

Population-based Hospitalization Infection Model

Logistic growth with population-dependant growth-rate

Instant growth (alternative: periodic time-dependant growth)

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Assumptions

Rate linearly decreasing to zero at max hospitalized M.
1 respirator per 5 hospitalized (SST data) and for 7 days.

Data

SSI: Sundhedsstyrelsen

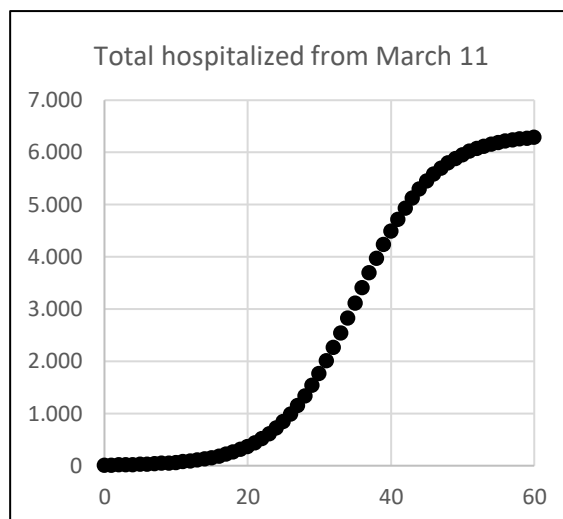
SST: Statens Serum Institut, Denmark

Logistic formulas

Change in Total Hosp. $H' = ro*(1-H/M)*H$

Level of Total Hosp. $H = M/(1+c*exp(-ro*t))$

Mar 11: $t = 0, Ho = M/(1+c); c = M/Ho-1$



Parameters

DK population Jan 1 2020

5822763

Herd immunity 60%

3493658

Infect/hospitalized IH

550

Herning DK March estimate 1650 since app. 50000 visitors at a 5 day Horse show gave 30 Hospitalized

Max H: $M = \text{Herd im.} / \text{IH}$

6352

Initial H_0

10

Initial rate ro

18,3%	27,4%	39,4%
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(EU comma used)

(SSI data)

Enponential tendency March 1-10:

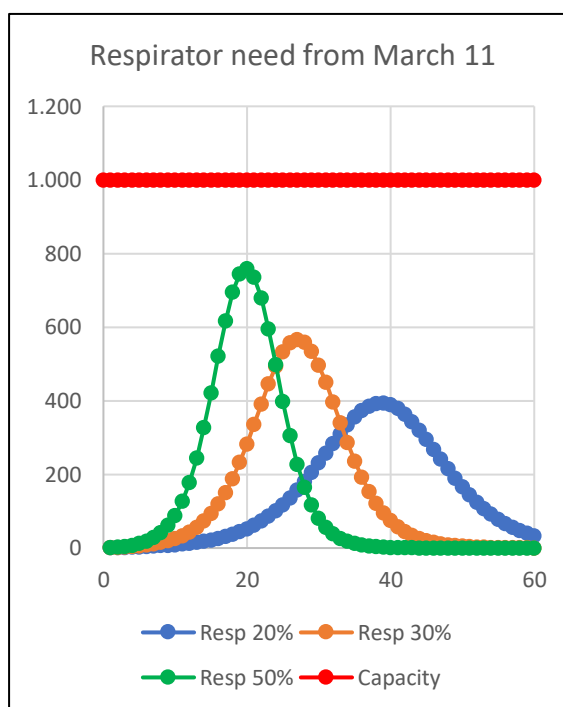
$T = 0,52*exp(0,3939x)$; so 48% growth rate, $R = 1,48$

Enponential tendency March 11-17:

$T = 2,30*exp(0,2741x)$; so 32% growth rate, $R = 1,32$

Enponential tendency March 11-26:

$T = 8,34*exp(0,1833x)$; so 20% growth rate, $R = 1,20$



Predictions

Date	Periods	Total 20%	Total 30%	Total 50%	Hosp 20%	Total 30%	Hosp 50%	Resp 20%	Resp 30%	Resp 50%	Capacity	Inf.mio
11-mar	0	10	10	10							1.000	0,006
12-mar	1	12	13	15	2	3	5	0	1	1	1.000	0,007
13-mar	2	14	17	22	2	4	7	1	1	2	1.000	0,008
14-mar	3	17	23	32	3	5	11	1	3	4	1.000	0,010
15-mar	4	21	30	48	3	7	16	2	4	8	1.000	0,011
16-mar	5	25	39	71	4	9	23	3	6	12	1.000	0,014
17-mar	6	30	51	105	5	12	34	4	8	19	1.000	0,016
18-mar	7	36	68	154	6	16	49	5	12	29	1.000	0,020
19-mar	8	43	88	226	7	21	72	6	15	42	1.000	0,024
20-mar	9	52	116	329	9	27	103	7	20	61	1.000	0,028
21-mar	10	62	152	476	10	36	147	9	26	89	1.000	0,034
22-mar	11	74	198	681	12	46	205	11	34	127	1.000	0,041

23-mar	12	89	258	960	15	60	279	13	44	178	1.000	0,049
24-mar	13	107	335	1.327	18	77	367	15	57	244	1.000	0,059
25-mar	14	128	433	1.787	21	98	460	18	73	327	1.000	0,070
26-mar	15	153	558	2.333	25	125	546	22	94	421	1.000	0,084
27-mar	16	183	714	2.938	30	156	605	26	120	522	1.000	0,100
28-mar	17	218	907	3.561	35	193	623	31	151	617	1.000	0,120
29-mar	18	260	1141	4.156	42	235	594	37	189	695	1.000	0,143
30-mar	19	310	1421	4.683	50	279	527	44	233	745	1.000	0,171
31-mar	20	369	1746	5.121	59	325	438	52	282	759	1.000	0,203
01-apr	21	438	2113	5.466	69	367	345	62	336	736	1.000	0,241
02-apr	22	519	2515	5.726	81	402	260	73	392	679	1.000	0,285
03-apr	23	613	2941	5.916	94	426	190	86	446	596	1.000	0,337
04-apr	24	722	3376	6.051	109	435	135	101	494	498	1.000	0,397
05-apr	25	848	3803	6.146	126	427	95	118	532	398	1.000	0,467
06-apr	26	992	4208	6.212	144	405	66	136	557	306	1.000	0,546
07-apr	27	1.156	4578	6.257	163	371	45	157	567	227	1.000	0,636
08-apr	28	1.339	4907	6.287	183	328	31	180	559	164	1.000	0,737
09-apr	29	1.543	5190	6.308	204	283	21	205	535	116	1.000	0,849
10-apr	30	1.767	5428	6.323	224	238	14	231	497	81	1.000	0,972
11-apr	31	2.010	5624	6.332	243	196	10	258	450	56	1.000	1,106
12-apr	32	2.270	5783	6.339	260	159	6	284	396	39	1.000	1,249
13-apr	33	2.544	5910	6.343	274	127	4	310	340	26	1.000	1,399
14-apr	34	2.828	6010	6.346	284	100	3	334	286	18	1.000	1,555
15-apr	35	3.117	6089	6.348	290	79	2	356	236	12	1.000	1,715
16-apr	36	3.408	6150	6.349	291	61	1	373	192	8	1.000	1,874
17-apr	37	3.695	6197	6.350	287	47	1	386	154	6	1.000	2,032
18-apr	38	3.973	6234	6.351	278	36	1	393	122	4	1.000	2,185
19-apr	39	4.239	6262	6.351	266	28	0	394	96	3	1.000	2,332
20-apr	40	4.489	6283	6.352	250	21	0	389	75	2	1.000	2,469
21-apr	41	4.721	6300	6.352	232	16	0	379	58	1	1.000	2,597
22-apr	42	4.933	6312	6.352	212	13	0	363	45	1	1.000	2,713
23-apr	43	5.125	6322	6.352	192	10	0	343	34	1	1.000	2,819
24-apr	44	5.296	6329	6.352	171	7	0	320	26	0	1.000	2,913
25-apr	45	5.448	6334	6.352	152	6	0	295	20	0	1.000	2,996
26-apr	46	5.581	6339	6.352	133	4	0	268	15	0	1.000	3,070
27-apr	47	5.697	6342	6.352	116	3	0	242	12	0	1.000	3,133
28-apr	48	5.797	6344	6.352	100	2	0	215	9	0	1.000	3,188
29-apr	49	5.883	6346	6.352	86	2	0	190	7	0	1.000	3,236
30-apr	50	5.957	6348	6.352	74	1	0	166	5	0	1.000	3,276
01-maj	51	6.020	6349	6.352	63	1	0	145	4	0	1.000	3,311
02-maj	52	6.073	6350	6.352	53	1	0	125	3	0	1.000	3,340
03-maj	53	6.118	6350	6.352	45	1	0	107	2	0	1.000	3,365
04-maj	54	6.156	6351	6.352	38	0	0	92	2	0	1.000	3,386
05-maj	55	6.188	6351	6.352	32	0	0	78	1	0	1.000	3,403
06-maj	56	6.215	6351	6.352	27	0	0	66	1	0	1.000	3,418
07-maj	57	6.237	6351	6.352	23	0	0	56	1	0	1.000	3,431
08-maj	58	6.256	6352	6.352	19	0	0	47	1	0	1.000	3,441
09-maj	59	6.272	6352	6.352	16	0	0	40	0	0	1.000	3,450
10-maj	60	6.285	6352	6.352	13	0	0	34	0	0	1.000	3,457
11-maj	61	6.296	6352	6.352	11	0	0	28	0	0	1.000	3,463

12-maj	62	6.306	6352	6.352	9	0	0	24	0	0	1.000	3,468
13-maj	63	6.313	6352	6.352	8	0	0	20	0	0	1.000	3,472
14-maj	64	6.320	6352	6.352	6	0	0	17	0	0	1.000	3,476
15-maj	65	6.325	6352	6.352	5	0	0	14	0	0	1.000	3,479
16-maj	66	6.330	6352	6.352	4	0	0	12	0	0	1.000	3,481
17-maj	67	6.333	6352	6.352	4	0	0	10	0	0	1.000	3,483
18-maj	68	6.337	6352	6.352	3	0	0	8	0	0	1.000	3,485
19-maj	69	6.339	6352	6.352	3	0	0	7	0	0	1.000	3,487
20-maj	70	6.341	6352	6.352	2	0	0	6	0	0	1.000	3,488