepting that they are much more likely to have a prolonged death from CHF or respiratory failure AND are okay with surviving with a very impaired neurological status AND understand that a poor neurological status is much more likely than surviving with a good neurological status.

CPR is a bad choice for someone who cares about dying peacefully OR who cares mainly about comfort, OR who has a low pain tolerance OR or would not want to expose themselves to the risk of having a prolonged death OR surviving with a worse neurological status.

REMEMBER: The decision regarding CPR is a separate issue from the aggressiveness of care someone would want while they are still alive. Someone may want to be in the ICU for their pneumonia but if they were found dead, they would want to be left in peace. DNR does not mean comfort care.

Cancer screening
Vaccines
https://www.ncbi.nlm.nih.gov/pubmed/29388195
https://www.ncbi.nlm.nih.gov/pubmed/29388197
https://www.ncbi.nlm.nih.gov/pubmed/29388196
https://www.thennt.com/nnt/vaccines-preventing-influenza-healthy-individuals/

It is common
35% of adults have mcc account for 71% of health care dollars
8.7% of adults have 5+cc leading to 35% of costs
Majority of Visits (64%), prescriptions (83%), home care visits (87.5), hospital stays (70.4%)
Majority of prescriptions (50 per year for 5cc)
45% have ADL dysfunction
2010 ahrq chart book

Medicare 2010 chart book
More common in older adults
70% will have an ER visit (compared to 14%) with 25% with 3 or more ER visits
The majority of those with MCC will be hospitalized over the course of the year (63%)
Post acute setting 99%
Almost all home visits there are mcc
Readmissions nearly 100%

1. Outcome
2. Efficacy
3. Time frame
4. Risks