A model to study the impact of self-imposed prevention measures and short-term government intervention on mitigating and delaying a COVID-19 epidemic

Clearing memory

In[4]:=
```
ClearSystemCache[]
ClearAll["Global`*"]
Clear["Subscript"]
Clear["Superscript"]
Clear["Subsuperscript"]
```

Model equations

In[9]:=
```
eq[Intervention_][1] :=
 S'[t] == -λ[Intervention][t] S[t] - k λawareness[t] S[t] + μ1 Sa[t]
eq[Intervention_][2] :=
 EE'[t] == λ[Intervention][t] S[t] - α EE[t] - k λawareness[t] EE[t] + μ1 EEa[t]
eq[Intervention_][3] := IM'[t] == p α EE[t] - γ1 IM[t] - k λawareness[t] IM[t] + μ1 IMa[t]
eq[Intervention_][4] :=
 IS'[t] == (1 - p) α EE[t] - ν IS[t] - λawareness[t] IS[t] + μ2 ISa[t]
eq[Intervention_][5] := IQ'[t] == ν IS[t] - γ2 IQ[t] - η IQ[t]
eq[Intervention_][6] := IQa'[t] == ν^a ISa[t] - γ3 IQa[t] - ηa IQa[t]
eq[Intervention_][7] := R'[t] == γ1 IM[t] + γ1 IMa[t] + γ2 IQ[t] + γ3 IQa[t]
eq[Intervention_][8] := RQ'[t] == γ2 IQ[t] + γ3 IQa[t]
eq[Intervention_][9] :=
 Sa'[t] == -λa[Intervention][t] Sa[t] + k λawareness[t] S[t] - μ1 Sa[t]
eq[Intervention_][10] :=
 EEa'[t] == λa[Intervention][t] Sa[t] - α EEa[t] + k λawareness[t] EE[t] - μ1 EEa[t]
eq[Intervention_][11] :=
 IMa'[t] == p α EEa[t] - γ1 IMa[t] + k λawareness[t] IM[t] - μ1 IMa[t]
eq[Intervention_][12] :=
 ISa'[t] == (1 - p) α EEa[t] - ν^a ISa[t] + λawareness[t] IS[t] - μ2 ISa[t]
eq[Intervention_][13] := DD'[t] == η IQ[t] + ηa IQa[t]
eq[Intervention_][14] := DDQ'[t] == η IQ[t]
eq[Intervention_][15] := DDQa'[t] == ηa IQa[t]
eq[Intervention_][16] := RM'[t] == γ1 IM[t] - k λawareness[t] RM[t] + μ1 RMa[t]
eq[Intervention_][17] := RMa'[t] == γ1 IMa[t] + k λawareness[t] RM[t] - μ1 RMa[t]
```

Numer of variables in the model (including deceased individuals)

In[26]:=
```
numvar = 17
eqs[Intervention_] := Table[eq[Intervention][i], {i, 1, numvar}]
lhs[Intervention_] := eqs[Intervention][[All, 1]];
rhs[Intervention_] := eqs[Intervention][[All, 2]];
TableForm[eqs[Intervention]]
```

Out[26]= 17

Out[30]//TableForm=

$$S'[t] == Sa[t]\,\mu_1 - k\,S[t]\,\lambda_{awareness}[t] - S[t]\,\lambda[Intervention][t]$$
$$EE'[t] == -\alpha\,EE[t] + EEa[t]\,\mu_1 - k\,EE[t]\,\lambda_{awareness}[t] + S[t]\,\lambda[Intervention][t]$$
$$IM'[t] == p\,\alpha\,EE[t] - IM[t]\,\gamma_1 + IMa[t]\,\mu_1 - k\,IM[t]\,\lambda_{awareness}[t]$$
$$IS'[t] == (1-p)\,\alpha\,EE[t] - \nu\,IS[t] + ISa[t]\,\mu_2 - IS[t]\,\lambda_{awareness}[t]$$
$$IQ'[t] == -\eta\,IQ[t] + \nu\,IS[t] - IQ[t]\,\gamma_2$$
$$IQa'[t] == \nu^a\,ISa[t] - IQa[t]\,\gamma_3 - IQa[t]\,\eta_a$$
$$R'[t] == IM[t]\,\gamma_1 + IMa[t]\,\gamma_1 + IQ[t]\,\gamma_2 + IQa[t]\,\gamma_3$$
$$RQ'[t] == IQ[t]\,\gamma_2 + IQa[t]\,\gamma_3$$
$$Sa'[t] == -Sa[t]\,\mu_1 + k\,S[t]\,\lambda_{awareness}[t] - Sa[t]\,\lambda_a[Intervention][t]$$
$$EEa'[t] == -\alpha\,EEa[t] - EEa[t]\,\mu_1 + k\,EE[t]\,\lambda_{awareness}[t] + Sa[t]\,\lambda_a[Intervention][t]$$
$$IMa'[t] == p\,\alpha\,EEa[t] - IMa[t]\,\gamma_1 - IMa[t]\,\mu_1 + k\,IM[t]\,\lambda_{awareness}[t]$$
$$ISa'[t] == (1-p)\,\alpha\,EEa[t] - \nu^a\,ISa[t] - ISa[t]\,\mu_2 + IS[t]\,\lambda_{awareness}[t]$$
$$DD'[t] == \eta\,IQ[t] + IQa[t]\,\eta_a$$
$$DDQ'[t] == \eta\,IQ[t]$$
$$DDQa'[t] == IQa[t]\,\eta_a$$
$$RM'[t] == IM[t]\,\gamma_1 + RMa[t]\,\mu_1 - k\,RM[t]\,\lambda_{awareness}[t]$$
$$RMa'[t] == IMa[t]\,\gamma_1 - RMa[t]\,\mu_1 + k\,RM[t]\,\lambda_{awareness}[t]$$

Model variables

In[31]:=
```
vars = {S[t], EE[t], IM[t], IS[t], IQ[t], IQa[t], R[t], RQ[t],
   Sa[t], EEa[t], IMa[t], ISa[t], DD[t], DDQ[t], DDQa[t], RM[t], RMa[t]}
```

Out[31]= {S[t], EE[t], IM[t], IS[t], IQ[t], IQa[t], R[t], RQ[t], Sa[t], EEa[t], IMa[t], ISa[t], DD[t], DDQ[t], DDQa[t], RM[t], RMa[t]}

Total population size N(t) is not constant due to disease-related mortality

In[32]:=
```
NN[t] = S[t] + EE[t] + IM[t] + IS[t] +
   IQ[t] + IQa[t] + R[t] + Sa[t] + EEa[t] + IMa[t] + ISa[t]
```

Out[32]= EE[t] + EEa[t] + IM[t] + IMa[t] + IQ[t] + IQa[t] + IS[t] + ISa[t] + R[t] + S[t] + Sa[t]

Awareness acquisition rate $\lambda_{awareness}(t)$

In[33]:=
```
λawareness[t] = δ (IQ[t] + IQa[t])
```

Out[33]= δ (IQ[t] + IQa[t])

Vector of infectious individuals

In[34]:=
```
VecInf = {IM[t], IS[t], IMa[t], ISa[t]}
```

Out[34]= {IM[t], IS[t], IMa[t], ISa[t]}

Transmission matrix for self-imposed measures and government intervention

Model with disease-awareness and without interventions

```
In[35]:= TrMatrix[Intervention_ /; Intervention == "Baseline"] :=
          β / (NN[t] - IQ[t] - IQa[t]) {{σ, 1, σ, 1}, {σ, 1, σ, 1}}
```

Model with disease-awareness and mask-wearing

```
In[36]:= TrMatrix[Intervention_ /; Intervention == "Mask"] :=
          β / (NN[t] - IQ[t] - IQa[t]) {{σ, 1, r1 σ, r1}, {σ, 1, r1 σ, r1}}
```

Model with disease-awareness and handwashing

```
In[37]:= TrMatrix[Intervention_ /; Intervention == "Hand"] :=
          β / (NN[t] - IQ[t] - IQa[t]) {{σ, 1, σ, 1}, {r2 σ, r2, r2 σ, r2}}
```

Model with disease-awareness and self-imposed social distancing

```
In[38]:= TrMatrix[Intervention_ /; Intervention == "ContactReductionIndividuals"] :=
          β / (S[t] + EE[t] + IM[t] + IS[t] + RQ[t] +
               RM[t] + r3 (Sa[t] + EEa[t] + IMa[t] + ISa[t] + RMa[t]))
           {{σ, 1, r3 σ, r3}, {r3 σ, r3, (r3)^2 σ, (r3)^2}}
```

Model with disease-awareness and government-imposed social distancing

```
In[39]:= TrMatrix[Intervention_ /; Intervention == "ContactReductionGovernment"] :=
          ((β If[t ≥ StartTime && t ≤ (StopTime + StartTime), r4, 1]) / (NN[t] - IQ[t] - IQa[t]))
           {{σ, 1, σ, 1}, {σ, 1, σ, 1}}
```

Model with disease-awareness, government-imposed social distancing and handwashing

```
In[40]:= TrMatrix[Intervention_ /; Intervention == "GovernmentAndHand"] :=
          ((β If[t ≥ StartTime && t ≤ (StopTime + StartTime), r4, 1]) / (NN[t] - IQ[t] - IQa[t]))
           {{σ, 1, σ, 1}, {r2 σ, r2, r2 σ, r2}}
```

Force of infection for unaware $\lambda(t)$

```
In[41]:= λ[Intervention_][t] := (TrMatrix[Intervention].VecInf)[[1]]
```

Force of infection for disease-aware $\lambda_a(t)$

```
In[42]:= λa[Intervention_][t] := (TrMatrix[Intervention].VecInf)[[2]]
```

Epidemiological parameters of the model

Average contact rate (unique persons), 1/year

In[43]:= **AverageContactRate = c → 13.85 × 365**

Out[43]= c → 5055.25

Relative infectivity of mildly infected

In[44]:= **RelativeInfectivity = σ → 0.5**

Out[44]= σ → 0.5

1/latent period, 1/year

In[45]:= **RateInfectiousnessOnset = α → 365 / 4**

Out[45]= $\alpha \to \frac{365}{4}$

Proportion of mildly infected

In[46]:= **ProportionMildSymptoms = p → 0.82**

Out[46]= p → 0.82

1/recovery period of mildly infected, 1/year

In[47]:= **RecoveryRateMildSymptoms = γ1 → 365 / 7**

Out[47]= $\gamma_1 \to \frac{365}{7}$

1/delay from onset of infectiousness to diagnosis for individuals with severe symptoms, 1/year

In[48]:= **DiagnosisRate = ν → 365 / 5**

Out[48]= ν → 73

1/delay from diagnosis to recovery for diagnosed unaware, 1/year

In[49]:= **RecoveryRateSevereSymptomsUnaware = γ2 → 365 / 14**

Out[49]= $\gamma_2 \to \frac{365}{14}$

Case fatality rate of unaware diagnosed

In[50]:= **FatalityRateUnaware = f → 0.016**

Out[50]= f → 0.016

Disease-associated death rate of unaware diagnosed, 1/year

In[51]:=
```
DeathRateDiagnosedUnaware =
  η → γ2 f / (1 - f) /. {RecoveryRateSevereSymptomsUnaware, FatalityRateUnaware}
```

Out[51]= $\eta \to 0.423926$

Basic reproduction number

In[52]:=
```
BasicReproductionNumber = R0 → 2.5
```

Out[52]= $R_0 \to 2.5$

Probability of transmission per contact with infectious with severe symptoms

In[53]:=
```
TransmissionProbability = Solve[R0 == p β σ / γ1 + (1 - p) β / ν /. β → c ϵ, ϵ][[1, 1]] /.
  {ProportionMildSymptoms, AverageContactRate, RelativeInfectivity,
   RecoveryRateMildSymptoms, DiagnosisRate, BasicReproductionNumber}
```

Out[53]= $\epsilon \to 0.0478794$

Transmission rate of infection via contact with infectious with severe symptoms, 1/year

In[54]:=
```
TransmissionRate = β → c ϵ /. {AverageContactRate, TransmissionProbability}
```

Out[54]= $\beta \to 242.042$

Disease-awareness parameters of the model

Rate of awareness acquisition, 1/year

In[55]:=
```
AcquisitionRateAwarenessBaseline = 1 (*5 10^(-5)*) (* δ *)
```

Out[55]= 1

Relative susceptibility to awareness acquisition for susceptible, exposed, infectious with mild symptoms and recovered after a mild infection

In[56]:=
```
RelativeSusceptibilityAwarenessBaseline = 0.5 (* k *)
```

Out[56]= 0.5

Rate of awareness fading for individuals who are susceptible, exposed, infectious with mild symptoms and recovered after a mild infection, 1/year

In[57]:=
```
RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline = 365 / 30 (* μ1 *)
```

Out[57]= $\frac{73}{6}$

Rate of awareness fading for individuals with severe symptoms, 1/year

In[58]:=
```
RateAwarenessFadingSevereSymptomsBaseline = 365 / 60 (* μ2 *)
```

Out[58]=
$$\frac{73}{12}$$

1/delay from onset of infectiousness to diagnosis for disease-aware with severe symptoms, 1/year

In[59]:=
```
DiagnosisRateAwareBaseline = 365 / 3 (* ν^a *)
```

Out[59]=
$$\frac{365}{3}$$

1/delay from diagnosis to recovery of diagnosed aware, 1/year

In[60]:=
```
RecoveryRateSevereSymptomsAware = γ3 → 365 / 12
```

Out[60]=
$$\gamma_3 \to \frac{365}{12}$$

Case fatality rate of aware diagnosed

In[61]:=
```
FatalityRateAware = fa → 0.01
```

Out[61]=
$$f_a \to 0.01$$

Disease-associated death rate of aware diagnosed, 1/year

In[62]:=
```
DeathRateDiagnosedAware =
  ηa → γ3 fa / (1 - fa) /. {RecoveryRateSevereSymptomsAware, FatalityRateAware}
```

Out[62]=
$$\eta_a \to 0.307239$$

Prevention measures parameters of the model

Duration of government intervention, years

In[63]:=
```
StopTime = 3 / 12;
```

Threshold for initiation of government intervention (10 diagnosed individuals in this notebook) Please note that if the threshold for initiation of government intervention is larger than 10 individuals, StartTime can be different for fast and slow spread of awareness (Check it!)

In[64]:=
```
StartTimeBaseline = 0.1037;
```

Parameters of the model

In[65]:=
```
Parameters[RelativeSusceptibilityAwareness_,
  RateAwarenessFadingSusceptibleExposedMildSymptoms_,
  RateAwarenessFadingSevereSymptoms_, TransmissionRateAwareness_,
  DiagnosisRateAware_, StartTimeValue_] :=
 {AverageContactRate, RelativeInfectivity, RateInfectiousnessOnset,
  ProportionMildSymptoms, RecoveryRateMildSymptoms, DiagnosisRate,
  RecoveryRateSevereSymptomsUnaware, RecoveryRateSevereSymptomsAware,
  FatalityRateUnaware, FatalityRateAware, DeathRateDiagnosedUnaware,
  DeathRateDiagnosedAware, BasicReproductionNumber, TransmissionProbability,
  TransmissionRate, k → RelativeSusceptibilityAwareness,
  μ1 → RateAwarenessFadingSusceptibleExposedMildSymptoms,
  μ2 → RateAwarenessFadingSevereSymptoms, δ → TransmissionRateAwareness,
  ν^a → DiagnosisRateAware, StartTime → StartTimeValue}
```

Solving differential equations

Start time, year

In[66]:=
```
t_start = 0
```

Out[66]= 0

End time, year

In[67]:=
```
t_end = 2.5;
```

Total population size at the beginning of an outbreak

In[68]:=
```
Ntot = 17 × 10^6
```

Out[68]= 17 000 000

Initial number of infected individuals

In[69]:=
```
InfInit = 1
```

Out[69]= 1

Number of points per day for discretization of the solution

In[70]:=
```
spacing = 20;
```

Initial conditions

In[71]:=
```
ics = Table[ic[i], {i, 1, numvar}];

ic[1] = (Ntot - InfInit) == vars[[1]] /. {t → t_start}
ic[2] = 0 == vars[[2]] /. {t → t_start}
ic[3] = 0 == vars[[3]] /. {t → t_start}
ic[4] = InfInit == vars[[4]] /. {t → t_start}
ic[5] = 0 == vars[[5]] /. {t → t_start}
ic[6] = 0 == vars[[6]] /. {t → t_start}
ic[7] = 0 == vars[[7]] /. {t → t_start}
ic[8] = 0 == vars[[8]] /. {t → t_start}
ic[9] = 0 == vars[[9]] /. {t → t_start}
ic[10] = 0 == vars[[10]] /. {t → t_start}
ic[11] = 0 == vars[[11]] /. {t → t_start}
ic[12] = 0 == vars[[12]] /. {t → t_start}
ic[13] = 0 == vars[[13]] /. {t → t_start}
ic[14] = 0 == vars[[14]] /. {t → t_start}
ic[15] = 0 == vars[[15]] /. {t → t_start}
ic[16] = 0 == vars[[16]] /. {t → t_start}
ic[17] = 0 == vars[[17]] /. {t → t_start}
```

Out[72]= $16\,999\,999 == S[0]$

Out[73]= $0 == EE[0]$

Out[74]= $0 == IM[0]$

Out[75]= $1 == IS[0]$

Out[76]= $0 == IQ[0]$

Out[77]= $0 == IQa[0]$

Out[78]= $0 == R[0]$

Out[79]= $0 == RQ[0]$

Out[80]= $0 == Sa[0]$

Out[81]= $0 == EEa[0]$

Out[82]= $0 == IMa[0]$

Out[83]= $0 == ISa[0]$

Out[84]= $0 == DD[0]$

Out[85]= $0 == DDQ[0]$

Out[86]= $0 == DDQa[0]$

Out[87]= $0 == RM[0]$

Out[88]= $0 == RMa[0]$

Solution

In[89]:=
```
solution[Intervention_, Parameters_] :=
  NDSolve[Join[eqs[Intervention], ics] /. Parameters, vars, {t, t_start, t_end}];
```

Computing peak number of diagnoses per 1000 persons

```
In[90]:= Peak[Intervention_, Parameters_] :=
          Max[Flatten[Table[Evaluate[(1000 (IQ[t] + IQa[t]) / NN[t]) /. First@solution[
                  Intervention, Parameters]], {t, t_start, t_end, 1 / (t_end 364 spacing)}]]]
```

Model without disease-awareness

```
In[91]:= PeakBaseline = Peak["Baseline", Parameters[0, 0, 0, 0, 0, 0]]
Out[91]= 45.7976
```

Model with disease-awareness, no measures

```
In[92]:= PeakAwareness =
          Peak["Baseline", Parameters[RelativeSusceptibilityAwarenessBaseline,
            RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
            RateAwarenessFadingSevereSymptomsBaseline, AcquisitionRateAwarenessBaseline,
            DiagnosisRateAwareBaseline, StartTimeBaseline]]
Out[92]= 37.0119
```

Model with disease-awareness and handwashing with 30% efficacy

```
In[93]:= PeakHand = Peak["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
             RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
             RateAwarenessFadingSevereSymptomsBaseline,
             AcquisitionRateAwarenessBaseline,
             DiagnosisRateAwareBaseline, StartTimeBaseline], {r_2 → 0.7}]]
Out[93]= 15.884
```

Computing time until the peak number of diagnoses since the first case (days)

```
In[94]:= PeakTiming[Intervention_, Parameters_] :=
          365 × 1 / ((t_end 364  spacing) + 1) ReplaceAll[
             Ordering[Flatten[Table[Evaluate[(1000 (IQ[t] + IQa[t]) / NN[t]) /. First@
                     solution[Intervention, Parameters]],
                 {t, t_start, t_end, 1 / (t_end 364 spacing)}]], -1][[1]],
            (x_ /; x == Length[Table[t, {t, t_start, t_end, 1 / (t_end 364 spacing)}]]) → 0] // N
```

Model without disease-awareness

```
In[95]:= PeakTimingBaseline = PeakTiming["Baseline", Parameters[0, 0, 0, 0, 0, 0]]
Out[95]= 155.417
```

Model with disease-awareness, no measures

In[96]:=
```
PeakTimingAwareness =
 PeakTiming["Baseline", Parameters[RelativeSusceptibilityAwarenessBaseline,
   RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
   RateAwarenessFadingSevereSymptomsBaseline, AcquisitionRateAwarenessBaseline,
   DiagnosisRateAwareBaseline, StartTimeBaseline]]
```

Out[96]= 162.797

Model with disease-awareness and handwashing with 30% efficacy

In[97]:=
```
PeakTimingHand =
 PeakTiming["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline,
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₂ → 0.7}]]
```

Out[97]= 237.297

Plotting Figure 3 A (main text)

In[98]:=
```
imagePadding = {{47.5, 5}, {60, 22.5}};

ymax = 50;
tmax = 1;

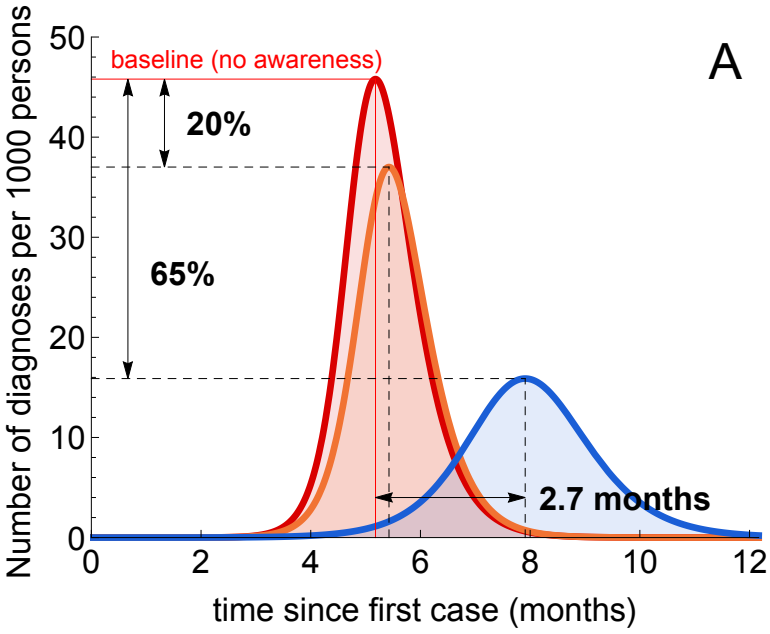
PlotFigure3A[vars_, ylabs_, scenario_] :=
 Table[Show[Plot[{Evaluate[vars[[i]] /. solution["Baseline",
          Parameters[0, 0, 0, 0, 0, 0]]], Evaluate[vars[[i]] /.
         solution[scenario, Parameters[RelativeSusceptibilityAwarenessBaseline,
           RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
           RateAwarenessFadingSevereSymptomsBaseline,
           AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
           StartTimeBaseline]]], Evaluate[vars[[i]] /. solution["Hand",
          Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
            RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
            RateAwarenessFadingSevereSymptomsBaseline,
            AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
            StartTimeBaseline], {r₂ → 0.7}]]]},
      {t, t_start, tmax}, AspectRatio → 0.75, ImageSize → 400,
      PlotRangePadding → None,
      Filling → Axis,
      PlotRange → {{0, All}, {0, ymax}},
      AxesOrigin → {0, 0},
      Frame → {{True, False}, {True, False}},
      FrameStyle → Directive[Black, 17],
      PlotStyle → {{Thickness[0.01], RGBColor[217 / 255, 0, 0]},
        {Thickness[0.01], RGBColor[241 / 255, 115 / 255, 51 / 255]},
        {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]}},
      FillingStyle -> Directive[Opacity[0.125]],
      ImagePadding → imagePadding,
      (*PlotLegends→Placed[{Table[Style[Row[{label}],Black,13,"Text"],{label,
           {"Model without awareness","Model with awareness, no measures",
            "Model with awareness and handwashing with 30% efficacy"}}]},
        Bottom],*)FrameLabel → {{ylabs[[i]], None},
        {"time since first case (months)", None}},
      FrameTicks → {{Automatic, None}, {{{0, "0"}, {60 / 365, "2"},
```

```
        {120 / 365, "4"}, {180 / 365, "6"}, {240 / 365, "8"},
        {300 / 365, "10"}, {360 / 365, "12"}}, None}}],
    Graphics[{Red, Line[{{PeakTimingBaseline / 365, 0},
       {PeakTimingBaseline / 365, PeakBaseline}}]}], Graphics[
     {Red, Line[{{0, PeakBaseline}, {PeakTimingBaseline / 365, PeakBaseline}}]}],
    Graphics[{Black, Dashed, Line[{{PeakTimingAwareness / 365, 0},
       {PeakTimingAwareness / 365, PeakAwareness}}]}], Graphics[{Black, Dashed,
      Line[{{0, PeakAwareness}, {PeakTimingAwareness / 365, PeakAwareness}}]}],
    Graphics[{Black, Dashed, Line[{{PeakTimingHand / 365, 0},
       {PeakTimingHand / 365, PeakHand}}]}], Graphics[
     {Black, Dashed, Line[{{0, PeakHand}, {PeakTimingHand / 365, PeakHand}}]}],
    Graphics[Text[StyleForm["A", FontSize → 26], {1 * 0.95, ymax * 0.95}]],
    Graphics[{Black, Arrowheads[{-.025, .025}],
      Arrow[{{40 / 365, PeakBaseline}, {40 / 365, PeakAwareness}}]}],
    Graphics[{Black, Arrowheads[{-.025, .025}],
      Arrow[{{20 / 365, PeakBaseline}, {20 / 365, PeakHand}}]}],
    Graphics[{Black, Arrowheads[{-.025, .025}],
      Arrow[{{PeakTimingBaseline / 365, 4}, {PeakTimingHand / 365, 4}}]}],
    Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
       FontColor → Red], {85 / 365, PeakBaseline + 2}]],
    Graphics[Text[StyleForm["20%", FontSize → 17, FontWeight -> "Bold"],
      {70 / 365, (PeakBaseline - PeakAwareness) / 2 + PeakAwareness}]],
    Graphics[Text[StyleForm["65%", FontSize → 17, FontWeight -> "Bold"],
      {50 / 365, (PeakAwareness - PeakHand) / 2 + PeakHand}]],
    Graphics[Text[StyleForm["2.7 months", FontSize → 17, FontWeight -> "Bold"],
      {0.8, 4}]]], {i, 1, Length[vars]}][[1]]

fig3A = PlotFigure3A[{1000 (IQ[t] + IQa[t]) / NN[t]},
  {"Number of diagnoses per 1000 persons"}, "Baseline"]

Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//GitHub//
     Figures//Figure3A", ".eps"], fig3A];
Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
     Figure3A", ".eps"], fig3A];
```

Out[102]=



Computing the deaths at baseline (%)

In[150]:=
```
Deaths[Intervention_, Parameters_] :=
 Max[Flatten[Table[Evaluate[DD[t] /. First@solution[Intervention, Parameters]],
    {t, tstart, tend, 1 / (tend 364 spacing)}]]]
```

```
DeathsBaseline = Deaths["Baseline", Parameters[0, 0, 0, 0, 0, 0]]
```

Out[151]= 44 205.2

Computing the attack rate (%)

In[105]:=
```
AttackRate[Intervention_, Parameters_] :=
 Max[Flatten[Table[Evaluate[((RQ[t] + DD[t]) / Ntot 100) /. First@solution[
        Intervention, Parameters]], {t, tstart, tend, 1 / (tend 364 spacing)}]]]
```

Model without disease-awareness

```
AttackRateBaseline = AttackRate["Baseline", Parameters[0, 0, 0, 0, 0, 0]]
```

Out[106]= 16.2519

Model with disease-awareness, no measures

In[107]:=
```
AttackRateAwareness =
 AttackRate["Baseline", Parameters[RelativeSusceptibilityAwarenessBaseline,
   RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
   RateAwarenessFadingSevereSymptomsBaseline, AcquisitionRateAwarenessBaseline,
   DiagnosisRateAwareBaseline, StartTimeBaseline]]
```

Out[107]= 15.5895

Model with disease-awareness and handwashing with 30% efficacy

In[108]:=
```
AttackRateHand =
 AttackRate["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline,
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r2 → 0.7}]]
```

Out[108]=
```
11.5675
```

Plotting Figure 3 B (main text)

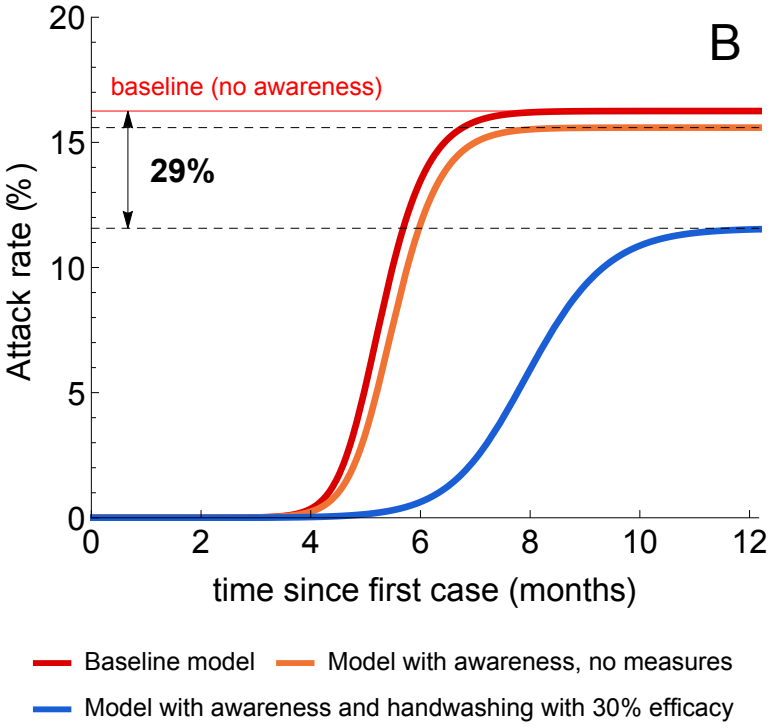
In[139]:=
```
imagePadding = {{47.5, 5}, {60, 22.5}};

PlotFigure3B[vars_, ylabs_, scenario_] :=
 Table[Show[Plot[{Evaluate[vars[[i]] /. solution["Baseline",
          Parameters[0, 0, 0, 0, 0, 0]]], Evaluate[vars[[i]] /.
         solution[scenario, Parameters[RelativeSusceptibilityAwarenessBaseline,
           RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
           RateAwarenessFadingSevereSymptomsBaseline,
           AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
           StartTimeBaseline]]], Evaluate[vars[[i]] /. solution["Hand",
          Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
            RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
            RateAwarenessFadingSevereSymptomsBaseline,
            AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
            StartTimeBaseline], {r2 → 0.7}]]]},
      {t, tstart, tmax}, AspectRatio → 0.75, ImageSize → 400,
      ImagePadding → imagePadding,
      PlotRangePadding → None,
      PlotRange → {{0, All}, {0, 20}},
      AxesOrigin → {0, 0},
      Frame → {{True, False}, {True, False}},
      PlotLegends → Placed[{Table[Style[Row[{label}], Black, 13, "Text"],
          {label, {"Baseline model", "Model with awareness, no measures",
            "Model with awareness and handwashing with 30% efficacy"}}]},
        Bottom], FrameStyle → Directive[Black, 17],
      PlotStyle → {{Thickness[0.01], RGBColor[217 / 255, 0, 0]},
        {Thickness[0.01], RGBColor[241 / 255, 115 / 255, 51 / 255]},
        {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]}},
      FrameLabel → {{ylabs[[i]], None}, {"time since first case (months)", None}},
      FrameTicks → {{Automatic, None}, {{{0, "0"}, {60 / 365, "2"},
          {120 / 365, "4"}, {180 / 365, "6"}, {240 / 365, "8"}, {300 / 365, "10"},
          {360 / 365, "12"}, {420 / 365, "14"}, {480 / 365, "16"}, {540 / 365, "18"},
          {600 / 365, "20"}, {660 / 365, "22"}, {720 / 365, "24"}}, None}}],
     Graphics[Text[StyleForm["B", FontSize → 26], {1 * 0.95, 20 * 0.95}]],
     Graphics[{Red, Line[{{0, AttackRateBaseline}, {1, AttackRateBaseline}}]}],
     Graphics[{Black, Dashed,
       Line[{{0, AttackRateAwareness}, {1, AttackRateAwareness}}]}],
     Graphics[{Black, Dashed, Line[{{0, AttackRateHand}, {1, AttackRateHand}}]}],
     Graphics[{Black, Arrowheads[{-.025, .025}],
       Arrow[{{20 / 365, AttackRateHand}, {20 / 365, AttackRateBaseline}}]}],
     Graphics[Text[StyleForm["29%", FontSize → 17, FontWeight -> "Bold"],
       {50 / 365, (AttackRateBaseline - AttackRateHand) / 2 + AttackRateHand}]],
     Graphics[Text[StyleForm["baseline (no awareness)",
        FontSize → 13, FontColor → Red],
       {85 / 365, AttackRateBaseline + 1}]]], {i, 1, Length[vars]}][[1]]

fig3B = PlotFigure3B[{(RQ[t] + DD[t]) / Ntot 100}, {"Attack rate (%)"}, "Baseline"]

Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//GitHub//
     Figures//Figure3B", ".eps"], fig3B];
Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
     Figure3B", ".eps"], fig3B];
```

Out[141]=



Combined intervention: government-imposed social distancing and handwashing (fast spread of awareness)

Time when government-imposed social distancing has to start (10 diagnoses)

In[411]:=
```
(IQ[t] + IQa[t]) /.
  solution["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
     RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
     RateAwarenessFadingSevereSymptomsBaseline,
     AcquisitionRateAwarenessBaseline,
     DiagnosisRateAwareBaseline, 0], {r2 → 0.7}]] /. t → 0.10437
```

Out[411]=
```
{10.0016}
```

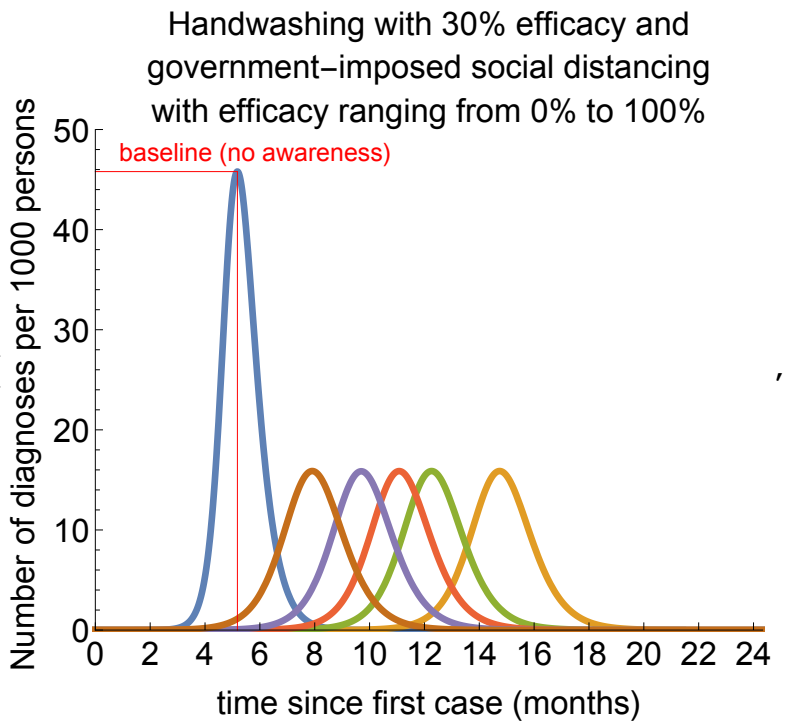
Impact of government-imposed social distancing with efficacy ranging from 0% ($r_4 = 1$) to 100% ($r_4 = 0$) and handwashing with 30% efficacy ($r_2 = 0.7$)

In[277]:=
```
imagePadding = {{47.5, 5}, {60, 0}};
relvars = {1000 (IQ[t] + IQa[t]) / NN[t], (RQ[t] + DD[t]) / Ntot 100};
relyalabs = {"Number of diagnoses per 1000 persons", "Attack rate (%)"};
relylim = {50, 20};
ReductionFactor = Table[i, {i, 0, 1, 0.25}];

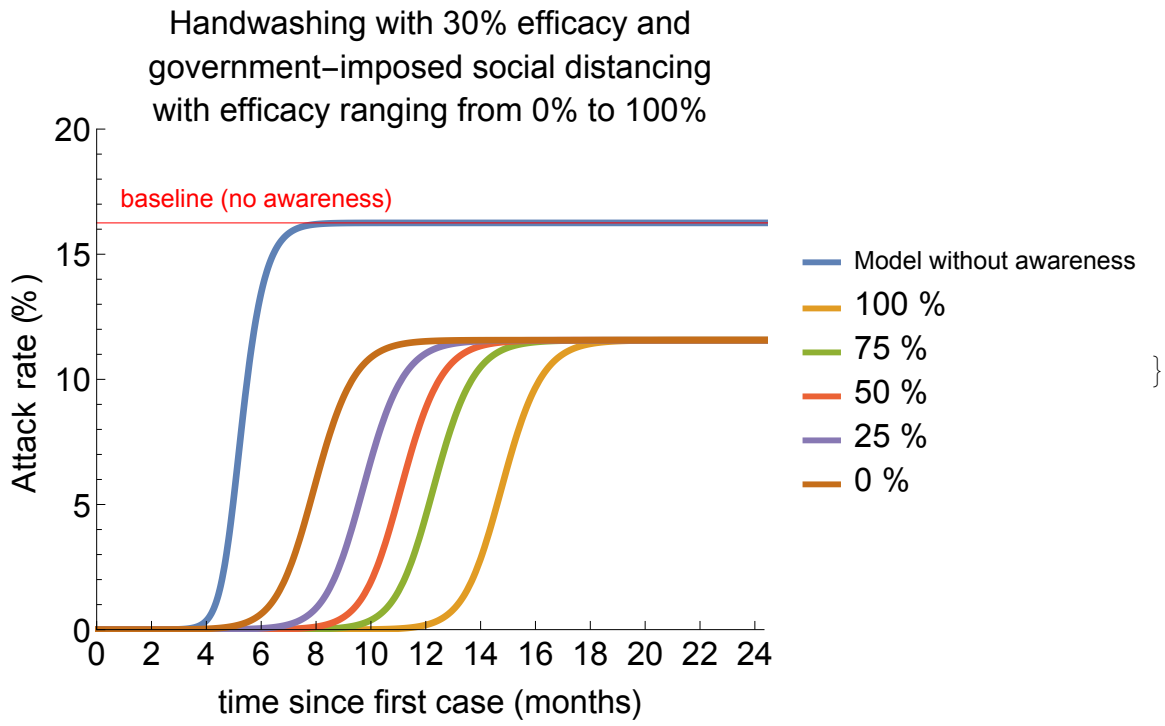
PlotCombinedIntervention[vars_, ylabs_, ylim_,
  scenario_, title_, parameters_, range_, legend_] := Table[Show[
   Plot[{Evaluate[vars[[i]] /. solution["Baseline", Parameters[0, 0, 0, 0, 0, 0]]],
     Evaluate[Table[vars[[i]] /. solution[scenario, parameters], range]]},
    {t, tstart, tend}, AspectRatio → 0.75, ImageSize → 400, PlotRangePadding → None,
    PlotRange → {{0, 2}, {0, ylim[[i]]}}, AxesOrigin → {0, 0},
    Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
    PlotStyle → Thickness[0.01], PlotLabel → Style[title, 17, Black],
    FrameLabel → {{ylabs[[i]], None}, {"time since first case (months)", None}},
    ImagePadding → imagePadding,
    FrameTicks → {{Automatic, None}, {{{0, "0"}, {60 / 365, "2"}, {120 / 365, "4"},
        {180 / 365, "6"}, {240 / 365, "8"}, {300 / 365, "10"}, {360 / 365, "12"},
        {420 / 365, "14"}, {480 / 365, "16"}, {540 / 365, "18"}, {600 / 365, "20"},
        {660 / 365, "22"}, {720 / 365, "24"}}, None}}, PlotLegends →
    If[i == 2, Prepend[Table[Style[Row[legend], Black, 17, "Text"], range],
      "Model without awareness"], None]], If[i == 2, {Graphics[
     {Red, Line[{{0, AttackRateBaseline}, {tend, AttackRateBaseline}}]}],
    Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
       FontColor → Red], {175 / 365, AttackRateBaseline + 1}]]},
   {Graphics[{Red, Line[{{PeakTimingBaseline / 365, 0},
       {PeakTimingBaseline / 365, PeakBaseline}}]}], Graphics[{Red,
     Line[{{0, PeakBaseline}, {PeakTimingBaseline / 365, PeakBaseline}}]}],
    Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
       FontColor → Red], {175 / 365, PeakBaseline + 2}]]}]], {i, 1, Length[vars]}]

PlotCombinedIntervention[relvars, relyalabs, relylim, "GovernmentAndHand",
 "Handwashing with 30% efficacy and\ngovernment-imposed
   social distancing\nwith efficacy ranging from 0% to 100%",
 Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
   RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
   RateAwarenessFadingSevereSymptomsBaseline, AcquisitionRateAwarenessBaseline,
   DiagnosisRateAwareBaseline, 0.10437], {r2 → 0.7}, {r4 → factor}],
 {factor, ReductionFactor}, {IntegerPart[(1 - factor) 100], " %"}]
```

Out[283]=


Handwashing with 30% efficacy and
government−imposed social distancing
with efficacy ranging from 0% to 100%
baseline (no awareness)
Number of diagnoses per 1000 persons
0
10
20
30
40
50
0 2 4 6 8 10 12 14 16 18 20 22 24
time since first case (months)

,


Handwashing with 30% efficacy and
government−imposed social distancing
with efficacy ranging from 0% to 100%
baseline (no awareness)
Attack rate (%)
0
5
10
15
20
0 2 4 6 8 10 12 14 16 18 20 22 24
time since first case (months)
Model without awareness
100 %
75 %
50 %
25 %
0 %

Computing the relative reduction in peak number of diagnoses per 1000 persons (%) for an efficacy of prevention measure ranging from 0% to 100%

In[113]:=
```
ReductionFactor = Table[i, {i, 0, 1, 0.01}];

PeakRange[Intervention_, Parameters_] := Table[{100 (1 - factor),
   100 (PeakBaseline - Max[Flatten[Table[Evaluate[(1000 (IQ[t] + IQa[t]) / NN[t]) /.
            First@solution[Intervention, Parameters]], {t, tstart, tend,
           1 / (tend 364 spacing)}]]]) / PeakBaseline}, {factor, ReductionFactor}]
```

Model with disease-awareness and mask-wearing

In[520]:=
```
PeakMaskRange =
 PeakRange["Mask", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r1 → factor}]]
```

Out[520]=
```
{{100., 99.9897}, {99., 99.9895}, {98., 99.9894}, {97., 99.9892}, {96., 99.9891},
 {95., 99.9889}, {94., 99.9887}, {93., 99.9886}, {92., 99.9884}, {91., 99.9882},
 {90., 99.988}, {89., 99.9878}, {88., 99.9876}, {87., 99.9874}, {86., 99.9872},
 {85., 99.987}, {84., 99.9867}, {83., 99.9865}, {82., 99.9862}, {81., 99.986},
 {80., 99.9857}, {79., 99.9854}, {78., 99.9851}, {77., 99.9847}, {76., 99.9844},
 {75., 99.984}, {74., 99.9837}, {73., 99.9832}, {72., 99.9828}, {71., 99.9823},
 {70., 99.9818}, {69., 99.9812}, {68., 99.9806}, {67., 99.9799}, {66., 99.9792},
 {65., 99.9783}, {64., 99.9772}, {63., 99.9758}, {62., 99.9733}, {61., 99.9687},
 {60., 99.9621}, {59., 99.9522}, {58., 99.9356}, {57., 99.9046}, {56., 99.8396},
 {55., 99.6973}, {54., 99.4204}, {53., 98.9754}, {52., 98.3611}, {51., 97.5905},
 {50., 96.6796}, {49., 95.6439}, {48., 94.4978}, {47., 93.2544}, {46., 91.9255},
 {45., 90.5218}, {44., 89.053}, {43., 87.5278}, {42., 85.9542}, {41., 84.3393},
 {40., 82.6896}, {39., 81.011}, {38., 79.3088}, {37., 77.5876}, {36., 75.8518},
 {35., 74.1053}, {34., 72.3514}, {33., 70.5933}, {32., 68.8339}, {31., 67.0755},
 {30., 65.3205}, {29., 63.5709}, {28., 61.8284}, {27., 60.0946},
 {26., 58.3709}, {25., 56.6586}, {24., 54.9588}, {23., 53.2724},
 {22., 51.6003}, {21., 49.9432}, {20., 48.3019}, {19., 46.6767},
 {18., 45.0683}, {17., 43.4769}, {16., 41.903}, {15., 40.3467}, {14., 38.8084},
 {13., 37.2881}, {12., 35.7861}, {11., 34.3024}, {10., 32.8369},
 {9., 31.3899}, {8., 29.9612}, {7., 28.5509}, {6., 27.1588}, {5., 25.7848},
 {4., 24.4289}, {3., 23.091}, {2., 21.771}, {1., 20.4686}, {0., 19.1837}}
```

Model with disease-awareness and handwashing

In[521]:=
```
PeakHandRange =
 PeakRange["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r₂ → factor}]]
```

Out[521]=
```
{{100., 99.989}, {99., 99.9889}, {98., 99.9887}, {97., 99.9885}, {96., 99.9884},
 {95., 99.9882}, {94., 99.988}, {93., 99.9879}, {92., 99.9877}, {91., 99.9875},
 {90., 99.9873}, {89., 99.9871}, {88., 99.9868}, {87., 99.9866}, {86., 99.9864},
 {85., 99.9861}, {84., 99.9859}, {83., 99.9856}, {82., 99.9853}, {81., 99.9851},
 {80., 99.9848}, {79., 99.9845}, {78., 99.9841}, {77., 99.9838}, {76., 99.9834},
 {75., 99.983}, {74., 99.9826}, {73., 99.9822}, {72., 99.9817}, {71., 99.9812},
 {70., 99.9807}, {69., 99.9801}, {68., 99.9794}, {67., 99.9787}, {66., 99.9779},
 {65., 99.9769}, {64., 99.9758}, {63., 99.9742}, {62., 99.9711}, {61., 99.9661},
 {60., 99.9588}, {59., 99.9478}, {58., 99.9295}, {57., 99.8958}, {56., 99.8267},
 {55., 99.6802}, {54., 99.401}, {53., 98.956}, {52., 98.3429}, {51., 97.5737},
 {50., 96.6642}, {49., 95.6299}, {48., 94.485}, {47., 93.2426}, {46., 91.9146},
 {45., 90.5117}, {44., 89.0436}, {43., 87.5191}, {42., 85.9461}, {41., 84.3318},
 {40., 82.6826}, {39., 81.0045}, {38., 79.3027}, {37., 77.5819},
 {36., 75.8465}, {35., 74.1003}, {34., 72.3467}, {33., 70.589}, {32., 68.8298},
 {31., 67.0717}, {30., 65.3169}, {29., 63.5675}, {28., 61.8252},
 {27., 60.0916}, {26., 58.3681}, {25., 56.656}, {24., 54.9564}, {23., 53.2701},
 {22., 51.5982}, {21., 49.9413}, {20., 48.3001}, {19., 46.675}, {18., 45.0667},
 {17., 43.4755}, {16., 41.9017}, {15., 40.3455}, {14., 38.8073},
 {13., 37.2871}, {12., 35.7852}, {11., 34.3015}, {10., 32.8362},
 {9., 31.3893}, {8., 29.9607}, {7., 28.5504}, {6., 27.1584}, {5., 25.7845},
 {4., 24.4287}, {3., 23.0909}, {2., 21.7709}, {1., 20.4685}, {0., 19.1837}}
```

Model with disease-awareness and self-imposed social distancing

In[522]:=
```
PeakSelfImposedDistancingRange = PeakRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r3 → factor}]]
```

Out[522]=
```
{{100., 99.9815}, {99., 99.9815}, {98., 99.9814}, {97., 99.9814}, {96., 99.9813},
 {95., 99.9813}, {94., 99.9812}, {93., 99.9811}, {92., 99.981}, {91., 99.9809},
 {90., 99.9808}, {89., 99.9807}, {88., 99.9805}, {87., 99.9804}, {86., 99.9802},
 {85., 99.9801}, {84., 99.9799}, {83., 99.9797}, {82., 99.9795}, {81., 99.9793},
 {80., 99.9791}, {79., 99.9788}, {78., 99.9785}, {77., 99.9782}, {76., 99.9779},
 {75., 99.9776}, {74., 99.9773}, {73., 99.9769}, {72., 99.9764}, {71., 99.976},
 {70., 99.9755}, {69., 99.9749}, {68., 99.9743}, {67., 99.9737}, {66., 99.9729},
 {65., 99.972}, {64., 99.9709}, {63., 99.9696}, {62., 99.9678}, {61., 99.9641},
 {60., 99.9578}, {59., 99.9482}, {58., 99.9325}, {57., 99.9037}, {56., 99.8448},
 {55., 99.7205}, {54., 99.4833}, {53., 99.1012}, {52., 98.5672}, {51., 97.8875},
 {50., 97.0726}, {49., 96.1339}, {48., 95.0826}, {47., 93.9295}, {46., 92.6848},
 {45., 91.3579}, {44., 89.958}, {43., 88.4934}, {42., 86.9718}, {41., 85.4006},
 {40., 83.7864}, {39., 82.1354}, {38., 80.4531}, {37., 78.745}, {36., 77.0156},
 {35., 75.2695}, {34., 73.5104}, {33., 71.7421}, {32., 69.9678},
 {31., 68.1905}, {30., 66.4129}, {29., 64.6373}, {28., 62.8661},
 {27., 61.1011}, {26., 59.3441}, {25., 57.5966}, {24., 55.8601},
 {23., 54.1358}, {22., 52.4247}, {21., 50.728}, {20., 49.0463}, {19., 47.3805},
 {18., 45.7311}, {17., 44.0988}, {16., 42.4839}, {15., 40.887}, {14., 39.3082},
 {13., 37.7479}, {12., 36.2063}, {11., 34.6835}, {10., 33.1797},
 {9., 31.6948}, {8., 30.2291}, {7., 28.7824}, {6., 27.3547}, {5., 25.946},
 {4., 24.5562}, {3., 23.1852}, {2., 21.8329}, {1., 20.4991}, {0., 19.1837}}
```

Model with disease-awareness and government-imposed social distancing

In[523]:=
```
PeakGovernmentImposedDistancingRange = PeakRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r4 → factor}]]
```

Out[523]=
```
{{100., 19.1862}, {99., 19.1863}, {98., 19.1863}, {97., 19.1863}, {96., 19.1864},
 {95., 19.1864}, {94., 19.1865}, {93., 19.1865}, {92., 19.1866}, {91., 19.1867},
 {90., 19.1867}, {89., 19.1868}, {88., 19.1868}, {87., 19.1869}, {86., 19.187},
 {85., 19.1871}, {84., 19.1872}, {83., 19.1873}, {82., 19.1874}, {81., 19.1875},
 {80., 19.1876}, {79., 19.1878}, {78., 19.1879}, {77., 19.1881}, {76., 19.1883},
 {75., 19.1885}, {74., 19.1887}, {73., 19.1889}, {72., 19.1892}, {71., 19.1895},
 {70., 19.1898}, {69., 19.1901}, {68., 19.1905}, {67., 19.1909}, {66., 19.1914},
 {65., 19.1919}, {64., 19.1925}, {63., 19.1931}, {62., 19.1938}, {61., 19.1946},
 {60., 19.1954}, {59., 19.1964}, {58., 19.1974}, {57., 19.1986}, {56., 19.1999},
 {55., 19.2013}, {54., 19.2028}, {53., 19.2045}, {52., 19.2064}, {51., 19.2085},
 {50., 19.2108}, {49., 19.2133}, {48., 19.2161}, {47., 19.2191}, {46., 19.2225},
 {45., 19.2263}, {44., 19.2304}, {43., 19.2349}, {42., 19.2399}, {41., 19.2454},
 {40., 19.2514}, {39., 19.2581}, {38., 19.2654}, {37., 19.2734}, {36., 19.2822},
 {35., 19.2918}, {34., 19.3023}, {33., 19.3137}, {32., 19.3262}, {31., 19.3398},
 {30., 19.3545}, {29., 19.3705}, {28., 19.3877}, {27., 19.4063}, {26., 19.4262},
 {25., 19.4475}, {24., 19.4702}, {23., 19.4943}, {22., 19.5197},
 {21., 19.5464}, {20., 19.5743}, {19., 19.6032}, {18., 19.6328},
 {17., 19.6628}, {16., 19.6929}, {15., 19.7226}, {14., 19.7511},
 {13., 19.7779}, {12., 19.8019}, {11., 19.8219}, {10., 19.8368},
 {9., 19.8448}, {8., 19.8441}, {7., 19.8326}, {6., 19.8076}, {5., 19.7664},
 {4., 19.7055}, {3., 19.6212}, {2., 19.5093}, {1., 19.3652}, {0., 19.1837}}
```

Model with disease-awareness and combined intervention (government-imposed social distancing and handwashing with 30% efficacy)

In[524]:=
```
PeakCombinedRange = PeakRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    0.10437], {r2 → 0.7}, {r4 → factor}]]
```

Out[524]=
```
{{100., 65.3188}, {99., 65.3188}, {98., 65.3188}, {97., 65.3189}, {96., 65.3189},
 {95., 65.3189}, {94., 65.319}, {93., 65.319}, {92., 65.319}, {91., 65.3191},
 {90., 65.3191}, {89., 65.3192}, {88., 65.3192}, {87., 65.3193}, {86., 65.3193},
 {85., 65.3194}, {84., 65.3195}, {83., 65.3195}, {82., 65.3196}, {81., 65.3197},
 {80., 65.3198}, {79., 65.3199}, {78., 65.32}, {77., 65.3201}, {76., 65.3202},
 {75., 65.3204}, {74., 65.3205}, {73., 65.3207}, {72., 65.3208}, {71., 65.321},
 {70., 65.3212}, {69., 65.3215}, {68., 65.3217}, {67., 65.322}, {66., 65.3223},
 {65., 65.3226}, {64., 65.3229}, {63., 65.3233}, {62., 65.3237}, {61., 65.3241},
 {60., 65.3246}, {59., 65.3251}, {58., 65.3256}, {57., 65.3262}, {56., 65.3268},
 {55., 65.3274}, {54., 65.3281}, {53., 65.3289}, {52., 65.3296}, {51., 65.3304},
 {50., 65.3313}, {49., 65.3322}, {48., 65.3331}, {47., 65.3341}, {46., 65.3352},
 {45., 65.3363}, {44., 65.3374}, {43., 65.3386}, {42., 65.3399}, {41., 65.3412},
 {40., 65.3426}, {39., 65.344}, {38., 65.3455}, {37., 65.3471}, {36., 65.3487},
 {35., 65.3503}, {34., 65.3521}, {33., 65.3538}, {32., 65.3557},
 {31., 65.3576}, {30., 65.3595}, {29., 65.3615}, {28., 65.3636},
 {27., 65.3656}, {26., 65.3677}, {25., 65.3699}, {24., 65.372}, {23., 65.3741},
 {22., 65.3763}, {21., 65.3783}, {20., 65.3804}, {19., 65.3823},
 {18., 65.3841}, {17., 65.3858}, {16., 65.3873}, {15., 65.3885},
 {14., 65.3895}, {13., 65.3901}, {12., 65.3903}, {11., 65.39}, {10., 65.3891},
 {9., 65.3876}, {8., 65.3852}, {7., 65.3819}, {6., 65.3774}, {5., 65.3718},
 {4., 65.3646}, {3., 65.3559}, {2., 65.3452}, {1., 65.3323}, {0., 65.3169}}
```

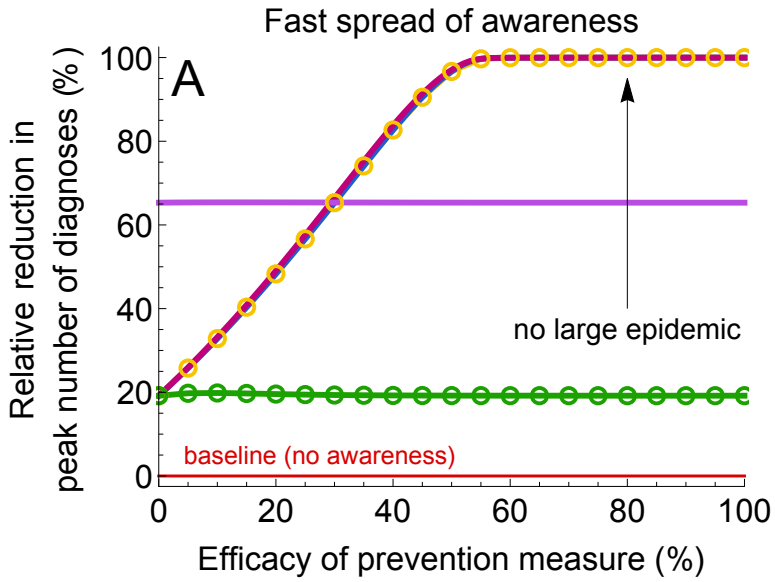
Plotting Figure 5 A (main text) (fast spread of awareness)

In[529]:=
```
imagePadding = {{80, 15}, {50, 5}};

fig5A = Show[ListLinePlot[
    {PeakMaskRange[[ ;;  ;; 5]], PeakHandRange, PeakSelfImposedDistancingRange,
     PeakGovernmentImposedDistancingRange[[ ;;  ;; 5]], PeakCombinedRange},
    AspectRatio → 0.75, ImageSize → 400, PlotRange → {All, {-2.5, 102.5}},
    AxesOrigin → {0, 0}, Frame → {{True, False}, {True, False}},
    FrameStyle → Directive[Black, 17],
    PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
      {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
      {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
      {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
      {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
    PlotRangePadding → None, PlotMarkers → {Graphics[
       {RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]}, ImageSize → 10], "", "",
      Graphics[{RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10],
      ""}, PlotLabel → Style[Row[{"Fast spread of awareness"}], 17, Black],
    ImagePadding → imagePadding, FrameLabel →
     {{"Relative reduction in\npeak number of diagnoses (%)", None},
      {"Efficacy of prevention measure (%)", None}}],
  Graphics[Text[StyleForm["A", FontSize → 26], {100 * 0.05, 100 * 0.95}]],
  Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
     FontColor → RGBColor[217 / 255, 0, 0]], {27.5, 5}]], Graphics[
   {RGBColor[217 / 255, 0, 0], Thickness[0.005], Line[{{0, 0}, {100, 0}}]}],
  Graphics[{Black, Arrow[{{80, 40}, {80, 95}}]}],
  Graphics[Text[StyleForm["no large epidemic",
     FontSize → 15, FontColor → Black], {80, 35}]]]

Export[StringJoin[
    "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//GitHub//
      Figures//Figure5A", ".eps"], fig5A];
Export[StringJoin[
    "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
      Figure5A", ".eps"], fig5A];
```

Out[530]=



Computing the attack rate (%) for an efficacy of prevention measure ranging from 0% to 100%

In[116]:=
```
AttackRateRange[Intervention_, Parameters_] :=
 Table[{(1 - factor) 100, Max[Flatten[Table[Evaluate[
       ((RQ[t] + DD[t]) / Ntot 100) /. First@solution[Intervention, Parameters]],
      {t, tstart, tend, 1 / (tend 364 spacing)}]]]}, {factor, ReductionFactor}]
```

Model with disease-awareness and mask-wearing

In[117]:=
```
AttackRateMaskRange = AttackRateRange["Mask",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r1 → factor}]]
```

Out[117]=
```
{{100., 0.0139929}, {99., 0.0143083}, {98., 0.0146382}, {97., 0.0149835},
 {96., 0.0153453}, {95., 0.0157249}, {94., 0.0161236}, {93., 0.0165428},
 {92., 0.0169843}, {91., 0.0174499}, {90., 0.0179415}, {89., 0.0184615},
 {88., 0.0190124}, {87., 0.0195969}, {86., 0.0202184}, {85., 0.0208804},
 {84., 0.0215871}, {83., 0.0223432}, {82., 0.0231541}, {81., 0.024026},
 {80., 0.024966}, {79., 0.0259827}, {78., 0.0270857}, {77., 0.0282867},
 {76., 0.0295994}, {75., 0.0310405}, {74., 0.0326297}, {73., 0.0343915},
 {72., 0.0363557}, {71., 0.0385599}, {70., 0.0410512}, {69., 0.0438904},
 {68., 0.0471564}, {67., 0.0509542}, {66., 0.0554265}, {65., 0.0607718},
 {64., 0.0672748}, {63., 0.0753581}, {62., 0.0856753}, {61., 0.09929},
 {60., 0.118038}, {59., 0.145326}, {58., 0.18798}, {57., 0.260716},
 {56., 0.396241}, {55., 0.661302}, {54., 1.14896}, {53., 1.87324},
 {52., 2.67945}, {51., 3.4173}, {50., 4.06489}, {49., 4.65068}, {48., 5.19629},
 {47., 5.71174}, {46., 6.20132}, {45., 6.66722}, {44., 7.11091}, {43., 7.53366},
 {42., 7.93661}, {41., 8.32086}, {40., 8.68743}, {39., 9.03728},
 {38., 9.37132}, {37., 9.6904}, {36., 9.99534}, {35., 10.2869}, {34., 10.5658},
 {33., 10.8326}, {32., 11.0881}, {31., 11.3328}, {30., 11.5672},
 {29., 11.7919}, {28., 12.0072}, {27., 12.2137}, {26., 12.4119}, {25., 12.602},
 {24., 12.7845}, {23., 12.9598}, {22., 13.1282}, {21., 13.29}, {20., 13.4455},
 {19., 13.595}, {18., 13.7388}, {17., 13.8772}, {16., 14.0103}, {15., 14.1385},
 {14., 14.2619}, {13., 14.3808}, {12., 14.4953}, {11., 14.6056}, {10., 14.7119},
 {9., 14.8145}, {8., 14.9133}, {7., 15.0087}, {6., 15.1007}, {5., 15.1895},
 {4., 15.2752}, {3., 15.3579}, {2., 15.4378}, {1., 15.5149}, {0., 15.5895}}
```

Model with disease-awareness and handwashing

In[118]:=
```
AttackRateHandRange = AttackRateRange["Hand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r₂ → factor}]]
```

Out[118]=
```
{{100., 0.0140407}, {99., 0.0143743}, {98., 0.0147234}, {97., 0.0150892},
 {96., 0.0154729}, {95., 0.0158757}, {94., 0.0162993}, {93., 0.0167452},
 {92., 0.0172151}, {91., 0.0177111}, {90., 0.0182355}, {89., 0.0187905},
 {88., 0.0193791}, {87., 0.0200044}, {86., 0.0206697}, {85., 0.0213792},
 {84., 0.0221373}, {83., 0.0229492}, {82., 0.0238208}, {81., 0.0247589},
 {80., 0.0257713}, {79., 0.0268674}, {78., 0.0280578}, {77., 0.0293553},
 {76., 0.030775}, {75., 0.0323351}, {74., 0.0340576}, {73., 0.0359691},
 {72., 0.0381028}, {71., 0.0404998}, {70., 0.0432124}, {69., 0.0463074},
 {68., 0.0498723}, {67., 0.054023}, {66., 0.0589172}, {65., 0.0647747},
 {64., 0.0719103}, {63., 0.0807912}, {62., 0.0921395}, {61., 0.107127},
 {60., 0.127769}, {59., 0.157776}, {58., 0.204509}, {57., 0.283557},
 {56., 0.428699}, {55., 0.706238}, {54., 1.20244}, {53., 1.92033},
 {52., 2.70967}, {51., 3.43419}, {50., 4.075}, {49., 4.65767}, {48., 5.20165},
 {47., 5.71606}, {46., 6.20487}, {45., 6.67016}, {44., 7.11336}, {43., 7.53571},
 {42., 7.93835}, {41., 8.32233}, {40., 8.68868}, {39., 9.03835}, {38., 9.37224},
 {37., 9.6912}, {36., 9.99603}, {35., 10.2875}, {34., 10.5663}, {33., 10.8331},
 {32., 11.0885}, {31., 11.3332}, {30., 11.5675}, {29., 11.7921},
 {28., 12.0075}, {27., 12.214}, {26., 12.4121}, {25., 12.6022}, {24., 12.7847},
 {23., 12.96}, {22., 13.1283}, {21., 13.2901}, {20., 13.4456}, {19., 13.5951},
 {18., 13.7389}, {17., 13.8773}, {16., 14.0104}, {15., 14.1386},
 {14., 14.262}, {13., 14.3808}, {12., 14.4953}, {11., 14.6056}, {10., 14.712},
 {9., 14.8145}, {8., 14.9134}, {7., 15.0087}, {6., 15.1007}, {5., 15.1895},
 {4., 15.2752}, {3., 15.3579}, {2., 15.4378}, {1., 15.5149}, {0., 15.5895}}
```

Model with disease-awareness and self-imposed social distancing

In[119]:=
```
AttackRateSelfImposedDistancingRange =
 AttackRateRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r3 → factor}]]
```

Out[119]=
```
{{100., 0.0389164}, {99., 0.0383051}, {98., 0.0378212}, {97., 0.0374449},
 {96., 0.0371617}, {95., 0.0369607}, {94., 0.036834}, {93., 0.0367758},
 {92., 0.0367817}, {91., 0.0368486}, {90., 0.0369746}, {89., 0.0371585},
 {88., 0.0374002}, {87., 0.0377}, {86., 0.0380591}, {85., 0.0384794},
 {84., 0.0389636}, {83., 0.039515}, {82., 0.0401379}, {81., 0.0408375},
 {80., 0.0416201}, {79., 0.0424935}, {78., 0.0434666}, {77., 0.0445505},
 {76., 0.0457582}, {75., 0.0471058}, {74., 0.0486125}, {73., 0.0503019},
 {72., 0.0522034}, {71., 0.0543533}, {70., 0.0567976}, {69., 0.0595955},
 {68., 0.0628236}, {67., 0.066584}, {66., 0.0710146}, {65., 0.0763075},
 {64., 0.0827377}, {63., 0.0907127}, {62., 0.100864}, {61., 0.114217},
 {60., 0.132549}, {59., 0.159166}, {58., 0.200704}, {57., 0.271327},
 {56., 0.401359}, {55., 0.647841}, {54., 1.07891}, {53., 1.68977},
 {52., 2.36316}, {51., 2.99944}, {50., 3.58276}, {49., 4.12858}, {48., 4.64895},
 {47., 5.14917}, {46., 5.63109}, {45., 6.09536}, {44., 6.54232}, {43., 6.97235},
 {42., 7.38584}, {41., 7.78324}, {40., 8.16503}, {39., 8.53172}, {38., 8.88381},
 {37., 9.22182}, {36., 9.54628}, {35., 9.8577}, {34., 10.1566}, {33., 10.4435},
 {32., 10.7189}, {31., 10.9832}, {30., 11.2369}, {29., 11.4805}, {28., 11.7143},
 {27., 11.9387}, {26., 12.1542}, {25., 12.3611}, {24., 12.5598},
 {23., 12.7506}, {22., 12.9339}, {21., 13.11}, {20., 13.2791}, {19., 13.4417},
 {18., 13.598}, {17., 13.7482}, {16., 13.8927}, {15., 14.0316}, {14., 14.1652},
 {13., 14.2938}, {12., 14.4175}, {11., 14.5365}, {10., 14.6511},
 {9., 14.7615}, {8., 14.8677}, {7., 14.97}, {6., 15.0686}, {5., 15.1636},
 {4., 15.2551}, {3., 15.3433}, {2., 15.4284}, {1., 15.5104}, {0., 15.5895}}
```

Model with disease-awareness and government-imposed social distancing

In[120]:=
```
AttackRateGovernmentImposedDistancingRange =
 AttackRateRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r4 → factor}]]
```

Out[120]=
```
{{100., 15.5894}, {99., 15.5894}, {98., 15.5894}, {97., 15.5894}, {96., 15.5894},
 {95., 15.5894}, {94., 15.5894}, {93., 15.5894}, {92., 15.5894}, {91., 15.5894},
 {90., 15.5894}, {89., 15.5894}, {88., 15.5894}, {87., 15.5894}, {86., 15.5894},
 {85., 15.5894}, {84., 15.5894}, {83., 15.5894}, {82., 15.5894}, {81., 15.5894},
 {80., 15.5894}, {79., 15.5894}, {78., 15.5894}, {77., 15.5894}, {76., 15.5894},
 {75., 15.5894}, {74., 15.5893}, {73., 15.5893}, {72., 15.5893}, {71., 15.5893},
 {70., 15.5893}, {69., 15.5893}, {68., 15.5893}, {67., 15.5893}, {66., 15.5893},
 {65., 15.5893}, {64., 15.5893}, {63., 15.5892}, {62., 15.5892}, {61., 15.5892},
 {60., 15.5892}, {59., 15.5892}, {58., 15.5891}, {57., 15.5891}, {56., 15.5891},
 {55., 15.589}, {54., 15.589}, {53., 15.589}, {52., 15.5889}, {51., 15.5889},
 {50., 15.5888}, {49., 15.5888}, {48., 15.5887}, {47., 15.5886}, {46., 15.5885},
 {45., 15.5884}, {44., 15.5883}, {43., 15.5882}, {42., 15.5881}, {41., 15.588},
 {40., 15.5878}, {39., 15.5877}, {38., 15.5875}, {37., 15.5873},
 {36., 15.5871}, {35., 15.5869}, {34., 15.5866}, {33., 15.5863}, {32., 15.586},
 {31., 15.5857}, {30., 15.5853}, {29., 15.5849}, {28., 15.5845},
 {27., 15.5841}, {26., 15.5836}, {25., 15.5831}, {24., 15.5825},
 {23., 15.5819}, {22., 15.5813}, {21., 15.5807}, {20., 15.58}, {19., 15.5793},
 {18., 15.5786}, {17., 15.5778}, {16., 15.5771}, {15., 15.5764},
 {14., 15.5757}, {13., 15.575}, {12., 15.5744}, {11., 15.5739}, {10., 15.5735},
 {9., 15.5733}, {8., 15.5733}, {7., 15.5736}, {6., 15.5742}, {5., 15.5752},
 {4., 15.5767}, {3., 15.5787}, {2., 15.5815}, {1., 15.585}, {0., 15.5895}}
```

Model with disease-awareness and combined intervention (government-imposed social distancing and handwashing with 30% efficacy)

In[121]:=
```
AttackRateCombinedRange = AttackRateRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    0.10437], {r2 → 0.7}, {r4 → factor}]]
```

Out[121]=
```
{{100., 11.5674}, {99., 11.5674}, {98., 11.5674}, {97., 11.5674}, {96., 11.5674},
 {95., 11.5674}, {94., 11.5674}, {93., 11.5674}, {92., 11.5674}, {91., 11.5674},
 {90., 11.5674}, {89., 11.5674}, {88., 11.5674}, {87., 11.5674}, {86., 11.5674},
 {85., 11.5674}, {84., 11.5674}, {83., 11.5674}, {82., 11.5674}, {81., 11.5674},
 {80., 11.5673}, {79., 11.5673}, {78., 11.5673}, {77., 11.5673}, {76., 11.5673},
 {75., 11.5673}, {74., 11.5673}, {73., 11.5673}, {72., 11.5673}, {71., 11.5673},
 {70., 11.5673}, {69., 11.5672}, {68., 11.5672}, {67., 11.5672},
 {66., 11.5672}, {65., 11.5672}, {64., 11.5672}, {63., 11.5671},
 {62., 11.5671}, {61., 11.5671}, {60., 11.5671}, {59., 11.567}, {58., 11.567},
 {57., 11.567}, {56., 11.5669}, {55., 11.5669}, {54., 11.5668}, {53., 11.5668},
 {52., 11.5667}, {51., 11.5667}, {50., 11.5666}, {49., 11.5666}, {48., 11.5665},
 {47., 11.5665}, {46., 11.5664}, {45., 11.5663}, {44., 11.5663}, {43., 11.5662},
 {42., 11.5661}, {41., 11.566}, {40., 11.5659}, {39., 11.5659}, {38., 11.5658},
 {37., 11.5657}, {36., 11.5656}, {35., 11.5655}, {34., 11.5654}, {33., 11.5652},
 {32., 11.5651}, {31., 11.565}, {30., 11.5649}, {29., 11.5648}, {28., 11.5646},
 {27., 11.5645}, {26., 11.5644}, {25., 11.5643}, {24., 11.5641}, {23., 11.564},
 {22., 11.5639}, {21., 11.5637}, {20., 11.5636}, {19., 11.5635},
 {18., 11.5634}, {17., 11.5633}, {16., 11.5632}, {15., 11.5631},
 {14., 11.563}, {13., 11.563}, {12., 11.563}, {11., 11.563}, {10., 11.5631},
 {9., 11.5632}, {8., 11.5633}, {7., 11.5635}, {6., 11.5638}, {5., 11.5641},
 {4., 11.5646}, {3., 11.5651}, {2., 11.5658}, {1., 11.5666}, {0., 11.5675}}
```

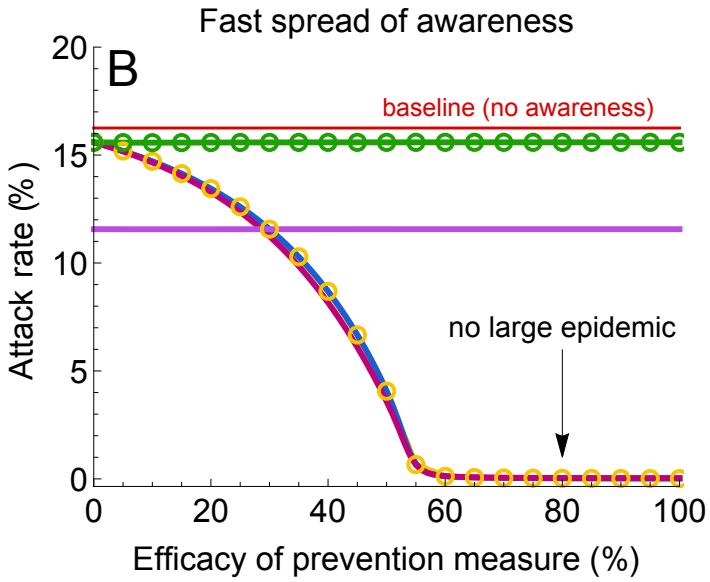
Plotting Figure 5 B (main text) (fast spread of awareness)

In[122]:=
```
imagePadding = {{80, 15}, {50, 5}};

fig5B = Show[ListLinePlot[{AttackRateMaskRange[[ ;; ;; 5]],
     AttackRateHandRange, AttackRateSelfImposedDistancingRange,
     AttackRateGovernmentImposedDistancingRange[[ ;; ;; 5]],
     AttackRateCombinedRange}, AspectRatio → 0.75, ImageSize → 400,
    PlotRange → {{0, 100}, {-0.35, 20}}, AxesOrigin → {0, 0},
    Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
    PlotMarkers → {Graphics[{RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]},
       ImageSize → 10], "", "", Graphics[
       {RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10], ""},
    PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
      {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
      {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
      {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
      {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
    FrameLabel → {{"Attack rate (%)", None},
      {"Efficacy of prevention measure (%)", None}}, PlotRangePadding → None,
    PlotLabel → Style[Row[{"Fast spread of awareness"}], 17, Black],
    ImagePadding → imagePadding], Graphics[{RGBColor[217 / 255, 0, 0]
, Thickness[0.005], Line[{{0, AttackRateBaseline}, {100, AttackRateBaseline}}]}],
  Graphics[Text[StyleForm["B", FontSize → 26], {100 * 0.05, 20 * 0.95}]],
  Graphics[Text[StyleForm["baseline (no awareness)",
     FontSize → 13, FontColor → RGBColor[217 / 255, 0, 0]
], {72.5, 17.25}]], Graphics[{Black, Arrow[{{80, 6}, {80, 1}}]}],
Graphics[Text[
    StyleForm["no large epidemic", FontSize → 15, FontColor → Black], {80, 7}]]]

Export[StringJoin[
    "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//GitHub//
      Figures//Figure5B", ".eps"], fig5B];
Export[StringJoin[
    "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
      Figure5B", ".eps"], fig5B];
```

Out[123]=



Computing time until the peak number of diagnoses since the

first case for an efficacy of prevention measure ranging from 0% to 100%

In[126]:=
```
PeakTimingRange[Intervention_, Parameters_] :=
 Table[{(1 - factor) 100, 365 × 1 / ((t_end 364 spacing) + 1)
    ReplaceAll[Ordering[Flatten[Table[Evaluate[(1000 (IQ[t] + IQa[t]) / NN[t]) /.
           First@solution[Intervention, Parameters]],
         {t, t_start, t_end, 1 / (t_end 364 spacing)}]], -1][[1]],
     (x_ /; x == Length[Table[t, {t, t_start, t_end, 1 / (t_end 364 spacing)}]]) → 0]},
  {factor, ReductionFactor}]
```

Model with disease-awareness and mask-wearing

In[127]:=
```
PeakTimingMaskRange = PeakTimingRange["Mask",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r_1 → factor}]]
```

Out[127]=
```
{{100., 71.893}, {99., 72.0936}, {98., 72.3142}, {97., 72.5348}, {96., 72.7553},
 {95., 72.996}, {94., 73.2366}, {93., 73.4773}, {92., 73.738}, {91., 73.9987},
 {90., 74.2794}, {89., 74.5802}, {88., 74.8811}, {87., 75.1819}, {86., 75.5228},
 {85., 75.8637}, {84., 76.2247}, {83., 76.6057}, {82., 77.0068}, {81., 77.4479},
 {80., 77.8891}, {79., 78.3905}, {78., 78.8918}, {77., 79.4533}, {76., 80.075},
 {75., 80.7167}, {74., 81.4587}, {73., 82.2609}, {72., 83.1432}, {71., 84.166},
 {70., 85.3291}, {69., 86.7128}, {68., 88.3572}, {67., 90.4027}, {66., 93.0699},
 {65., 96.7798}, {64., 102.676}, {63., 115.129}, {62., 266.155}, {61., 367.647},
 {60., 439.801}, {59., 513.178}, {58., 593.814}, {57., 679.344}, {56., 751.137},
 {55., 773.376}, {54., 737.46}, {53., 675.855}, {52., 614.289}, {51., 560.866},
 {50., 516.166}, {49., 478.886}, {48., 447.542}, {47., 420.93}, {46., 398.089},
 {45., 378.276}, {44., 360.909}, {43., 345.588}, {42., 331.931}, {41., 319.698},
 {40., 308.669}, {39., 298.682}, {38., 289.557}, {37., 281.215}, {36., 273.554},
 {35., 266.475}, {34., 259.938}, {33., 253.842}, {32., 248.166},
 {31., 242.872}, {30., 237.919}, {29., 233.266}, {28., 228.875},
 {27., 224.743}, {26., 220.853}, {25., 217.163}, {24., 213.654},
 {23., 210.325}, {22., 207.176}, {21., 204.168}, {20., 201.3}, {19., 198.573},
 {18., 195.946}, {17., 193.439}, {16., 191.053}, {15., 188.747},
 {14., 186.541}, {13., 184.415}, {12., 182.37}, {11., 180.404}, {10., 178.519},
 {9., 176.694}, {8., 174.93}, {7., 173.245}, {6., 171.601}, {5., 170.016},
 {4., 168.472}, {3., 166.988}, {2., 165.544}, {1., 164.141}, {0., 162.797}}
```

Model with disease-awareness and handwashing

In[128]:=
```
PeakTimingHandRange = PeakTimingRange["Hand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r₂ → factor}]]
```

Out[128]=
```
{{100., 72.8356}, {99., 73.0361}, {98., 73.2567}, {97., 73.4572}, {96., 73.6778},
 {95., 73.8984}, {94., 74.1391}, {93., 74.3797}, {92., 74.6404}, {91., 74.9011},
 {90., 75.1618}, {89., 75.4426}, {88., 75.7434}, {87., 76.0442}, {86., 76.365},
 {85., 76.706}, {84., 77.0469}, {83., 77.4279}, {82., 77.8089}, {81., 78.23},
 {80., 78.6712}, {79., 79.1325}, {78., 79.6338}, {77., 80.1753}, {76., 80.7769},
 {75., 81.4186}, {74., 82.1205}, {73., 82.9026}, {72., 83.7649}, {71., 84.7676},
 {70., 85.9107}, {69., 87.2543}, {68., 88.8987}, {67., 90.9241}, {66., 93.6113},
 {65., 97.4416}, {64., 103.718}, {63., 118.979}, {62., 295.173}, {61., 378.396},
 {60., 445.817}, {59., 515.223}, {58., 590.766}, {57., 669.257}, {56., 733.349},
 {55., 752.52}, {54., 719.712}, {53., 662.619}, {52., 604.503}, {51., 553.406},
 {50., 510.27}, {49., 474.093}, {48., 443.551}, {47., 417.561}, {46., 395.181},
 {45., 375.729}, {44., 358.683}, {43., 343.603}, {42., 330.166}, {41., 318.114},
 {40., 307.225}, {39., 297.358}, {38., 288.374}, {37., 280.132},
 {36., 272.552}, {35., 265.553}, {34., 259.076}, {33., 253.059},
 {32., 247.444}, {31., 242.21}, {30., 237.297}, {29., 232.685}, {28., 228.353},
 {27., 224.262}, {26., 220.392}, {25., 216.742}, {24., 213.273},
 {23., 209.964}, {22., 206.835}, {21., 203.867}, {20., 201.02}, {19., 198.292},
 {18., 195.705}, {17., 193.219}, {16., 190.832}, {15., 188.566}, {14., 186.36},
 {13., 184.255}, {12., 182.229}, {11., 180.284}, {10., 178.419},
 {9., 176.594}, {8., 174.849}, {7., 173.165}, {6., 171.541}, {5., 169.956},
 {4., 168.432}, {3., 166.948}, {2., 165.524}, {1., 164.141}, {0., 162.797}}
```

Model with disease-awareness and self-imposed social distancing

In[129]:=
```
PeakTimingSelfImposedDistancingRange =
 PeakTimingRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r3 → factor}]]
```

Out[129]=
```
{{100., 77.3677}, {99., 77.3477}, {98., 77.3477}, {97., 77.3677}, {96., 77.4078},
 {95., 77.468}, {94., 77.5482}, {93., 77.6284}, {92., 77.7287}, {91., 77.849},
 {90., 77.9894}, {89., 78.1498}, {88., 78.3103}, {87., 78.4907}, {86., 78.6913},
 {85., 78.9119}, {84., 79.1525}, {83., 79.4132}, {82., 79.714}, {81., 80.0148},
 {80., 80.3557}, {79., 80.7167}, {78., 81.1178}, {77., 81.5389}, {76., 82.0202},
 {75., 82.5617}, {74., 83.1432}, {73., 83.805}, {72., 84.547}, {71., 85.3893},
 {70., 86.3518}, {69., 87.4949}, {68., 88.8385}, {67., 90.503}, {66., 92.6086},
 {65., 95.4362}, {64., 99.5272}, {63., 106.346}, {62., 123.291}, {61., 272.712},
 {60., 357.56}, {59., 432.281}, {58., 512.496}, {57., 597.805}, {56., 671.744},
 {55., 703.248}, {54., 682.653}, {53., 634.925}, {52., 583.246}, {51., 536.581},
 {50., 496.593}, {49., 462.762}, {48., 434.025}, {47., 409.439}, {46., 388.202},
 {45., 369.693}, {44., 353.429}, {43., 338.99}, {42., 326.116}, {41., 314.545},
 {40., 304.096}, {39., 294.591}, {38., 285.908}, {37., 277.946}, {36., 270.607},
 {35., 263.828}, {34., 257.531}, {33., 251.696}, {32., 246.221},
 {31., 241.127}, {30., 236.335}, {29., 231.842}, {28., 227.591},
 {27., 223.58}, {26., 219.81}, {25., 216.221}, {24., 212.811}, {23., 209.583},
 {22., 206.494}, {21., 203.567}, {20., 200.759}, {19., 198.072},
 {18., 195.525}, {17., 193.058}, {16., 190.712}, {15., 188.446}, {14., 186.28},
 {13., 184.195}, {12., 182.189}, {11., 180.244}, {10., 178.379},
 {9., 176.574}, {8., 174.849}, {7., 173.165}, {6., 171.541}, {5., 169.956},
 {4., 168.432}, {3., 166.968}, {2., 165.524}, {1., 164.141}, {0., 162.797}}
```

Model with disease-awareness and government-imposed social distancing

In[130]:=
```
PeakTimingGovernmentImposedDistancingRange =
 PeakTimingRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    StartTimeBaseline], {r4 → factor}]]
```

Out[130]=
```
{{100., 366.865}, {99., 361.952}, {98., 357.319}, {97., 352.968}, {96., 348.817},
 {95., 344.866}, {94., 341.096}, {93., 337.466}, {92., 333.977}, {91., 330.608},
 {90., 327.359}, {89., 324.21}, {88., 321.162}, {87., 318.194}, {86., 315.307},
 {85., 312.499}, {84., 309.752}, {83., 307.085}, {82., 304.478}, {81., 301.931},
 {80., 299.424}, {79., 296.977}, {78., 294.591}, {77., 292.265}, {76., 289.959},
 {75., 287.712}, {74., 285.507}, {73., 283.341}, {72., 281.215}, {71., 279.129},
 {70., 277.084}, {69., 275.079}, {68., 273.093}, {67., 271.148}, {66., 269.243},
 {65., 267.358}, {64., 265.493}, {63., 263.648}, {62., 261.843}, {61., 260.038},
 {60., 258.253}, {59., 256.489}, {58., 254.744}, {57., 252.999}, {56., 251.255},
 {55., 249.51}, {54., 247.785}, {53., 246.061}, {52., 244.316}, {51., 242.591},
 {50., 240.867}, {49., 239.142}, {48., 237.417}, {47., 235.693}, {46., 233.968},
 {45., 232.264}, {44., 230.539}, {43., 228.834}, {42., 227.13}, {41., 225.445},
 {40., 223.761}, {39., 222.076}, {38., 220.412}, {37., 218.747}, {36., 217.103},
 {35., 215.458}, {34., 213.814}, {33., 212.19}, {32., 210.565}, {31., 208.961},
 {30., 207.357}, {29., 205.772}, {28., 204.188}, {27., 202.624}, {26., 201.06},
 {25., 199.496}, {24., 197.951}, {23., 196.407}, {22., 194.883},
 {21., 193.359}, {20., 191.835}, {19., 190.331}, {18., 188.847},
 {17., 187.343}, {16., 185.859}, {15., 184.395}, {14., 182.911},
 {13., 181.447}, {12., 179.983}, {11., 178.539}, {10., 177.095},
 {9., 175.652}, {8., 174.208}, {7., 172.764}, {6., 171.34}, {5., 169.896},
 {4., 168.472}, {3., 167.049}, {2., 165.625}, {1., 164.221}, {0., 162.797}}
```

Model with disease-awareness and combined intervention (government-imposed social distancing and handwashing with 30% efficacy)

In[131]:=
```
PeakTimingCombinedRange = PeakTimingRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline,
    AcquisitionRateAwarenessBaseline, DiagnosisRateAwareBaseline,
    0.10437], {r2 → 0.7}, {r4 → factor}]]
```

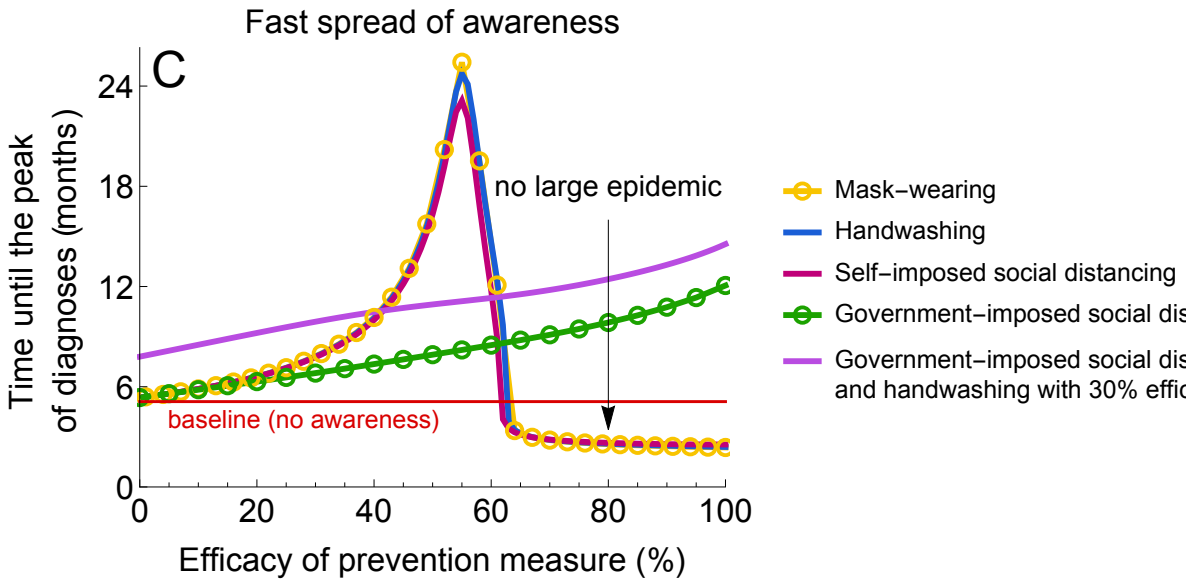
Out[131]=
```
{{100., 442.247}, {99., 437.575}, {98., 433.163}, {97., 428.992}, {96., 425.041},
 {95., 421.251}, {94., 417.641}, {93., 414.192}, {92., 410.863}, {91., 407.655},
 {90., 404.566}, {89., 401.578}, {88., 398.67}, {87., 395.883}, {86., 393.156},
 {85., 390.508}, {84., 387.962}, {83., 385.455}, {82., 383.028}, {81., 380.682},
 {80., 378.396}, {79., 376.15}, {78., 373.984}, {77., 371.878}, {76., 369.833},
 {75., 367.828}, {74., 365.902}, {73., 364.017}, {72., 362.192}, {71., 360.428},
 {70., 358.703}, {69., 357.039}, {68., 355.434}, {67., 353.87}, {66., 352.346},
 {65., 350.882}, {64., 349.478}, {63., 348.095}, {62., 346.751}, {61., 345.468},
 {60., 344.204}, {59., 342.961}, {58., 341.758}, {57., 340.574}, {56., 339.391},
 {55., 338.228}, {54., 337.065}, {53., 335.902}, {52., 334.739}, {51., 333.556},
 {50., 332.372}, {49., 331.149}, {48., 329.906}, {47., 328.642}, {46., 327.339},
 {45., 325.995}, {44., 324.612}, {43., 323.188}, {42., 321.724}, {41., 320.22},
 {40., 318.656}, {39., 317.071}, {38., 315.427}, {37., 313.742}, {36., 312.018},
 {35., 310.253}, {34., 308.468}, {33., 306.623}, {32., 304.758},
 {31., 302.853}, {30., 300.928}, {29., 298.963}, {28., 296.977},
 {27., 294.972}, {26., 292.947}, {25., 290.901}, {24., 288.836}, {23., 286.75},
 {22., 284.664}, {21., 282.559}, {20., 280.433}, {19., 278.307},
 {18., 276.182}, {17., 274.036}, {16., 271.89}, {15., 269.744}, {14., 267.578},
 {13., 265.413}, {12., 263.267}, {11., 261.101}, {10., 258.935},
 {9., 256.769}, {8., 254.604}, {7., 252.438}, {6., 250.272}, {5., 248.106},
 {4., 245.94}, {3., 243.775}, {2., 241.609}, {1., 239.463}, {0., 237.297}}
```

Plotting Figure 5 C (main text) (fast spread of awareness)

In[132]:=
```
fig5C = Show[ListLinePlot[{PeakTimingMaskRange[[ ;; ;; 3]],
     PeakTimingHandRange, PeakTimingSelfImposedDistancingRange,
     PeakTimingGovernmentImposedDistancingRange[[ ;; ;; 5]],
     PeakTimingCombinedRange}, AspectRatio → 0.75,
    ImageSize → 400, PlotRange → {All, {0, 800}}, AxesOrigin → {0, 0},
    Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
    PlotMarkers → {Graphics[{RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]},
       ImageSize → 10], "", "", Graphics[
       {RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10], ""},
    PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
      {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
      {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
      {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
      {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
    FrameLabel → {{"Time until the peak\nof diagnoses (months)", None},
      {"Efficacy of prevention measure (%)", None}},
    PlotRangePadding → None, ImagePadding → imagePadding,
    PlotLabel → Style[Row[{"Fast spread of awareness"}], 17, Black],
    PlotLegends → Table[Style[Row[{label}], Black, 13, "Text"],
      {label, {"Mask-wearing", "Handwashing", "Self-imposed social distancing",
        "Government-imposed social distancing", "Government-imposed social
          distancing\nand handwashing with 30% efficacy"}}],
    FrameTicks → {{{{0, "0"}, {365 × 18 / 12, "18"}, {365 / 2, "6"}, {365, "12"},
        {365 × 2, "24"}, {365 × 3, "36"}, {365 × 4, "48"}, {365 × 5, "60"}, {365 × 6,
         "72"}}, None}, {Automatic, None}}], Graphics[{RGBColor[217 / 255, 0, 0]
, Thickness[0.005], Line[{{0, PeakTimingBaseline}, {100, PeakTimingBaseline}}]}],
  Graphics[Text[StyleForm["C", FontSize → 26], {100 * 0.05, 800 * 0.95}]],
  Graphics[Text[StyleForm["baseline (no awareness)",
     FontSize → 13, FontColor → RGBColor[217 / 255, 0, 0]
], {28, 125}]], Graphics[{Black, Arrow[{{80, 365 × 16 / 12}, {80, 365 / 3.5}}]}],
  Graphics[Text[StyleForm["no large epidemic",
     FontSize → 15, FontColor → Black], {80, 365 × 18 / 12}]]]

Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//GitHub//
     Figures//Figure5C", ".eps"], fig5C];
Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
     Figure5C", ".eps"], fig5C];
```

Out[132]=



Combined intervention: government-imposed social distancing and handwashing (slow spread of awareness)

Time when government-imposed social distancing has to start (10 diagnoses)

In[421]:=
```
(IQ[t] + IQa[t]) /.
  solution["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
     RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
     RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
     DiagnosisRateAwareBaseline, 0], {r2 → 0.7}]] /. t → 0.10393
```

Out[421]=
```
{10.0025}
```

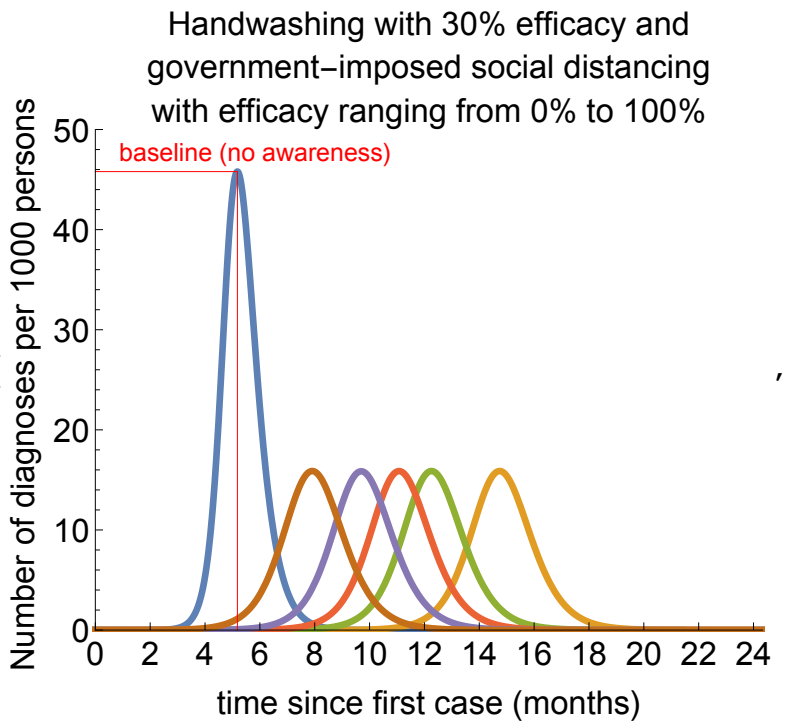
Impact of government-imposed social distancing with efficacy ranging from 0% ($r_4 = 1$) to 100% ($r_4 = 0$) and handwashing with 30% efficacy ($r_2 = 0.7$)

In[422]:=
```
imagePadding = {{47.5, 5}, {60, 0}};
relvars = {1000 (IQ[t] + IQa[t]) / NN[t], (RQ[t] + DD[t]) / Ntot 100};
relyalabs = {"Number of diagnoses per 1000 persons", "Attack rate (%)"};
relylim = {50, 20};
ReductionFactor = Table[i, {i, 0, 1, 0.25}];

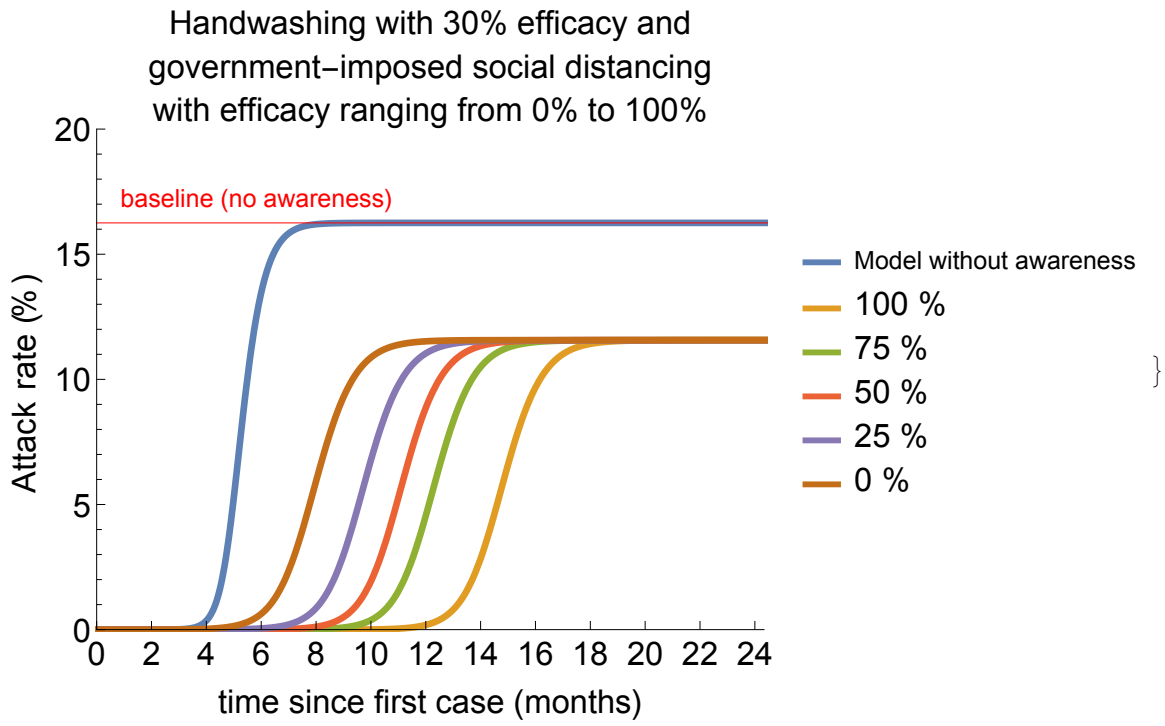
PlotCombinedIntervention[vars_, ylabs_, ylim_,
  scenario_, title_, parameters_, range_, legend_] := Table[Show[
   Plot[{Evaluate[vars[[i]] /. solution["Baseline", Parameters[0, 0, 0, 0, 0, 0]]],
     Evaluate[Table[vars[[i]] /. solution[scenario, parameters], range]]},
    {t, tstart, tend}, AspectRatio → 0.75, ImageSize → 400, PlotRangePadding → None,
    PlotRange → {{0, 2}, {0, ylim[[i]]}}, AxesOrigin → {0, 0},
    Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
    PlotStyle → Thickness[0.01], PlotLabel → Style[title, 17, Black],
    FrameLabel → {{ylabs[[i]], None}, {"time since first case (months)", None}},
    ImagePadding → imagePadding,
    FrameTicks → {{Automatic, None}, {{{0, "0"}, {60 / 365, "2"}, {120 / 365, "4"},
        {180 / 365, "6"}, {240 / 365, "8"}, {300 / 365, "10"}, {360 / 365, "12"},
        {420 / 365, "14"}, {480 / 365, "16"}, {540 / 365, "18"}, {600 / 365, "20"},
        {660 / 365, "22"}, {720 / 365, "24"}}, None}}, PlotLegends →
    If[i == 2, Prepend[Table[Style[Row[legend], Black, 17, "Text"], range],
      "Model without awareness"], None]], If[i == 2, {Graphics[
     {Red, Line[{{0, AttackRateBaseline}, {tend, AttackRateBaseline}}]}],
    Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
       FontColor → Red], {175 / 365, AttackRateBaseline + 1}]]},
   {Graphics[{Red, Line[{{PeakTimingBaseline / 365, 0},
       {PeakTimingBaseline / 365, PeakBaseline}}]}], Graphics[{Red,
     Line[{{0, PeakBaseline}, {PeakTimingBaseline / 365, PeakBaseline}}]}],
    Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
       FontColor → Red], {175 / 365, PeakBaseline + 2}]]}]], {i, 1, Length[vars]}]

PlotCombinedIntervention[relvars, relyalabs, relylim, "GovernmentAndHand",
 "Handwashing with 30% efficacy and\ngovernment-imposed
   social distancing\nwith efficacy ranging from 0% to 100%",
 Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
   RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
   RateAwarenessFadingSevereSymptomsBaseline, AcquisitionRateAwarenessBaseline,
   DiagnosisRateAwareBaseline, 0.10393], {r2 → 0.7}, {r4 → factor}],
 {factor, ReductionFactor}, {IntegerPart[(1 - factor) 100], " %"}]
```

Out[428]=


Handwashing with 30% efficacy and
government−imposed social distancing
with efficacy ranging from 0% to 100%
baseline (no awareness)
Number of diagnoses per 1000 persons
time since first case (months)

,


Handwashing with 30% efficacy and
government−imposed social distancing
with efficacy ranging from 0% to 100%
baseline (no awareness)
Attack rate (%)
time since first case (months)
Model without awareness
100 %
75 %
50 %
25 %
0 %

}

Plotting Figure 4 A, B and C (main text) (slow spread of awareness)

In[439]:=
```
ReductionFactor = Table[i, {i, 0, 1, 0.01}];

PeakMaskRange =
 PeakRange["Mask", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r1 → factor}]]
```

Out[440]=
```
{{100., 27.0069}, {99., 26.7787}, {98., 26.55}, {97., 26.3206}, {96., 26.0906},
 {95., 25.8601}, {94., 25.6289}, {93., 25.3972}, {92., 25.1649}, {91., 24.9321},
 {90., 24.6987}, {89., 24.4647}, {88., 24.2302}, {87., 23.9952}, {86., 23.7597},
 {85., 23.5237}, {84., 23.2871}, {83., 23.0501}, {82., 22.8126}, {81., 22.5746},
 {80., 22.3361}, {79., 22.0972}, {78., 21.8579}, {77., 21.6181}, {76., 21.3779},
 {75., 21.1372}, {74., 20.8962}, {73., 20.6548}, {72., 20.4129},
 {71., 20.1707}, {70., 19.9282}, {69., 19.6853}, {68., 19.442}, {67., 19.1984},
 {66., 18.9545}, {65., 18.7103}, {64., 18.4658}, {63., 18.2209},
 {62., 17.9758}, {61., 17.7305}, {60., 17.4848}, {59., 17.239}, {58., 16.9929},
 {57., 16.7466}, {56., 16.5}, {55., 16.2533}, {54., 16.0064}, {53., 15.7593},
 {52., 15.512}, {51., 15.2646}, {50., 15.0171}, {49., 14.7694}, {48., 14.5216},
 {47., 14.2737}, {46., 14.0257}, {45., 13.7776}, {44., 13.5294}, {43., 13.2812},
 {42., 13.0329}, {41., 12.7846}, {40., 12.5363}, {39., 12.2879}, {38., 12.0396},
 {37., 11.7912}, {36., 11.5429}, {35., 11.2946}, {34., 11.0464}, {33., 10.7982},
 {32., 10.5501}, {31., 10.302}, {30., 10.054}, {29., 9.80618}, {28., 9.55843},
 {27., 9.31079}, {26., 9.0633}, {25., 8.81593}, {24., 8.56872}, {23., 8.32168},
 {22., 8.07481}, {21., 7.82812}, {20., 7.58163}, {19., 7.33535}, {18., 7.08928},
 {17., 6.84342}, {16., 6.59781}, {15., 6.35245}, {14., 6.10735},
 {13., 5.86251}, {12., 5.61793}, {11., 5.37363}, {10., 5.12964},
 {9., 4.88594}, {8., 4.64256}, {7., 4.39949}, {6., 4.15676}, {5., 3.91437},
 {4., 3.67232}, {3., 3.43062}, {2., 3.18929}, {1., 2.94834}, {0., 2.70776}}
```

In[441]:=
```
PeakHandRange =
 PeakRange["Hand", Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₂ → factor}]]
```

Out[441]=
```
{{100., 30.0847}, {99., 29.8002}, {98., 29.515}, {97., 29.2293}, {96., 28.943},
 {95., 28.6561}, {94., 28.3688}, {93., 28.0809}, {92., 27.7925}, {91., 27.5037},
 {90., 27.2144}, {89., 26.9248}, {88., 26.6348}, {87., 26.3444}, {86., 26.0537},
 {85., 25.7627}, {84., 25.4715}, {83., 25.18}, {82., 24.8883}, {81., 24.5964},
 {80., 24.3044}, {79., 24.0122}, {78., 23.72}, {77., 23.4276}, {76., 23.1353},
 {75., 22.8429}, {74., 22.5506}, {73., 22.2582}, {72., 21.966}, {71., 21.6739},
 {70., 21.3819}, {69., 21.09}, {68., 20.7984}, {67., 20.507}, {66., 20.2158},
 {65., 19.9249}, {64., 19.6343}, {63., 19.344}, {62., 19.0541}, {61., 18.7646},
 {60., 18.4755}, {59., 18.1868}, {58., 17.8986}, {57., 17.6109}, {56., 17.3237},
 {55., 17.0371}, {54., 16.7511}, {53., 16.4656}, {52., 16.1808}, {51., 15.8966},
 {50., 15.6131}, {49., 15.3303}, {48., 15.0482}, {47., 14.7669}, {46., 14.4863},
 {45., 14.2065}, {44., 13.9276}, {43., 13.6494}, {42., 13.3721}, {41., 13.0957},
 {40., 12.8202}, {39., 12.5457}, {38., 12.272}, {37., 11.9993}, {36., 11.7276},
 {35., 11.4568}, {34., 11.1871}, {33., 10.9184}, {32., 10.6507},
 {31., 10.3841}, {30., 10.1186}, {29., 9.85413}, {28., 9.59079},
 {27., 9.32855}, {26., 9.06745}, {25., 8.80749}, {24., 8.54867},
 {23., 8.29104}, {22., 8.03457}, {21., 7.77929}, {20., 7.52521},
 {19., 7.27235}, {18., 7.0207}, {17., 6.77027}, {16., 6.52109}, {15., 6.27315},
 {14., 6.02647}, {13., 5.78105}, {12., 5.53689}, {11., 5.29401}, {10., 5.0524},
 {9., 4.81208}, {8., 4.57305}, {7., 4.33531}, {6., 4.09888}, {5., 3.86375},
 {4., 3.62992}, {3., 3.3974}, {2., 3.1662}, {1., 2.93632}, {0., 2.70776}}
```

In[442]:=
```
PeakSelfImposedDistancingRange = PeakRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₃ → factor}]]
```

Out[442]=
```
{{100., 23.0653}, {99., 22.9132}, {98., 22.7603}, {97., 22.6065}, {96., 22.4519},
 {95., 22.2964}, {94., 22.1399}, {93., 21.9824}, {92., 21.8239}, {91., 21.6644},
 {90., 21.5039}, {89., 21.3423}, {88., 21.1796}, {87., 21.0158}, {86., 20.8508},
 {85., 20.6848}, {84., 20.5176}, {83., 20.3492}, {82., 20.1796}, {81., 20.0089},
 {80., 19.8369}, {79., 19.6637}, {78., 19.4894}, {77., 19.3137}, {76., 19.1369},
 {75., 18.9588}, {74., 18.7795}, {73., 18.5989}, {72., 18.417}, {71., 18.2339},
 {70., 18.0496}, {69., 17.864}, {68., 17.6771}, {67., 17.489}, {66., 17.2996},
 {65., 17.109}, {64., 16.9171}, {63., 16.724}, {62., 16.5297}, {61., 16.3341},
 {60., 16.1373}, {59., 15.9393}, {58., 15.7401}, {57., 15.5397}, {56., 15.3381},
 {55., 15.1353}, {54., 14.9314}, {53., 14.7263}, {52., 14.5201},
 {51., 14.3127}, {50., 14.1042}, {49., 13.8947}, {48., 13.684}, {47., 13.4723},
 {46., 13.2595}, {45., 13.0457}, {44., 12.8309}, {43., 12.6151},
 {42., 12.3983}, {41., 12.1805}, {40., 11.9618}, {39., 11.7422},
 {38., 11.5217}, {37., 11.3003}, {36., 11.078}, {35., 10.8549}, {34., 10.631},
 {33., 10.4063}, {32., 10.1808}, {31., 9.9546}, {30., 9.72767}, {29., 9.50001},
 {28., 9.2717}, {27., 9.04274}, {26., 8.81314}, {25., 8.58295}, {24., 8.35217},
 {23., 8.12086}, {22., 7.889}, {21., 7.65666}, {20., 7.42383}, {19., 7.19056},
 {18., 6.95688}, {17., 6.72278}, {16., 6.48833}, {15., 6.25354},
 {14., 6.0184}, {13., 5.78299}, {12., 5.54731}, {11., 5.3114}, {10., 5.07526},
 {9., 4.83893}, {8., 4.60244}, {7., 4.36582}, {6., 4.12908}, {5., 3.89226},
 {4., 3.65538}, {3., 3.41847}, {2., 3.18154}, {1., 2.94463}, {0., 2.70776}}
```

In[443]:=
```
PeakGovernmentImposedDistancingRange = PeakRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r4 → factor}]]
```

Out[443]=
```
{{100., 2.71047}, {99., 2.71052}, {98., 2.71054}, {97., 2.7106}, {96., 2.71065},
 {95., 2.71069}, {94., 2.71075}, {93., 2.71081}, {92., 2.71088}, {91., 2.71093},
 {90., 2.711}, {89., 2.71107}, {88., 2.71115}, {87., 2.71124}, {86., 2.71134},
 {85., 2.71144}, {84., 2.71153}, {83., 2.71165}, {82., 2.71178}, {81., 2.7119},
 {80., 2.71205}, {79., 2.71221}, {78., 2.71238}, {77., 2.71259}, {76., 2.71278},
 {75., 2.71302}, {74., 2.71326}, {73., 2.71354}, {72., 2.71385}, {71., 2.71419},
 {70., 2.71456}, {69., 2.71498}, {68., 2.71545}, {67., 2.71597}, {66., 2.71655},
 {65., 2.7172}, {64., 2.71793}, {63., 2.71875}, {62., 2.71966}, {61., 2.72067},
 {60., 2.72181}, {59., 2.72309}, {58., 2.72453}, {57., 2.72616}, {56., 2.72796},
 {55., 2.73}, {54., 2.7323}, {53., 2.73488}, {52., 2.73779}, {51., 2.74105},
 {50., 2.7447}, {49., 2.7488}, {48., 2.75342}, {47., 2.75859}, {46., 2.76439},
 {45., 2.7709}, {44., 2.77816}, {43., 2.78629}, {42., 2.79538}, {41., 2.80552},
 {40., 2.81685}, {39., 2.82944}, {38., 2.84347}, {37., 2.85903}, {36., 2.8763},
 {35., 2.89544}, {34., 2.91659}, {33., 2.93992}, {32., 2.96562},
 {31., 2.99385}, {30., 3.02481}, {29., 3.05866}, {28., 3.09556},
 {27., 3.13568}, {26., 3.17912}, {25., 3.22603}, {24., 3.27641},
 {23., 3.33033}, {22., 3.38766}, {21., 3.44829}, {20., 3.51197}, {19., 3.5783},
 {18., 3.64672}, {17., 3.71652}, {16., 3.78675}, {15., 3.85615},
 {14., 3.92322}, {13., 3.98609}, {12., 4.0425}, {11., 4.08972}, {10., 4.12458},
 {9., 4.14339}, {8., 4.14187}, {7., 4.11519}, {6., 4.05792}, {5., 3.96412},
 {4., 3.82727}, {3., 3.64049}, {2., 3.39654}, {1., 3.08806}, {0., 2.70776}}
```

In[444]:=
```
PeakCombinedRange = PeakRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, 0.10393], {r2 → 0.7}, {r4 → factor}]]
```

Out[444]=
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{{100., 10.1212}, {99., 10.1212}, {98., 10.1213}, {97., 10.1213}, {96., 10.1213},
 {95., 10.1214}, {94., 10.1214}, {93., 10.1215}, {92., 10.1215}, {91., 10.1216},
 {90., 10.1217}, {89., 10.1218}, {88., 10.1218}, {87., 10.1219}, {86., 10.122},
 {85., 10.1221}, {84., 10.1222}, {83., 10.1223}, {82., 10.1224}, {81., 10.1225},
 {80., 10.1227}, {79., 10.1228}, {78., 10.123}, {77., 10.1232}, {76., 10.1234},
 {75., 10.1236}, {74., 10.1239}, {73., 10.1241}, {72., 10.1244},
 {71., 10.1248}, {70., 10.1251}, {69., 10.1255}, {68., 10.126}, {67., 10.1265},
 {66., 10.127}, {65., 10.1277}, {64., 10.1284}, {63., 10.1291}, {62., 10.13},
 {61., 10.131}, {60., 10.1322}, {59., 10.1334}, {58., 10.1348}, {57., 10.1364},
 {56., 10.1382}, {55., 10.1402}, {54., 10.1425}, {53., 10.145}, {52., 10.1479},
 {51., 10.1511}, {50., 10.1548}, {49., 10.1589}, {48., 10.1635}, {47., 10.1687},
 {46., 10.1746}, {45., 10.1811}, {44., 10.1885}, {43., 10.1968},
 {42., 10.2061}, {41., 10.2165}, {40., 10.2281}, {39., 10.2412},
 {38., 10.2557}, {37., 10.2719}, {36., 10.29}, {35., 10.31}, {34., 10.3323},
 {33., 10.357}, {32., 10.3843}, {31., 10.4145}, {30., 10.4476}, {29., 10.484},
 {28., 10.5239}, {27., 10.5674}, {26., 10.6148}, {25., 10.666}, {24., 10.7214},
 {23., 10.7808}, {22., 10.8442}, {21., 10.9115}, {20., 10.9825},
 {19., 11.0566}, {18., 11.1333}, {17., 11.2118}, {16., 11.291}, {15., 11.3695},
 {14., 11.4455}, {13., 11.517}, {12., 11.5813}, {11., 11.6353}, {10., 11.6755},
 {9., 11.6976}, {8., 11.6969}, {7., 11.668}, {6., 11.6048}, {5., 11.501},
 {4., 11.3494}, {3., 11.1428}, {2., 10.8737}, {1., 10.5347}, {0., 10.1186}}
```

In[508]:=
```
imagePadding = {{72.5, 15}, {50, 5}};
fig4A = Show[ListLinePlot[
    {PeakMaskRange[[ ;; ;; 5]], PeakHandRange, PeakSelfImposedDistancingRange,
     PeakGovernmentImposedDistancingRange[[ ;; ;; 5]], PeakCombinedRange},
    AspectRatio → 0.75, ImageSize → 400, PlotRange → {All, {-2.5, 32.5}},
    AxesOrigin → {0, 0}, Frame → {{True, False}, {True, False}},
    FrameStyle → Directive[Black, 17],
    PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
      {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
      {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
      {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
      {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
    PlotRangePadding → None, PlotMarkers → {Graphics[
       {RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]}, ImageSize → 10], "", "",
      Graphics[{RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10],
      ""}, PlotLabel → Style[Row[{"Slow spread of awareness"}], 17, Black],
    ImagePadding → imagePadding, FrameLabel →
     {{"Relative reduction in\npeak number of diagnoses (%)", None},
      {"Efficacy of prevention measure (%)", None}}],
   Graphics[Text[StyleForm["A", FontSize → 26], {100 * 0.05, 32.5 * 0.95}]],
   Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
      FontColor → RGBColor[217 / 255, 0, 0]], {75, 1.5}]], Graphics[
    {RGBColor[217 / 255, 0, 0], Thickness[0.005], Line[{{0, 0}, {100, 0}}]}]]]

Export[StringJoin[
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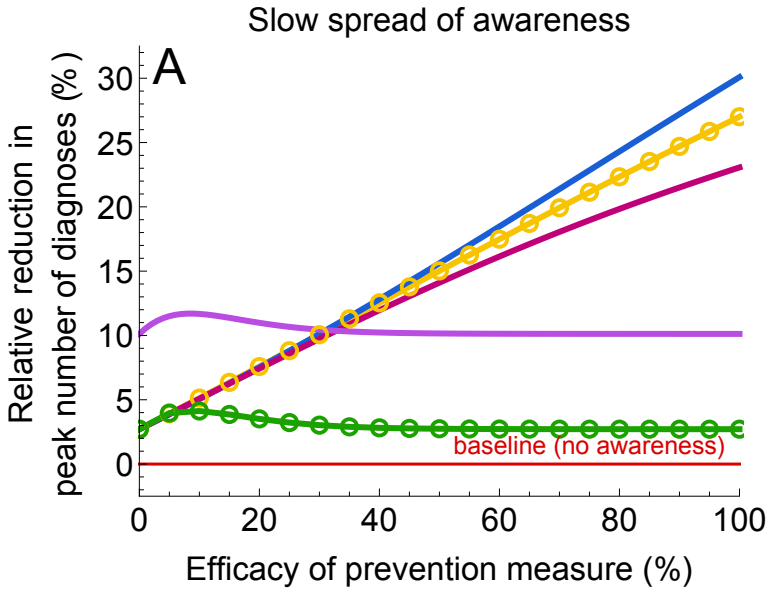
      Figures//Figure4A", ".eps"], fig4A];
Export[StringJoin[
    "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
      Figure4A", ".eps"], fig4A];
```

Out[509]=



In[449]:=
```
AttackRateMaskRange = AttackRateRange["Mask",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₁ → factor}]]
```

Out[449]=
```
{{100., 12.8943}, {99., 12.9324}, {98., 12.9705}, {97., 13.0086}, {96., 13.0467},
 {95., 13.0847}, {94., 13.1227}, {93., 13.1606}, {92., 13.1985},
 {91., 13.2363}, {90., 13.274}, {89., 13.3117}, {88., 13.3493}, {87., 13.3869},
 {86., 13.4243}, {85., 13.4616}, {84., 13.4989}, {83., 13.536}, {82., 13.5731},
 {81., 13.61}, {80., 13.6468}, {79., 13.6835}, {78., 13.7201}, {77., 13.7565},
 {76., 13.7929}, {75., 13.829}, {74., 13.8651}, {73., 13.901}, {72., 13.9367},
 {71., 13.9723}, {70., 14.0078}, {69., 14.0431}, {68., 14.0782}, {67., 14.1132},
 {66., 14.148}, {65., 14.1826}, {64., 14.2171}, {63., 14.2514}, {62., 14.2855},
 {61., 14.3194}, {60., 14.3532}, {59., 14.3868}, {58., 14.4202}, {57., 14.4534},
 {56., 14.4864}, {55., 14.5192}, {54., 14.5518}, {53., 14.5842}, {52., 14.6165},
 {51., 14.6485}, {50., 14.6803}, {49., 14.712}, {48., 14.7434}, {47., 14.7746},
 {46., 14.8056}, {45., 14.8364}, {44., 14.867}, {43., 14.8974}, {42., 14.9276},
 {41., 14.9575}, {40., 14.9873}, {39., 15.0168}, {38., 15.0461}, {37., 15.0752},
 {36., 15.1041}, {35., 15.1328}, {34., 15.1613}, {33., 15.1895}, {32., 15.2175},
 {31., 15.2453}, {30., 15.2729}, {29., 15.3003}, {28., 15.3274},
 {27., 15.3544}, {26., 15.3811}, {25., 15.4076}, {24., 15.4338},
 {23., 15.4599}, {22., 15.4857}, {21., 15.5114}, {20., 15.5368},
 {19., 15.562}, {18., 15.587}, {17., 15.6117}, {16., 15.6363}, {15., 15.6606},
 {14., 15.6847}, {13., 15.7086}, {12., 15.7323}, {11., 15.7558}, {10., 15.779},
 {9., 15.8021}, {8., 15.8249}, {7., 15.8476}, {6., 15.87}, {5., 15.8922},
 {4., 15.9142}, {3., 15.936}, {2., 15.9577}, {1., 15.9791}, {0., 16.0003}}
```

In[450]:=
```
AttackRateHandRange = AttackRateRange["Hand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₂ → factor}]]
```

Out[450]=
```
{{100., 12.2032}, {99., 12.253}, {98., 12.303}, {97., 12.3533}, {96., 12.4037},
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 {90., 12.7078}, {89., 12.7584}, {88., 12.809}, {87., 12.8594}, {86., 12.9098},
 {85., 12.96}, {84., 13.0101}, {83., 13.0599}, {82., 13.1096}, {81., 13.1591},
 {80., 13.2084}, {79., 13.2575}, {78., 13.3063}, {77., 13.3549}, {76., 13.4032},
 {75., 13.4512}, {74., 13.4989}, {73., 13.5463}, {72., 13.5935}, {71., 13.6403},
 {70., 13.6868}, {69., 13.733}, {68., 13.7788}, {67., 13.8243}, {66., 13.8694},
 {65., 13.9142}, {64., 13.9587}, {63., 14.0027}, {62., 14.0464}, {61., 14.0897},
 {60., 14.1327}, {59., 14.1752}, {58., 14.2174}, {57., 14.2592}, {56., 14.3005},
 {55., 14.3415}, {54., 14.3821}, {53., 14.4223}, {52., 14.4621}, {51., 14.5015},
 {50., 14.5405}, {49., 14.579}, {48., 14.6172}, {47., 14.655}, {46., 14.6923},
 {45., 14.7293}, {44., 14.7658}, {43., 14.802}, {42., 14.8377}, {41., 14.873},
 {40., 14.908}, {39., 14.9425}, {38., 14.9766}, {37., 15.0103}, {36., 15.0437},
 {35., 15.0766}, {34., 15.1091}, {33., 15.1413}, {32., 15.173}, {31., 15.2044},
 {30., 15.2354}, {29., 15.266}, {28., 15.2962}, {27., 15.3261}, {26., 15.3555},
 {25., 15.3846}, {24., 15.4133}, {23., 15.4417}, {22., 15.4697},
 {21., 15.4973}, {20., 15.5246}, {19., 15.5515}, {18., 15.5781},
 {17., 15.6043}, {16., 15.6302}, {15., 15.6557}, {14., 15.6809},
 {13., 15.7058}, {12., 15.7303}, {11., 15.7545}, {10., 15.7784},
 {9., 15.802}, {8., 15.8252}, {7., 15.8482}, {6., 15.8708}, {5., 15.8931},
 {4., 15.9151}, {3., 15.9368}, {2., 15.9583}, {1., 15.9794}, {0., 16.0003}}
```

In[451]:=
```
AttackRateSelfImposedDistancingRange =
 AttackRateRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r3 → factor}]]
```

Out[451]=
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{{100., 13.1526}, {99., 13.1776}, {98., 13.2029}, {97., 13.2284}, {96., 13.2542},
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 {90., 13.4145}, {89., 13.4421}, {88., 13.4699}, {87., 13.4979}, {86., 13.5261},
 {85., 13.5546}, {84., 13.5832}, {83., 13.6121}, {82., 13.6411}, {81., 13.6703},
 {80., 13.6997}, {79., 13.7292}, {78., 13.7589}, {77., 13.7888}, {76., 13.8188},
 {75., 13.8489}, {74., 13.8792}, {73., 13.9096}, {72., 13.9401}, {71., 13.9707},
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 {65., 14.1564}, {64., 14.1876}, {63., 14.2188}, {62., 14.2501}, {61., 14.2814},
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 {45., 14.7809}, {44., 14.8117}, {43., 14.8423}, {42., 14.8729}, {41., 14.9033},
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 {35., 15.0834}, {34., 15.1129}, {33., 15.1423}, {32., 15.1715},
 {31., 15.2005}, {30., 15.2294}, {29., 15.2581}, {28., 15.2866}, {27., 15.315},
 {26., 15.3431}, {25., 15.3711}, {24., 15.3989}, {23., 15.4265},
 {22., 15.4538}, {21., 15.481}, {20., 15.508}, {19., 15.5347}, {18., 15.5613},
 {17., 15.5876}, {16., 15.6137}, {15., 15.6396}, {14., 15.6652},
 {13., 15.6907}, {12., 15.7159}, {11., 15.7409}, {10., 15.7656},
 {9., 15.7901}, {8., 15.8144}, {7., 15.8385}, {6., 15.8623}, {5., 15.8859},
 {4., 15.9092}, {3., 15.9323}, {2., 15.9552}, {1., 15.9779}, {0., 16.0003}}
```

In[452]:=
```
AttackRateGovernmentImposedDistancingRange =
 AttackRateRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r4 → factor}]]
```

Out[452]=
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 {85., 16.0002}, {84., 16.0002}, {83., 16.0002}, {82., 16.0002}, {81., 16.0002},
 {80., 16.0002}, {79., 16.0002}, {78., 16.0002}, {77., 16.0002}, {76., 16.0002},
 {75., 16.0002}, {74., 16.0002}, {73., 16.0001}, {72., 16.0001}, {71., 16.0001},
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 {24., 15.9896}, {23., 15.9886}, {22., 15.9875}, {21., 15.9864}, {20., 15.9851},
 {19., 15.9839}, {18., 15.9826}, {17., 15.9812}, {16., 15.9799}, {15., 15.9785},
 {14., 15.9772}, {13., 15.976}, {12., 15.9748}, {11., 15.9738}, {10., 15.9731},
 {9., 15.9726}, {8., 15.9726}, {7., 15.973}, {6., 15.974}, {5., 15.9757},
 {4., 15.9783}, {3., 15.9818}, {2., 15.9866}, {1., 15.9926}, {0., 16.0003}}
```

In[453]:=
```
AttackRateCombinedRange = AttackRateRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, 0.10393], {r2 → 0.7}, {r4 → factor}]]
```

Out[453]=
```
{{100., 15.2353}, {99., 15.2353}, {98., 15.2353}, {97., 15.2353}, {96., 15.2353},
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 {90., 15.2353}, {89., 15.2353}, {88., 15.2353}, {87., 15.2353}, {86., 15.2353},
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 {75., 15.2353}, {74., 15.2353}, {73., 15.2353}, {72., 15.2353}, {71., 15.2353},
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 {65., 15.2352}, {64., 15.2352}, {63., 15.2352}, {62., 15.2352}, {61., 15.2352},
 {60., 15.2351}, {59., 15.2351}, {58., 15.2351}, {57., 15.235}, {56., 15.235},
 {55., 15.235}, {54., 15.2349}, {53., 15.2349}, {52., 15.2348}, {51., 15.2347},
 {50., 15.2347}, {49., 15.2346}, {48., 15.2345}, {47., 15.2344}, {46., 15.2343},
 {45., 15.2341}, {44., 15.234}, {43., 15.2338}, {42., 15.2336}, {41., 15.2334},
 {40., 15.2332}, {39., 15.2329}, {38., 15.2326}, {37., 15.2323},
 {36., 15.2319}, {35., 15.2315}, {34., 15.231}, {33., 15.2305}, {32., 15.2299},
 {31., 15.2292}, {30., 15.2285}, {29., 15.2278}, {28., 15.2269},
 {27., 15.2259}, {26., 15.2249}, {25., 15.2238}, {24., 15.2226},
 {23., 15.2212}, {22., 15.2198}, {21., 15.2183}, {20., 15.2167}, {19., 15.215},
 {18., 15.2132}, {17., 15.2114}, {16., 15.2095}, {15., 15.2077},
 {14., 15.2058}, {13., 15.204}, {12., 15.2024}, {11., 15.201}, {10., 15.1999},
 {9., 15.1992}, {8., 15.1989}, {7., 15.1994}, {6., 15.2006}, {5., 15.2028},
 {4., 15.2062}, {3., 15.2109}, {2., 15.2172}, {1., 15.2253}, {0., 15.2354}}
```

In[512]:=
```
fig4B = Show[ListLinePlot[{AttackRateMaskRange[[ ;; ;; 5]],
     AttackRateHandRange, AttackRateSelfImposedDistancingRange,
     AttackRateGovernmentImposedDistancingRange[[ ;; ;; 5]],
     AttackRateCombinedRange}, AspectRatio → 0.75, ImageSize → 400,
   PlotRange → {{0, 100}, {12, 17}}, AxesOrigin → {0, 0},
   Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
   PlotMarkers → {Graphics[{RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]},
      ImageSize → 10], "", "", Graphics[
      {RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10], ""},
   PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
     {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
     {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
     {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
     {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
   FrameLabel → {{"Attack rate (%)", None},
     {"Efficacy of prevention measure (%)", None}}, PlotRangePadding → None,
   PlotLabel → Style[Row[{"Slow spread of awareness"}], 17, Black],
   ImagePadding → imagePadding],
  Graphics[{RGBColor[217 / 255, 0, 0], Thickness[0.005],
    Line[{{0, AttackRateBaseline}, {100, AttackRateBaseline}}]}],
  Graphics[Text[StyleForm["B", FontSize → 26], {100 * 0.05, 12 + (17 - 12) * 0.95}]],
  Graphics[Text[StyleForm["baseline (no awareness)", FontSize → 13,
     FontColor → RGBColor[217 / 255, 0, 0]], {72.5, 16.5}]]]

Export[StringJoin[
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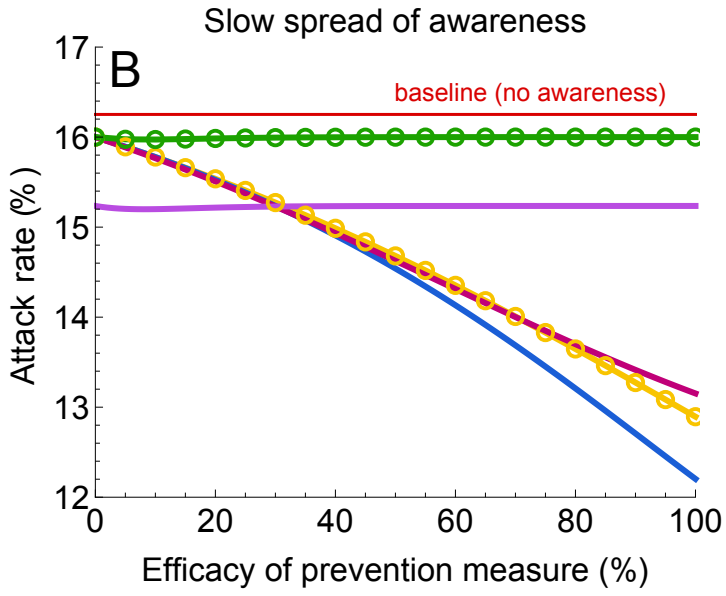
     Figures//Figure4B", ".eps"], fig4B];
Export[StringJoin[
   "//Users//LynxGAV//Documents//Work//CoronaLadies//Submission//Figures//
     Figure4B", ".eps"], fig4B];
```

Out[512]=



In[457]:=
```
PeakTimingMaskRange = PeakTimingRange["Mask",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₁ → factor}]]
```

Out[457]=
```
{{100., 152.309}, {99., 152.349}, {98., 152.369}, {97., 152.409}, {96., 152.429},
 {95., 152.469}, {94., 152.489}, {93., 152.53}, {92., 152.55}, {91., 152.59},
 {90., 152.61}, {89., 152.65}, {88., 152.67}, {87., 152.69}, {86., 152.73},
 {85., 152.75}, {84., 152.77}, {83., 152.81}, {82., 152.83}, {81., 152.85},
 {80., 152.891}, {79., 152.911}, {78., 152.931}, {77., 152.971}, {76., 152.991},
 {75., 153.011}, {74., 153.031}, {73., 153.051}, {72., 153.091}, {71., 153.111},
 {70., 153.131}, {69., 153.151}, {68., 153.171}, {67., 153.191}, {66., 153.211},
 {65., 153.251}, {64., 153.272}, {63., 153.292}, {62., 153.312}, {61., 153.332},
 {60., 153.352}, {59., 153.372}, {58., 153.392}, {57., 153.392}, {56., 153.412},
 {55., 153.432}, {54., 153.452}, {53., 153.472}, {52., 153.492}, {51., 153.512},
 {50., 153.532}, {49., 153.532}, {48., 153.552}, {47., 153.572}, {46., 153.592},
 {45., 153.592}, {44., 153.612}, {43., 153.632}, {42., 153.632}, {41., 153.653},
 {40., 153.673}, {39., 153.673}, {38., 153.693}, {37., 153.693}, {36., 153.713},
 {35., 153.713}, {34., 153.733}, {33., 153.733}, {32., 153.753}, {31., 153.753},
 {30., 153.773}, {29., 153.773}, {28., 153.793}, {27., 153.793}, {26., 153.793},
 {25., 153.813}, {24., 153.813}, {23., 153.813}, {22., 153.833},
 {21., 153.833}, {20., 153.833}, {19., 153.833}, {18., 153.853},
 {17., 153.853}, {16., 153.853}, {15., 153.853}, {14., 153.853},
 {13., 153.873}, {12., 153.873}, {11., 153.873}, {10., 153.873},
 {9., 153.873}, {8., 153.873}, {7., 153.873}, {6., 153.873}, {5., 153.873},
 {4., 153.873}, {3., 153.873}, {2., 153.873}, {1., 153.873}, {0., 153.873}}
```

In[458]:=
```
PeakTimingHandRange = PeakTimingRange["Hand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r₂ → factor}]]
```

Out[458]=
```
{{100., 151.567}, {99., 151.607}, {98., 151.667}, {97., 151.707}, {96., 151.767},
 {95., 151.808}, {94., 151.868}, {93., 151.908}, {92., 151.948}, {91., 152.008},
 {90., 152.048}, {89., 152.088}, {88., 152.149}, {87., 152.189}, {86., 152.229},
 {85., 152.269}, {84., 152.329}, {83., 152.369}, {82., 152.409},
 {81., 152.449}, {80., 152.489}, {79., 152.53}, {78., 152.57}, {77., 152.61},
 {76., 152.65}, {75., 152.69}, {74., 152.73}, {73., 152.77}, {72., 152.81},
 {71., 152.83}, {70., 152.87}, {69., 152.911}, {68., 152.951}, {67., 152.971},
 {66., 153.011}, {65., 153.051}, {64., 153.071}, {63., 153.111}, {62., 153.131},
 {61., 153.171}, {60., 153.191}, {59., 153.231}, {58., 153.251}, {57., 153.292},
 {56., 153.312}, {55., 153.332}, {54., 153.352}, {53., 153.392}, {52., 153.412},
 {51., 153.432}, {50., 153.452}, {49., 153.472}, {48., 153.492}, {47., 153.512},
 {46., 153.532}, {45., 153.552}, {44., 153.572}, {43., 153.592}, {42., 153.612},
 {41., 153.632}, {40., 153.653}, {39., 153.673}, {38., 153.673}, {37., 153.693},
 {36., 153.713}, {35., 153.713}, {34., 153.733}, {33., 153.753}, {32., 153.753},
 {31., 153.773}, {30., 153.773}, {29., 153.793}, {28., 153.793}, {27., 153.813},
 {26., 153.813}, {25., 153.833}, {24., 153.833}, {23., 153.833}, {22., 153.853},
 {21., 153.853}, {20., 153.853}, {19., 153.853}, {18., 153.873},
 {17., 153.873}, {16., 153.873}, {15., 153.873}, {14., 153.873},
 {13., 153.873}, {12., 153.873}, {11., 153.893}, {10., 153.893},
 {9., 153.893}, {8., 153.893}, {7., 153.893}, {6., 153.873}, {5., 153.873},
 {4., 153.873}, {3., 153.873}, {2., 153.873}, {1., 153.873}, {0., 153.873}}
```

In[459]:=
```
PeakTimingSelfImposedDistancingRange =
 PeakTimingRange["ContactReductionIndividuals",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r3 → factor}]]
```

Out[459]=
```
{{100., 151.908}, {99., 151.928}, {98., 151.968}, {97., 152.008}, {96., 152.048},
 {95., 152.068}, {94., 152.108}, {93., 152.149}, {92., 152.189}, {91., 152.209},
 {90., 152.249}, {89., 152.289}, {88., 152.309}, {87., 152.349}, {86., 152.369},
 {85., 152.409}, {84., 152.449}, {83., 152.469}, {82., 152.509}, {81., 152.53},
 {80., 152.57}, {79., 152.59}, {78., 152.63}, {77., 152.65}, {76., 152.69},
 {75., 152.71}, {74., 152.73}, {73., 152.77}, {72., 152.79}, {71., 152.83},
 {70., 152.85}, {69., 152.891}, {68., 152.911}, {67., 152.931}, {66., 152.971},
 {65., 152.991}, {64., 153.011}, {63., 153.031}, {62., 153.071}, {61., 153.091},
 {60., 153.111}, {59., 153.151}, {58., 153.171}, {57., 153.191}, {56., 153.211},
 {55., 153.231}, {54., 153.251}, {53., 153.292}, {52., 153.312}, {51., 153.332},
 {50., 153.352}, {49., 153.372}, {48., 153.392}, {47., 153.412}, {46., 153.432},
 {45., 153.452}, {44., 153.472}, {43., 153.492}, {42., 153.512}, {41., 153.532},
 {40., 153.552}, {39., 153.572}, {38., 153.572}, {37., 153.592}, {36., 153.612},
 {35., 153.632}, {34., 153.653}, {33., 153.653}, {32., 153.673}, {31., 153.693},
 {30., 153.693}, {29., 153.713}, {28., 153.733}, {27., 153.733}, {26., 153.753},
 {25., 153.753}, {24., 153.773}, {23., 153.773}, {22., 153.793},
 {21., 153.793}, {20., 153.813}, {19., 153.813}, {18., 153.833},
 {17., 153.833}, {16., 153.833}, {15., 153.853}, {14., 153.853},
 {13., 153.853}, {12., 153.853}, {11., 153.853}, {10., 153.873},
 {9., 153.873}, {8., 153.873}, {7., 153.873}, {6., 153.873}, {5., 153.873},
 {4., 153.873}, {3., 153.873}, {2., 153.873}, {1., 153.873}, {0., 153.873}}
```

In[460]:=
```
PeakTimingGovernmentImposedDistancingRange =
 PeakTimingRange["ContactReductionGovernment",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, StartTimeBaseline], {r4 → factor}]]
```

Out[460]=
```
{{100., 357.68}, {99., 352.627}, {98., 347.894}, {97., 343.402}, {96., 339.151},
 {95., 335.12}, {94., 331.249}, {93., 327.539}, {92., 323.97}, {91., 320.521},
 {90., 317.192}, {89., 313.963}, {88., 310.835}, {87., 307.786}, {86., 304.818},
 {85., 301.931}, {84., 299.123}, {83., 296.376}, {82., 293.668}, {81., 291.041},
 {80., 288.454}, {79., 285.928}, {78., 283.441}, {77., 280.994}, {76., 278.608},
 {75., 276.242}, {74., 273.935}, {73., 271.649}, {72., 269.403}, {71., 267.197},
 {70., 265.012}, {69., 262.866}, {68., 260.74}, {67., 258.654}, {66., 256.589},
 {65., 254.543}, {64., 252.538}, {63., 250.553}, {62., 248.567}, {61., 246.642},
 {60., 244.717}, {59., 242.812}, {58., 240.927}, {57., 239.082}, {56., 237.237},
 {55., 235.412}, {54., 233.607}, {53., 231.822}, {52., 230.058}, {51., 228.293},
 {50., 226.568}, {49., 224.844}, {48., 223.139}, {47., 221.455}, {46., 219.77},
 {45., 218.106}, {44., 216.461}, {43., 214.837}, {42., 213.212}, {41., 211.608},
 {40., 210.024}, {39., 208.44}, {38., 206.875}, {37., 205.311}, {36., 203.767},
 {35., 202.243}, {34., 200.719}, {33., 199.195}, {32., 197.711},
 {31., 196.207}, {30., 194.743}, {29., 193.259}, {28., 191.815},
 {27., 190.371}, {26., 188.927}, {25., 187.503}, {24., 186.08}, {23., 184.676},
 {22., 183.272}, {21., 181.868}, {20., 180.485}, {19., 179.101},
 {18., 177.737}, {17., 176.374}, {16., 175.01}, {15., 173.666}, {14., 172.323},
 {13., 170.979}, {12., 169.656}, {11., 168.312}, {10., 166.988},
 {9., 165.665}, {8., 164.341}, {7., 163.018}, {6., 161.714}, {5., 160.391},
 {4., 159.087}, {3., 157.784}, {2., 156.46}, {1., 155.157}, {0., 153.873}}
```

In[461]:=
```
PeakTimingCombinedRange = PeakTimingRange["GovernmentAndHand",
  Join[Parameters[RelativeSusceptibilityAwarenessBaseline,
    RateAwarenessFadingSusceptibleExposedMildSymptomsBaseline,
    RateAwarenessFadingSevereSymptomsBaseline, 5 × 10^(-5),
    DiagnosisRateAwareBaseline, 0.10393], {r2 → 0.7}, {r4 → factor}]]
```

Out[461]=
```
{{100., 357.6}, {99., 352.547}, {98., 347.814}, {97., 343.322}, {96., 339.07},
 {95., 335.02}, {94., 331.149}, {93., 327.439}, {92., 323.87}, {91., 320.42},
 {90., 317.091}, {89., 313.883}, {88., 310.734}, {87., 307.706}, {86., 304.738},
 {85., 301.85}, {84., 299.043}, {83., 296.275}, {82., 293.588}, {81., 290.961},
 {80., 288.374}, {79., 285.847}, {78., 283.361}, {77., 280.914}, {76., 278.528},
 {75., 276.161}, {74., 273.855}, {73., 271.569}, {72., 269.323}, {71., 267.097},
 {70., 264.931}, {69., 262.786}, {68., 260.66}, {67., 258.554}, {66., 256.509},
 {65., 254.463}, {64., 252.438}, {63., 250.452}, {62., 248.487}, {61., 246.542},
 {60., 244.637}, {59., 242.732}, {58., 240.847}, {57., 238.982}, {56., 237.157},
 {55., 235.332}, {54., 233.527}, {53., 231.742}, {52., 229.977}, {51., 228.213},
 {50., 226.488}, {49., 224.763}, {48., 223.059}, {47., 221.374}, {46., 219.69},
 {45., 218.025}, {44., 216.381}, {43., 214.757}, {42., 213.132}, {41., 211.528},
 {40., 209.944}, {39., 208.359}, {38., 206.795}, {37., 205.231}, {36., 203.707},
 {35., 202.163}, {34., 200.639}, {33., 199.135}, {32., 197.651},
 {31., 196.167}, {30., 194.683}, {29., 193.219}, {28., 191.755},
 {27., 190.311}, {26., 188.887}, {25., 187.463}, {24., 186.04}, {23., 184.636},
 {22., 183.232}, {21., 181.848}, {20., 180.465}, {19., 179.101},
 {18., 177.737}, {17., 176.374}, {16., 175.01}, {15., 173.666}, {14., 172.323},
 {13., 170.979}, {12., 169.656}, {11., 168.312}, {10., 166.988},
 {9., 165.665}, {8., 164.341}, {7., 163.018}, {6., 161.694}, {5., 160.371},
 {4., 159.047}, {3., 157.723}, {2., 156.4}, {1., 155.096}, {0., 153.773}}
```

In[515]:=
```
fig4C = Show[ListLinePlot[{PeakTimingMaskRange[[ ;; ;; 5]],
     PeakTimingHandRange, PeakTimingSelfImposedDistancingRange,
     PeakTimingGovernmentImposedDistancingRange[[ ;; ;; 5]],
     PeakTimingCombinedRange}, AspectRatio → 0.75,
   ImageSize → 400, PlotRange → {All, {0, 365}}, AxesOrigin → {0, 0},
   Frame → {{True, False}, {True, False}}, FrameStyle → Directive[Black, 17],
   PlotMarkers → {Graphics[{RGBColor[248 / 255, 196 / 255, 0], Thick, Circle[]},
      ImageSize → 10], "", "", Graphics[
      {RGBColor[28 / 255, 162 / 255, 0], Thick, Circle[]}, ImageSize → 10], ""},
   PlotStyle → {{Thickness[0.01], RGBColor[248 / 255, 196 / 255, 0]},
     {Thickness[0.01], RGBColor[26 / 255, 94 / 255, 214 / 255]},
     {Thickness[0.01], RGBColor[192 / 255, 0, 120 / 255]},
     {Thickness[0.01], RGBColor[28 / 255, 162 / 255, 0]},
     {Thickness[0.01], RGBColor[185 / 255, 76 / 255, 225 / 255]}},
   FrameLabel → {{"Time until the peak\nof diagnoses (months)", None},
     {"Efficacy of prevention measure (%)", None}},
   ImagePadding → imagePadding, PlotRangePadding → None,
   PlotLabel → Style[Row[{"Slow spread of awareness"}], 17, Black],
   PlotLegends → Table[Style[Row[{label}], Black, 13, "Text"],
     {label, {"Mask-wearing", "Handwashing", "Self-imposed social distancing",
       "Government-imposed social distancing",
       "Government-imposed social distancing\nand handwashing with 30%
         efficacy"}}],
   FrameTicks → {{{{0, "0"}, {365 × 3 / 12, "3"}, {365 × 9 / 12, "9"},
       {365 / 2, "6"}, {365, "12"}, {365 × 2, "24"}, {365 × 3, "36"}, {365 × 4, "48"},
       {365 × 5, "60"}, {365 × 6, "72"}}, None}, {Automatic, None}}],
  Graphics[{RGBColor[217 / 255, 0, 0], Thickness[0.005],
    Line[{{0, PeakTimingBaseline}, {100, PeakTimingBaseline}}]}],
  Graphics[Text[StyleForm["C", FontSize → 26], {100 * 0.05, 365 * 0.95}]],
  Graphics[Text[StyleForm["baseline (no awareness)",
     FontSize → 13, FontColor → RGBColor[217 / 255, 0, 0]], {75, 130}]]]

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```

Out[515]=