Governor and State Surgeon Physician Advisory Group

Supplemental Report

1. Methodology for the Initial and Modified COVID-19 Area Risk (CAR) Score to Determine Risk-Based Quarantine and Testing Requirements for Travelers Arriving on Guam.

2. Listing of CAR Scores for Areas Designated as Low-Risk and for Each US State and Territory.

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REVIEW

Initial Formula for COVID-19 Area Risk (**CAR) Score**

Utilized July 1-23, 2020

CAR Score =

(1 ÷ Case Doubling Days) x (Test Positivity Rate) x 10^6

Factor for Speed of Coronavirus Exponential Spread

Factor for Area's Ability to Identify and Contain Coronavirus

Adjustment Factor for Raw Scores

This logarithmic scoring system was previously used to determine High-Risk Areas using primarily WHO and CDC data during a 14-day span. Areas with a CAR Score >1000 were considered High-Risk.

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UPDATE

Modified Formula for COVID-19 Area Risk (**CAR) Score**

Effective July 24, 2020

Natural Log Conversion of Raw CAR Score to Allow for User-Friendly Scale

Modified **CAR Score** =

LN[(1 ÷ Case Doubling Days) x (Test Positivity Rate) x (New Cases per 100K) x 10^6]

Factor for Speed of Coronavirus Exponential Spread

Factor for Area's Ability to Identify and Contain Coronavirus

Factor for New COVID-19 Cases per Capita

Adjustment Factor for Raw Scores

This modified scoring system now includes New Cases per 100,000 population as a density factor to account for new cases per capita. This addition allows important consideration for areas with relatively low or high populations. This becomes even more important when the goal of the score is to stratify risk at the far end of the scale.

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UPDATE

Using the Modified CAR Score to Determine Risk-Based Quarantine and Testing Requirements for Travelers Entering Guam

Revised 14-Day Period Logarithmic **CAR Score** =

LN[(1 ÷ Case Doubling Days) x (Test Positivity Rate) x (New Cases per 100K) x 10^6]

Low-Risk Area Designation Criteria:

Must have CAR Score ≤5

A CAR Score of ≤5 is typical of areas with a combination of:

- Case Doubling Time >256 Days
- Test Positivity Rate <2%
- New Cases per 100K <2

An area with any of the individual metrics outside of values stated above could still achieve a favorable CAR Score if offset by other favorable metrics. For example, *256 Doubling Days, 2.5% Test Positivity, and 1.5 New Cases per 100K will still equal to a CAR Score of 5*.

An area with known COVID-19 active cases is automatically disqualified from achieving Low-Risk status if they do NOT consistently report both Daily New Cases & Tests Performed.

Note that all States and Territories, along with vast majority of developed countries do report both metrics consistently.

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Modified COVID-19 Area Risk (CAR) Score Log Formula

CAR Score =

LN [(*1 ÷ Case Doubling Days*) *x (Test Positivity Rate) x (New Cases per 100K) x 10^6]*

Low-Risk Area Designation Criteria:

Must have CAR Score ≤5

A CAR Score of ≤5 is typical of areas with a combination of:

- Case Doubling Time > 256 Days
- Test Positivity Rate < 2%
- New Cases per 100K < 2

An area with known COVID-19 active cases is automatically disqualified from achieving Low-Risk designation if they do NOT consistently report both Daily New Cases & Tests Performed.

Vast majority of developed countries do report both metrics, but may do so intermittently.

AREAS DESIGNATED AS LOW-RISK	CAR Log Score w/ LN adjustment	Case 2x Days (14D period)	Test Positivity Rate (14D Avg)	New Cases per 100K (14D Avg)
Pacific/Oceania				
American Samoa	0.0	0	0.0%	0.0
Australia	3.8	40	0.3%	0.6
CNMI	0.5	55	0.0%	0.9
FSM	0.0	0	0.0%	0
Guam	3.2	189	0.6%	0.8
Marshal Islands	0.0	0	0.0%	0
New Zealand	0.0	608	0.1%	0
Palau	0.0	0	0.0%	0
Asia				
Malaysia	0.0	871	0.1%	0
South Korea	0.9	210	0.5%	0.1
Taiwan	0.0	1,457	0.2%	0
Other Areas				
Austria	4.6	151	1.4%	1.1
Belgium	3.2	461	1.3%	0.9
Canada	3.1	279	0.8%	0.8
Denmark	0.6	454	0.2%	0.4
Finland	0.0	2,281	0.1%	0
Germany	1.9	378	0.5%	0.5
Greece	3.1	79	0.6%	0.3
Hungary	0.0	457	0.4%	0.1

AREAS DESIGNATED AS LOW-RISK	CAR Log Score w/ LN adjustment	Case 2x Days (14D period)	Test Positivity Rate (14D Avg)	New Cases per 100K (14D Avg)
Other Areas (cont)				
Iceland	4.8	310	2.9%	1.3
Ireland	0.0	1,125	0.3%	0.1
Italy	0.5	922	0.5%	0.3
Netherlands	1.0	660	0.6%	0.3
Norway	0.0	746	0.3%	0.2
Poland	4.7	99	1.3%	0.8
Slovakia	3.7	83.3	1.1%	0.3
Switzerland	4.0	266.4	1.3%	1.1
Spain	3.3	472	1.5%	0.9
United Kingdom	4.7	343	1.7%	2.3
	Noteworthy Non-Low Risk Areas			
Bangladesh	9.3	38.7	21.1%	2
India	9.2	22.4	10.8%	2
Indonesia	7.8	33.3	13.6%	0.6
Japan	5.5	45.8	3.8%	0.3
Mexico	11.3	31.7	56.2%	4.6
Philippines	8.3	23.3	7.2%	1.3
Singapore	6.1	189	2.6%	3.1
Sweden	8.2	69	6.9%	3.8
United States- All	10.6	39.3	8.8%	18.0

Per Source Data Available from WHO, CDC, Our World in Data, The COVID Tracking Project, The New York Times, and Guam DPHSS as of July 20, 2020

Modified COVID-19 Area Risk (CAR) Score Log Formula

CAR Score =

LN [*(1 ÷ Case Doubling Days) x (Test Positivity Rate) x (New Cases per 100K) x 10^6]*

Low-Risk Area Designation Criteria:

Must have CAR Score ≤5

A CAR Score of ≤5 is typical of areas with a combination of:

- Case Doubling Time > 256 Days
- Test Positivity Rate < 2%
- New Cases per 100K < 2

An area with known COVID-19 active cases is automatically disqualified from achieving Low-Risk designation if they do NOT consistently report both Daily New Cases & Tests Performed.

Note that all States and Territories, along with vast majority of developed countries do report both metrics.

Per Source Data Available from WHO, CDC, Our World in Data, The COVID Tracking Project, The New York Times, and Guam DPHSS as of July 20, 2020

LOW-RISK AREAS

U.S. States and Territories with Revised CAR Metrics per Data as of July 18	CAR Score w/ LN adjustment	Case 2x Days (14D period)	Test Positivity Rate (14D Avg)	New Cases per 100K (14D Avg)
USA-All	**10.6**	**39**	**8.8%**	**18.0**
American Samoa	**0.0**	**0**	**0.0%**	**0.0**
CNMI	**0.5**	**55**	**0.0%**	**0.9**
Guam	**3.2**	**189**	**0.6%**	**0.8**
Connecticut	**4.0**	**390**	**0.8%**	**2.5**
Vermont	**4.2**	**141**	**0.8%**	**1.1**
New York	**4.5**	**429**	**1.1%**	**3.5**
New Jersey	**4.5**	**487**	**1.4%**	**3.1**
Maine	**4.6**	**148**	**1.0%**	**1.3**
New Hampshire	**5.0**	**201**	**1.8%**	**1.7**
Massachusetts	5.6	332	2.5%	3.6
Rhode Island	6.8	210	3.2%	5.8
Hawaii	6.8	34	1.8%	1.8
District of Columbia	6.8	148	1.7%	7.9
Michigan	7.5	90	2.5%	6.3
Illinois	7.6	113	2.8%	7.7
Pennsylvania	8.2	93	5.4%	6.1
South Dakota	8.6	91	6.8%	6.9
Maryland	8.6	92	5.2%	9.6
Delaware	8.6	95	4.9%	10.8
Alaska	8.7	21	1.7%	7.9
Colorado	8.9	63	5.9%	7.7
Minnesota	8.9	55	4.0%	10.2
Virginia	9.0	65	5.4%	9.6
Nebraska	9.0	79	6.4%	10.2

U.S. States and Territories with Revised CAR Metrics per Data as of July 18	CAR Score w/ LN adjustment	Case 2x Days (14D period)	Test Positivity Rate (14-Day Avg)	New Cases per 100K (14-Day Avg)
Wyoming	9.1	38	5.7%	6.1
West Virginia	9.2	25	3.6%	6.7
Puerto Rico	9.2	26	3.5%	7.7
Indiana	9.2	66	7.5%	9.1
New Mexico	9.4	42	3.9%	12.6
North Dakota	9.5	39	4.8%	10.6
Oregon	9.6	29	6.0%	7.6
Washington	9.7	40	5.8%	11.0
Kentucky	9.8	31	5.6%	9.8
Ohio	9.8	38	6.1%	10.8
Montana	9.9	14	3.2%	9.0
Wisconsin	10.1	37	6.7%	13.5
Missouri	10.1	28	5.8%	12.1
Iowa	10.3	50	8.7%	16.3
North Carolina	10.6	33	7.3%	18.8
Kansas	10.8	31	10.4%	14.9
California	11.0	28	7.5%	21.5
Utah	11.0	33	9.7%	20.8
Oklahoma	11.1	21	8.0%	17.2
Arkansas	11.3	31	11.1%	22.4
Tennessee	11.4	25	8.4%	27.4
Virgin Islands	11.6	10	8.4%	12.9
Louisiana	11.7	32	9.4%	41.7
Mississippi	11.8	32	15.5%	26.7
Georgia	11.9	27	14.5%	28.5
Nevada	12.2	23	13.8%	32.0
Alabama	12.2	25	15.3%	32.9
South Carolina	12.5	24	17.3%	35.3
Idaho	12.5	16	13.7%	30.2
Texas	12.6	19	15.7%	34.9
Arizona	13.1	27	25.7%	48.9
Florida	13.2	19	18.8%	52.0

SUMMARY: Areas Designated as Low-Risk with COVID-19 Area Risk (CAR) Scores ≤ 5.0

For use with revised Quarantine and Testing protocol for travelers arriving on Guam, effective July 24, 2020.

States	CAR Score	Other Countries	CAR Score
Connecticut	4.0	Austria	4.6
Maine	4.6	Belgium	3.2
New Hampshire	5.0	Canada	3.1
New Jersey	4.5	Denmark	0.6
New York	4.5	Finland	0.0
Vermont	4.2	Germany	1.9
Pacific/Oceania		Greece	3.1
American Samoa	0.0	Hungary	0.0
Australia	3.8	Iceland	4.8
CNMI	0.5	Ireland	0.0
FSM	0.0	Italy	0.5
Marshall Islands	0.0	Netherlands	1.0
New Zealand	0.0	Norway	0.0
Palau	0.0	Poland	4.7
Asia		Slovakia	3.7
Malaysia	0.0	Switzerland	4.0
South Korea	0.9	Spain	3.3
Taiwan	0.0	United Kingdom	4.7

Per Source Data Available from WHO, CDC, Our World in Data, The COVID Tracking Project, The New York Times, and Guam DPHSS as of July 20, 2020

Listings to be updated approximately every 2 weeks or sooner as necessary.

Excludes areas that do NOT consistently report both case and testing data

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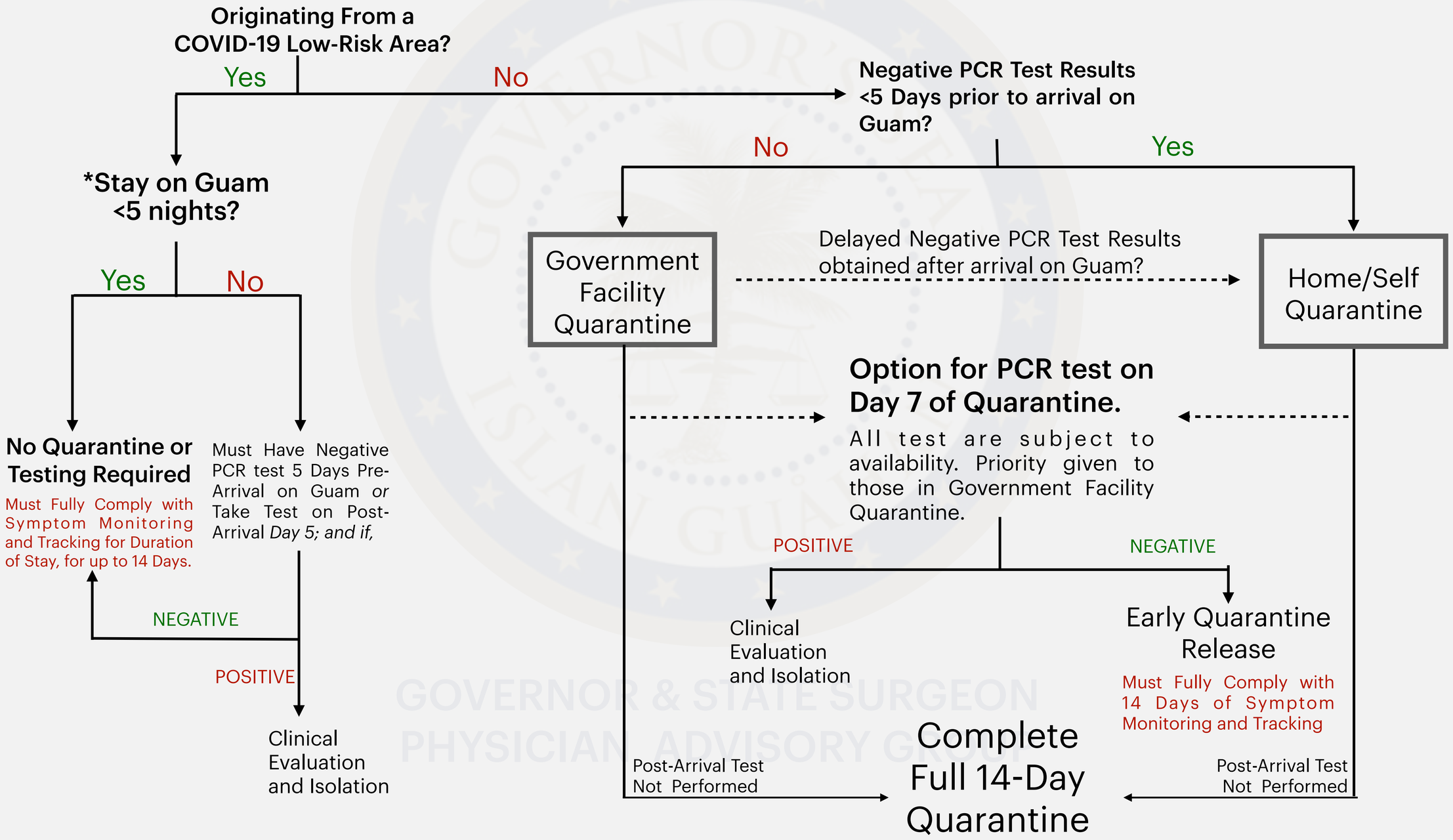
UPDATE

Risk-Based Quarantine and Testing Protocol for Travelers Entering Guam

Effective After Midnight on July 24, 2020



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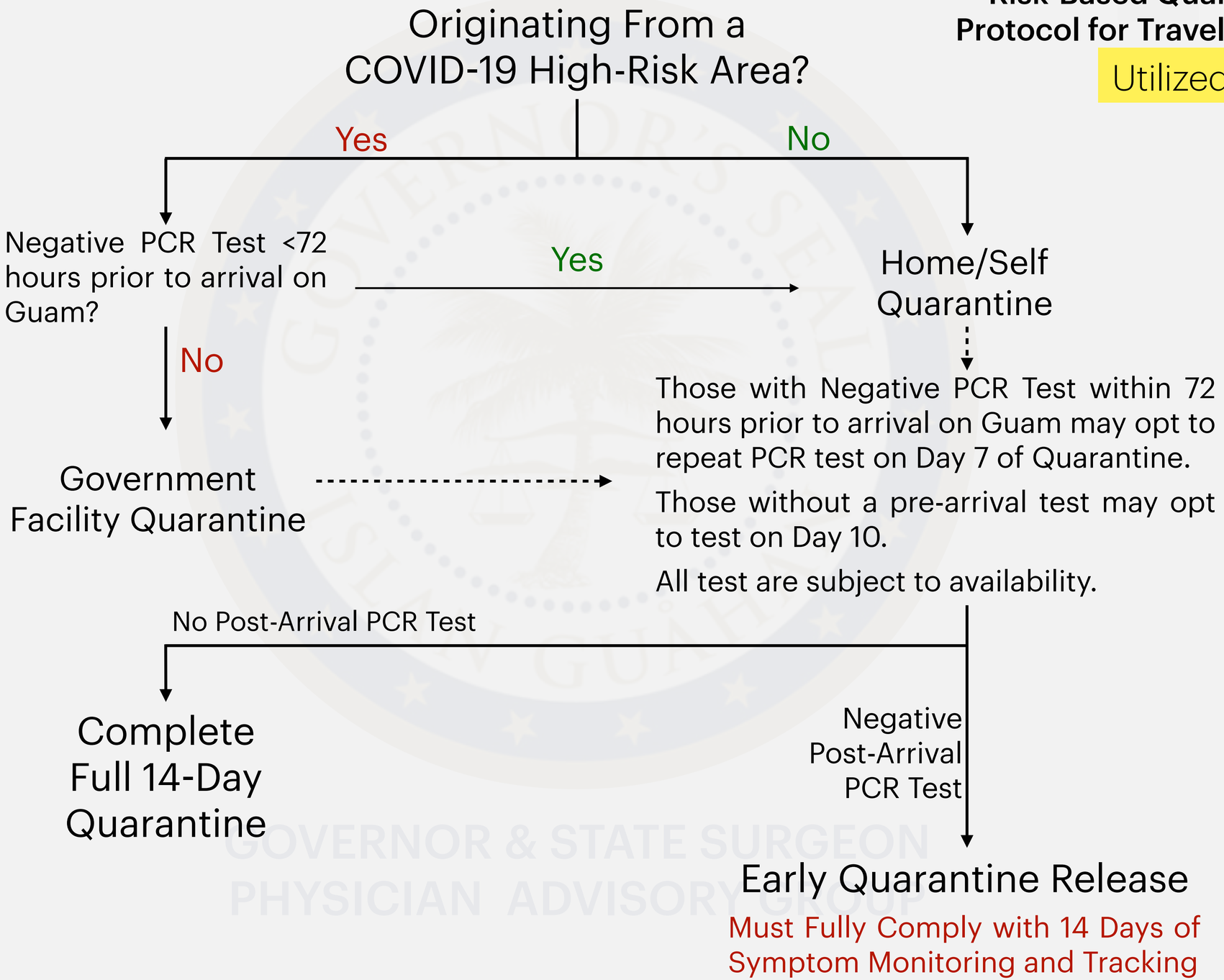
REVIEW

Risk-Based Quarantine and Testing Protocol for Travelers Entering Guam

Utilized July 1 - 23, 2020



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REVIEW

ADDITIONAL REFERENCE: Initial Selection of Metrics During First Iteration of CAR Score Formula. Developed June, 2020 and Utilized for Quarantine and Testing Protocols *Between July 1-23, 2020*

In order to configure a risk stratifying scoring system, appropriate consideration must be given to each variable used. In using this methodology, the following assumptions and inferences are made:

1. The prevalence of active cases in an area is directly proportionate to the risk of a traveler being infected upon arrival to Guam.
2. The current best way to determine active prevalence is to use corollary metrics that are readily available.
3. Although not the only options, 2 indicative variables of an area's prevalence of active cases currently available are:
   - Total Case Doubling Time (days): Serves as a surrogate for the rate of active spread. This is an inverse relationship, which may be exponential. Because of the wide variability, we standardized the calculation by looking at the addition of new cases over a 14 day period using the following equation, which incorporates natural log:

     a = [LN 2 ÷ LN (Total Case Count ÷ Total Case Count 14 days ago] x 14

   - Test Positivity Rate (%): Serves as a surrogate for testing capacity to determine prevalence for treatment and containment.

     b = New Cases ÷ Tests run for that period

4. Each Area considered has achieved a total >1 test per 1000 population.
5. Other metrics considered were:
   - New Cases per 100K (ratio): Serves as a surrogate for actual prevalence of KNOWN new cases. Highly dependent on ability to test, otherwise would be the gold standard metric. This is why Test Positivity Rate carries significant weight at this time.
   - New Cases 2-Week Delta (%): Serves as a surrogate for rate of active spread expressed as a percent of change over a 2-week period.
   - Total Death Doubling Time (days): Another surrogate for active spread, but important given that in some areas it may be more proportionate to prevalence as compared to the Total Case Doubling Time if there are serious limitations on testing capacity.

We ultimately developed a novel equation to provide an objective quantification of a traveler's odds of harboring active coronavirus infection based on their area of origin's COVID-19 risk. This was coined as the COVID-19 Area Risk (CAR) Score

CAR Score = 1/a x b x 10^6

a = Total Case Doubling Time (days)
b = Test Positivity Rate (%)

Inverse relationship of Total Case Doubling Time, multiplied by the Test Positivity Rate, multiplied by a factor of 10^6 (for user-friendly final raw score that reduces compression of values between 0-1). This CAR Score ultimately results on a logarithmic scale.

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