Additional file 5

Resource Model Parameters and Values

The AsiaFluCap Simulator

Resource parameter	Description	Chosen value	Justification/notes (all values can be changed by users in the interface)
p_{surge}	Proportion of total resource capacity that is available for influenza outbreak control and management.	0.12	Proportion based on [1-3].
$p_{threshold}$	Proportion of hospital beds that have to be occupied by cases before high pandemic activity period starts.	0.75	Arbitrary value. In our baseline scenarios we did not account for changes in resource use during the pandemic.
$p_{AbsenteeismPeak}$	Proportion of health care workers not available due to absenteeism.	0.15	10% absenteeism healthcare workers [4], 30% health care staff illness with work absences of up to 8 days [5], 40-70% absenteeism of health care staff [6].
$H_{hoursdayshiftsTotal}$	Total number of hours of both day shifts	16	We assumed a work day to be divided into two day shifts and one night.
$H_{hoursnightshift}$	Number of hours of night shift	8	We assumed a work day to be divided into two day shifts and one night.
$H_{workperday}$	Number of work hours per day	10	During the pandemic peak we assumed a 10 hour work day for health care workers.
$N_{workdaysweek}$	Number of work days per week	5	We assumed 5/7 days of work for health care workers during pandemic peak.
$H_{averageworkhoursperday}$	Average number of hours health care workers are available per day seen over one week.	7.1	$\mathbf{H}_{workday}*(\mathbf{N}_{workdaysperweek}/7)$
$Þ_{maskn95LOW}$ / $Þ_{maskn95HIGH}$	Number of masks N-95 / N-99 required per influenza case per day during low / high pandemic activity period.	1	10 N-95 respirators needed throughout hospital stay for non-ventilated hospitalised cases [7], mean 19.4 N95 masks per patients in the first 6 hours [8].
$F_{ventilatedmask95}$	Factor indicating the number of times more units are required per ventilated (ICU) case.	2	20 N-95 respirators needed throughout hospital stay for ventilated hospitalised cases [7]
$Þ_{SurgicalmaskLOW}$ / $Þ_{SurgicalmaskHIGH}$	Number of surgical masks required per influenza case per day during low / high pandemic activity period.	5	30 surgical masks needed per patient throughout hospital stay[7], 4,450 surgical masks needed (used by staff, patients and visitors) for 7 days for 29

			cases and WHO estimates are 2,436 [9],
$F_{ventilatedsurgmask}$	Factor indicating the number of times more units are required per ventilated (ICU) case.	$2^1/_3$	80 surgical masks needed per patient throughout hospital stay [7].
$Þ_{FaceshieldLOW}$ / $Þ_{FaceshieldHIGH}$	Number of face shields required per influenza case per day during low / high pandemic activity period.	1	Assumption based on [7, 9].
$F_{ventilatedfaceshield}$	Factor indicating the number of times more units are required per ventilated (ICU) case.	2	Assumption based on [7, 9].
$Þ_{GlovespairLOW}$ / $Þ_{GlovespairHIGH}$	Number of gloves (in pairs) required per influenza case per day during low / high pandemic activity period.	4	40 surgical gloves needed per patient throughout hospital stay [7], 8400 gloves (pairs) needed for 7 days for 29 cases and WHO estimates are 406 gloves (pairs) [9]. Mean 25.1 pairs of gloves per patient in the first 6 hours [8].
$F_{ventilatedgloves}$	Factor indicating the number of times more units are required per ventilated (ICU) case.	2½	100 surgical gloves needed per ventilated patient throughout hospital stay [7].
$Þ_{GownsLOW}$ / $Þ_{GownsHIGH}$	Number of coverall gowns required per influenza case per day during low / high pandemic activity period.	3	Assumption based on [9]. Mean 22.1 gowns per patients in first 6 hours [8].
$F_{ventilatedgowns}$	Factor indicating the number of times more units are required per ventilated (ICU) case.	2	Assumption based on [9].
p_{vac}	Proportion of (susceptible) population that will be vaccinated	-	Value set to 0 for baseline scenario. Users can include vaccination in interface (and indicate whether only risk groups are vaccinated or the whole population).
$N_{vaccinperperson}$	Number of vaccines per person	-	For instance: 1 or 2 doses needed per person.
v	Vaccine efficacy	-	Proportion which can be varied between 0 – 1.
$Þ_{antivirals}$	Courses (oseltamivir) per new influenza case (receiving antivirals)	1	One course defined as ten capsules (75 mg twice daily for five days) [10-14].

$Þ_{antibioticsLOW}$ / $Þ_{antibioticsHIGH}$	Antibiotics (grams) required per influenza case per day during low / high pandemic activity period.	0.420	Course is 500 mg twice daily for 5 days [15-17]. We assumed that cases only receive one course during their stay. An average hospital stay was assumed to be 12 days for non-ventilated cases: 5000 mg / 12 days.
$F_{ventilatedAntibiotics}$	Factor indicating the number of times more antibiotics are required per ventilated (ICU) case.	$^{12}/_{13}$	Course is 500 mg twice daily for 5 days [15-17]. We assumed that all cases only receive 1 course during their stay. As an average hospital stay was assumed to be 13 days for ventilated cases, we used: non-ventilated depletion rate times (12 days / 13 days).
$p_{NonventilatedAntibiotics}$	Proportion non-ventilated hospitalised cases requiring antibiotics.	0.74	74% of normal hospitalised cases required antibiotics [15].
$p_{VentilatedAntibiotics}$	Proportion ventilated hospitalised cases requiring antibiotics.	0.95	95% of ICU cases required antibiotics [15].
$Þ_{IVfluidsLOW}$ / $Þ_{IVfluidsHIGH}$	IV fluids (liters) required per influenza case per day during low / high pandemic activity period.	2.5	Assumption based on: hospital standard IV fluid regime 2.5 L/25 h) [18].
$F_{ventilatedIVfluids}$	Factor indicating the number of times more antibiotics are required per ventilated (ICU) case.	1	Assumption based on: hospital standard IV fluid regime 2.5 L/25 h) [18].
$p_{NonventilatedIVfluids}$	Proportion of non-ventilated cases receiving IV Fluids.	1	We assumed that all hospitalised cases received IV fluids (these proportions can be changed in the interface).
$p_{VentilatedIVfluids}$	Proportion of ventilated cases receiving IV Fluids.	1	
$R_{DayNonVentMDphysicians}$	Ratio medical doctors / physicians : non-ventilated hospitalised cases, day shift	1 : 10	One physician can take care for 10 cases during day shift [2, 7].

$R_{NightNonVentMDphysicians}$	Ratio medical doctors / physicians : non-ventilated hospitalised cases, night shift.	1 : 40	One physician can take care for 40 cases during night shift [2, 7]
$R_{DayVentMDphysicians}$	Ratio medical doctors/ physician : ventilated hospitalised cases, day shift.	1 : 4	Assumed based on [2, 7].
$R_{NightVentMDphysicians}$	Ratio medical doctors/ physicians : ventilated hospitalised cases, night shift.	1 : 4	Assumed based on [2, 7].
$p_{casesvisitingGP}$	Proportion of cases outside the hospital requiring a General Practitioners / Primary Care Physicians	0.08	Cumulative attack rate for GP consultants of 8.26% during H1N1 pandemic [19].
$H_{hoursGPneededpercase}$	Average duration of one consultation (in hours)	0.25	We assumed that one consultation takes 15 min (minutes/60). One mild case or outpatient was assumed to require one consultation during his/her days of illness.
$R_{DayNonVentInternalMS}$	Ratio internal medicine specialist: non-ventilated hospitalised cases, day shift	1 : 100	Assumptions for the AsiaFluCap model, based on [9]. Values can be changed in the interface.
$R_{NightNonVentInternalMS}$	Ratio internal medicine specialist: non-ventilated hospitalised cases, night shift	1 : 200	
$R_{DayVentInternalMS}$	Ratio internal medicine specialist : ventilated hospitalised cases, day shift	1 : 50	
$R_{NightVentInternalMS}$	Ratio internal medicine specialist : ventilated hospitalised cases, night shift	1 : 100	
$R_{DayNonVentOtherDoctors}$	Ratio other doctors (e.g. surgeons, pediatricians, obstetricians, etc.): non-ventilated hospitalised cases, day shift	1 : 15	Assumptions for the AsiaFluCap model, based on [9]. Values can be changed in the interface.

$R_{NightNonVentOtherDoctors}$	Ratio other doctors : non-ventilated hospitalised cases, night shift	1 : 40	
$R_{DayVentOtherDoctors}$	Ratio other doctors : ventilated hospitalised cases, day shift	1 : 10	
$R_{NightVentOtherDoctors}$	Ratio other doctors: ventilated hospitalised cases, night shift	1 : 20	
$R_{DayNonVentOtherNurses}$	Ratio nurses : non-ventilated hospitalised cases, day shift	1 : 5	Assumption based on [7, 9].
$R_{NightNonVentOtherNurses}$	Ratio nurses : non-ventilated hospitalised cases, night shift	1 : 10	Assumption based on [7, 9].
$R_{DayVentOtherNurses}$	Ratio nurses : ventilated hospitalised cases, day shift	1 : 1	Assumption based on [7, 9].
$R_{NightVentOtherNurses}$	Ratio nurses : ventilated hospitalised cases, night shift	1 : 2	Assumption based on [7, 9].
$H_{pharmacistpercase}$	Number of hours a pharmacists need per influenza case.	20/60	For preparing AV courses, and checking drug supplies in hospital (every morning and afternoon)[9]. We assumed that a pharmacist would require 20 minutes in total for one influenza case.
$R_{LaboratoryTCases}$	Ratio laboratory technicians: influenza cases.	1 : 30	This ratio implicates the number of cases which one laboratory technician can process (virus isolation, etc.) during one work day. Note that processing/testing clinical specimens takes > 1 day [20].
$R_{PublicHealthPCases}$	Ratio Public Health Personnel : influenza cases	1 : 50	This ratio implicates the number of cases one staff member can process during one work day.
$R_{VolunteersCases}$	Ratio volunteers : influenza cases	1 : 5	We assumed that volunteers can substitute nurses in case needed.
$R_{AdminStaffCases}$	Ratio administrative staff (hospital) : influenza cases.	1 : 25	We assumed that per certain number of cases one administrative staff member is required in the hospital (for instance per ward) [9].

$H_{AmbulanceCase}$	Total duration (in hours) of transport per influenza case.	2	Average mission duration per patient is two hours [21].
$p_{casesambulances}$	Proportion of all hospitalised cases that requires ambulance.	0.15	Around 10% of all hospitalised influenza cases required transport, to the hospital or to other advanced health care facilities [22, 23] , 83% of all hospitalised cases uses one [24].
$H_{OthertransportCase}$	Total duration (in hours) of transport per influenza case.	2	Average mission duration per patient is two hours [21].
$p_{casesOthertransport}$	Proportion of all hospitalised cases that requires other transport vehicles.	0.05	Assumption based on: around 10% of all hospitalised influenza cases required transport, to the hospital or to other advanced health care facilities [22, 23].
$H_{XrayCase}$	Total duration of one x-ray scan (in hours)	30 / 60	We assumed that one x-ray takes 30 minutes.
$p_{XrayCase}$	Proportion of all ventilated hospitalised cases undertaking an x-ray.	0.2	We assumed that only a proportion of all ventilated cases undertook an x-ray. Assumption based on: one patient required a portable chest x-ray [9], 50% of cases in nursing home residents had x-ray taken [25].

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