

Analysis Report

Data Request on Circle Based Allocation

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Executive Summary

SRTR has used the liver simulated allocation model (LSAM) to assess the simulated impact of two allocation frameworks based on concentric circles around the donor hospital: “Acuity Circles” (AC) and “Broader 2-Circle Distribution” (B2C).

What’s New in This Report

- Relisted candidates are now included in “by MELD/PELD” calculations for counts and rates of waitlist mortality and transplants.
- A finer resolution is used for person-time (denominator) in the rate calculations; previous reports’ calculations were rounded to whole days, whereas now fractional days are used. As a result, some of the rates calculated by DSA for small subgroups (e.g., pediatrics) were much larger than they were previously. Before these rates were used in the variance by DSA calculations, they were capped at the 99th percentile of all subgroups across all DSAs (e.g., 14.6 transplants per patient-year for patient age) to prevent overinflated variances.

Main Findings

The B2C scenarios yielded results similar to those under the policy approved by the UNOS Board in December 2017. Specifically, the variance in median allocation MELD/PELD at transplant (MMAT) decreased to a similar extent, and the transport metrics (transport time, transport distance, and percentage of organs flown) increased to a similar extent.

Compared with the current allocation policy, the AC framework tended to result in changes with a larger magnitude than the B2C framework; i.e., of all scenarios considered, the AC scenarios showed the largest decreases in variance of MMAT and the largest increases in the transport metrics.

MELD scores at transplant: Both proposed frameworks reduce variance in DSA level MMAT (Figure 1). The reduction in variability is due to increasing MMAT for DSAs with lower MMAT under the current framework (Figure 3); this corresponds to changes from “warm” to “cool” colors on the maps. The increase in MMAT also occurred nationally, driven largely by the “No Exception” group of candidates (Figure 2).

Transplant rates and counts: Transplant rates and counts were not affected by the new frameworks for the overall population or by exception status. Rates increased for high MELD/PELD (≥ 32) candidates for both frameworks (Figure 6).

Waitlist mortality rates and counts: Waitlist mortality rates decreased for the overall population under the AC framework driven largely by candidates without exceptions (Figure 11), while the B2C framework showed a more modest change.

Waitlist mortality counts decreased for high MELD/PELD (≥ 32) candidates in both frameworks (Figure 14).

Post-transplant mortality rates and counts: Post-transplant mortality was comparable between the different frameworks (Figures 18-21).

Transport metrics: Both of the new frameworks resulted in more travel; greater transport distances and times accomplished through a higher percentage of organs being transported by air

(Figures 22-29). A similar trend between the different frameworks is consistently seen across metrics and exception and MELD groupings.

Subgroup analysis: At a regional level (Appendix A), for most metrics, the different frameworks showed no impact (i.e., flat line of dots), or showed the same trend as the national population. Transplant rates by exception status were the exception to this, with some regions seeing slight increases or decreases in the rate, whereas the national population had essentially uniform transplant rates between frameworks.

Overall, trends in the demographic characteristics' (age, sex, and race/ethnicity) subgroups were similar between frameworks to the total population (Appendix B). The exception to this was the pediatric subgroup, which saw reductions in MMAT (Figure 242) and increases in transplant rate (Figure 245) that differed directionally from the overall population. The trends in the transportation metrics were common across age ranges (adult and pediatric).

The trends for the socio-economic status characteristics (education, insurance type, cumulative community risk score, and urbanicity) subgroups were similar between frameworks to the total population (Appendix C).

Study Population

Data for these policy simulations were collected between July 2013 and June 2016, post-Share35 implementation. The simulation uses donor and candidate populations created by the LSAM donor and candidate generators. This software draws on patient data for transplant candidates listed at the beginning of the data cohort period, and candidates added to the waiting list and organs donated during the data cohort period. The generators use these real patient data to create independent donor and candidate populations for each of the multiple LSAM iterations involved in simulating each allocation scenario.

Analytical Approach

Policy scenarios

The policy scenarios simulated as part of this request are shown below:

Scenario 1 - Current System: Uses current distribution and allocation order ("Share 35" with MELD sodium and HCC cap and delay). No proximity points are included, and there are no donor exclusions.

Scenario 2 - Board Approved: Candidates with a MELD score of at least 15 and listed at centers within either (a) the DSA of the donor hospital or (b) a 150-nautical-mile radius circle from the donor hospital receive three additional proximity points added to their lab MELD for adults and their allocation MELD/PELD for candidates aged younger than 18 years, with a sharing threshold of MELD/PELD ≥ 32 .

Proximity points are defined as follows: At the time of the match run, liver candidates with MELD or PELD scores of 15 or higher, and registered at a transplant hospital within a 150-mile radius of the donor hospital, or within the same DSA as the donor hospital, receive three MELD or PELD points added to their score as described above.

For adults, proximity points are only added to calculated (lab) MELD score. For candidates younger than 18, proximity points are added to the allocation MELD/PELD score.

Note: The summation of calculated MELD scores plus proximity points will not be capped at 40; a candidate with a calculated MELD score of 38 who receives three proximity points will be given an adjusted MELD score of 41 to preserve ranking of disease severity.

Scenario 3 - Acuity Circles (250 and 500 nautical miles): Uses three concentric circles around the donor hospital with radii measured in nautical miles: small = 150nm, medium = 250nm, and large = 500nm.

Status 1A and 1B are allocated first at centers within the large circle, and then allocation proceeds in expanding circles (small, medium, large) for each decreasing MELD/PELD subgroup: at least 37, [33,37), [29,33), [15,29).

Centers outside of the large circle are allocated next for: status 1A, status 1B, and then MELD/PELD of at least 15.

Finally, candidates with MELD/PELD less than 15 in expanding circles, and outside of the large circle.

Scenario 4 - Acuity Circles (300 and 600 nautical miles): Scenario 4 uses the same rules as scenario 3 with small, medium, and large circle sizes of 150, 300, and 600 nautical miles, respectively.

Scenario 5 - Broader 2-Circle Distribution (MELD Threshold = 35): Uses three concentric circles around the donor hospital with radii measured in nautical miles: small = 150nm, medium = 250nm, and large = 500nm.

Status 1A and 1B are allocated first at centers within the large circle, and followed by those within the medium circle with a MELD/PELD of at least the threshold of 35.

Allocation then proceeds in expanding circles (small, medium, large) for those with MELD/PELD of at least 15.

Centers outside of the large circle are allocated next for: status 1A, status 1B, and then MELD/PELD of at least 15.

Finally, candidates with MELD/PELD less than 15 in expanding circles, and outside of the large circle.

Scenario 6 - Broader 2-Circle Distribution (MELD Threshold = 32): Scenario 6 uses the same rules as scenario 5 with a MELD threshold of 32.

Metrics

SRTR assessed the following outcome metrics for the simulations:

1. Variance in median MELD/PELD at transplant by DSA
2. Median MELD/PELD at transplant
3. Transplant rates
4. Transplant counts
5. Variance in transplant rates by DSA

6. Wait list mortality rates
7. Wait list mortality counts
8. Variance in wait list mortality rates by DSA
9. Post-transplant mortality rates
10. Post-transplant mortality counts
11. Median transport time
12. Median transport distance
13. Percentage of organs flown for transport

Metrics 1 to 13 above will be assessed by subgroup populations including:

- Exception status: total, no exceptions, HCC exceptions, other exceptions
- MELD/PELD subgroups: <15, 15-24, 25-28, 29-31, 32-35, 35+ (includes Status 1A and 1B)

Color-coded maps displaying the following metrics by DSA are also included:

2. Median MELD/PELD at transplant
3. Transplant rates
4. Wait list mortality rates
5. Percentage of organs flown for transport (by both donor and transplant DSA)

The above metrics excluding those that measure variance by DSA (1, 5, 8) were assessed by OPTN region

- OPTN region: 01-11
 - By exception status
 - By MELD/PELD subgroup

Metrics 1 to 10 above were assessed by the additional subgroup populations including:

- Age: pediatric (aged younger than 18 years at listing) and adult (≥ 18 at listing)
- Sex: female and male
- Race/ethnicity: African American, Asian/Pacific Islander, Hispanic, white
- Education: high school or less, more than high school
- Insurance status: public and private
- Urbanicity: metropolitan, non-metropolitan, micropolitan, small town, rural
- Cumulative Community Risk Score (CCRS) subgroups: [0,10], (10,20], (20,30], (30,40]

Additionally, spreadsheets with the following metrics by DSA are included:

2. Median MELD/PELD at transplant
3. Transplant rates
4. Transplant counts
5. Wait list mortality rates
6. Wait list mortality counts
7. Percentage of organs flown for transport (by both donor and transplant DSA)

Results

Results for the simulated scenarios are reported primarily in the form of plots, with each plot displaying the values for a given metric across the six scenarios simulated. In viewing these results, it is important to compare the new scenarios with the current allocation policy scenario to identify changes in outcome metrics due to the proposed policy changes. Each scenario was simulated 10 times, and the plot displays the range of results across the 10 simulations as a vertical line extending from the minimum value to the maximum value found for that metric and scenario. A point along that line marks the mean value of the metric across the 10 iterations.

Overview Data Tables

Table 1 Overview of Main Metrics

Scenario	Variance in Median Allocation MELD/PELD at Transplant	Median Allocation MELD/PELD at Transplant	Median Transport Time (hours)	Median Transport Distance (miles)	Percent of Organs Flown
Current	9.97 (8.74,11.9)	29 (29,29)	1.7 (1.7,1.7)	88.5 (86.9,90)	50.7 (50.2,51.1)
Board Approved	7.41 (6.36,8.47)	29.1 (29,30)	1.7 (1.7,1.7)	100.4 (98.7,101.9)	54.4 (53.8,54.9)
Acuity 250+500	4.33 (3.23,6.27)	31 (31,31)	1.9 (1.9,1.9)	183.5 (180.4,187)	71.4 (70.6,71.9)
Acuity 300+600	4.07 (3.13,6.18)	31 (31,31)	2 (2,2)	211.3 (207.5,217)	74 (73.6,74.4)
Broader 2-Circle MELD 35	6.74 (5.85,8.83)	29 (29,29)	1.8 (1.7,1.8)	107.7 (106.1,110.2)	58.4 (58,59.1)
Broader 2-Circle MELD 32	6.54 (5.37,8)	29.5 (29,30)	1.8 (1.8,1.8)	117.1 (115.8,118.6)	60.8 (60.3,61.5)

All metrics reported as *mean (min, max)* across the 10 simulation iterations.

Table 2 Overview of Additional Metrics

Scenario	Transplant Rate	Transplant Count	Waitlist Mortality Rate	Waitlist Mortality Count	Post-Transplant Mortality Rate	Post-Transplant Mortality Count
Current	0.443 (0.435,0.451)	6651 (6575,6727)	0.097 (0.095,0.1)	1455 (1425,1504)	0.077 (0.075,0.08)	686 (666,721)
Board Approved	0.438 (0.43,0.448)	6643 (6561,6728)	0.091 (0.09,0.093)	1386 (1358,1419)	0.077 (0.075,0.079)	684 (662,712)
Acuity 250+500	0.428 (0.422,0.436)	6594 (6491,6672)	0.087 (0.085,0.088)	1341 (1310,1364)	0.078 (0.076,0.08)	687 (664,718)
Acuity 300+600	0.426 (0.419,0.434)	6583 (6492,6662)	0.085 (0.083,0.086)	1318 (1278,1346)	0.079 (0.078,0.08)	688 (676,719)
Broader 2-Circle MELD 35	0.438 (0.432,0.448)	6620 (6543,6706)	0.095 (0.093,0.096)	1433 (1404,1463)	0.077 (0.073,0.08)	676 (647,717)
Broader 2-Circle MELD 32	0.437 (0.43,0.446)	6616 (6556,6692)	0.094 (0.092,0.095)	1423 (1391,1442)	0.077 (0.076,0.08)	682 (661,721)

All metrics reported as *mean (min, max)* across the 10 simulation iterations.

Results by Exception Status and MELD/PELD Subgroup

Allocation MELD/PELD at Transplant

Variance in Median Allocation MELD/PELD at Transplant by Exception Status and DSA

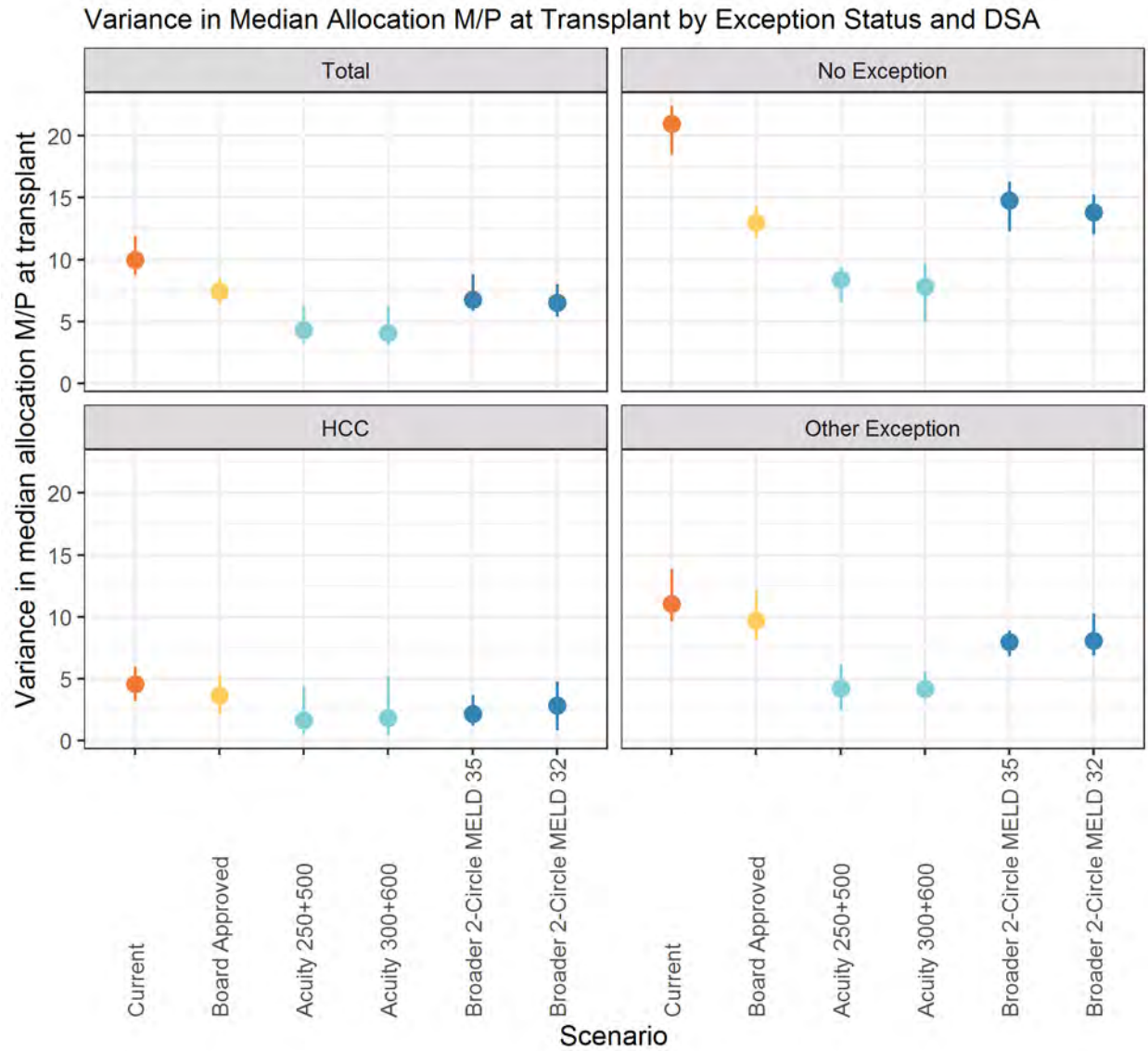


Figure 1 Variance in Median Allocation M/P at Transplant by Exception Status and DSA

Median Allocation MELD/PELD at Transplant

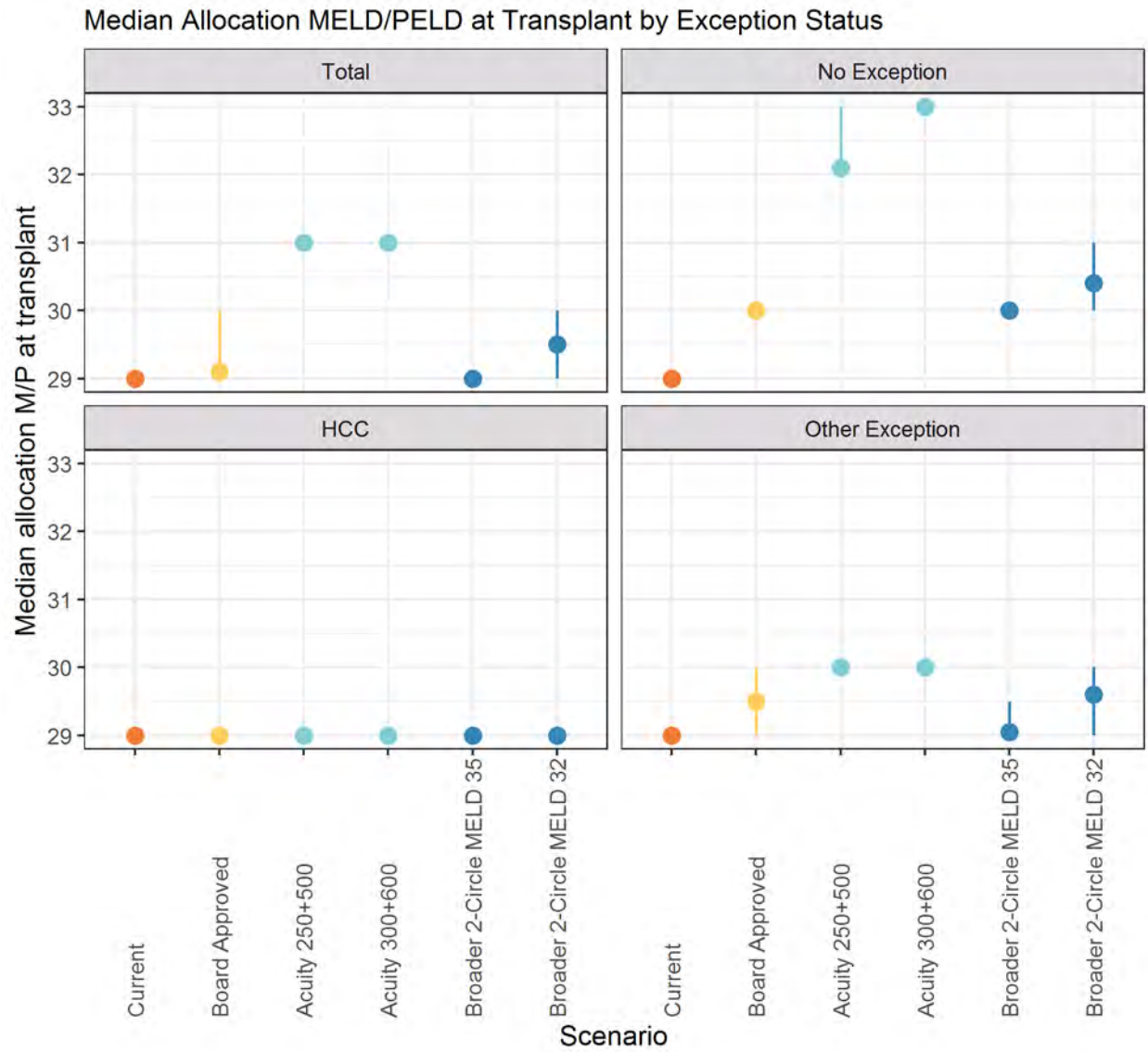


Figure 2 Median Allocation MELD/PELD at Transplant by Exception Status

Maps of Median Allocation MELD/PELD at Transplant by DSA

Maps of Median Allocation MELD/PELD at Transplant by DSA

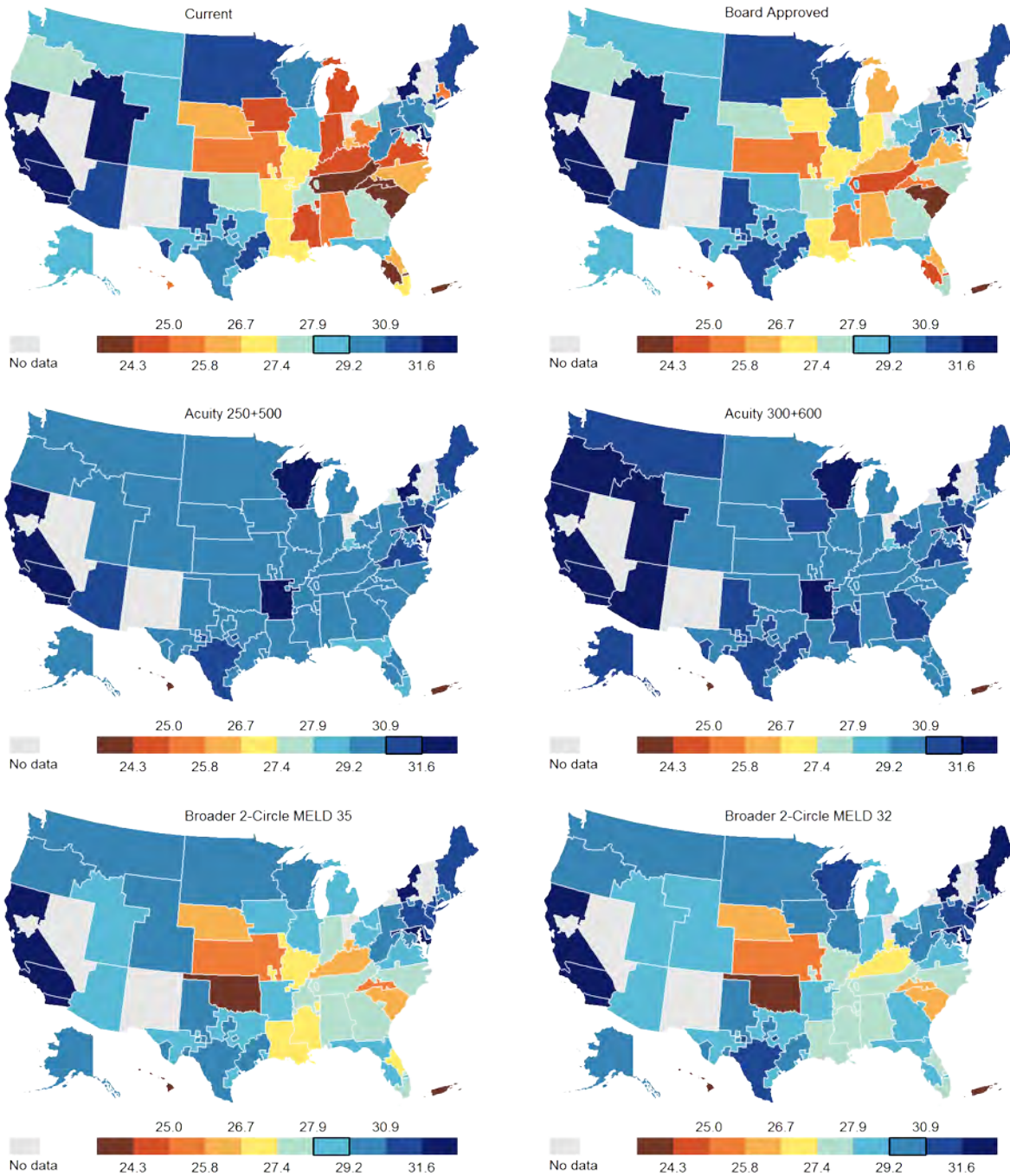


Figure 3 Maps of Median Allocation MELD/PELD at Transplant by DSA

Transplant

Transplant Rates by Exception Status

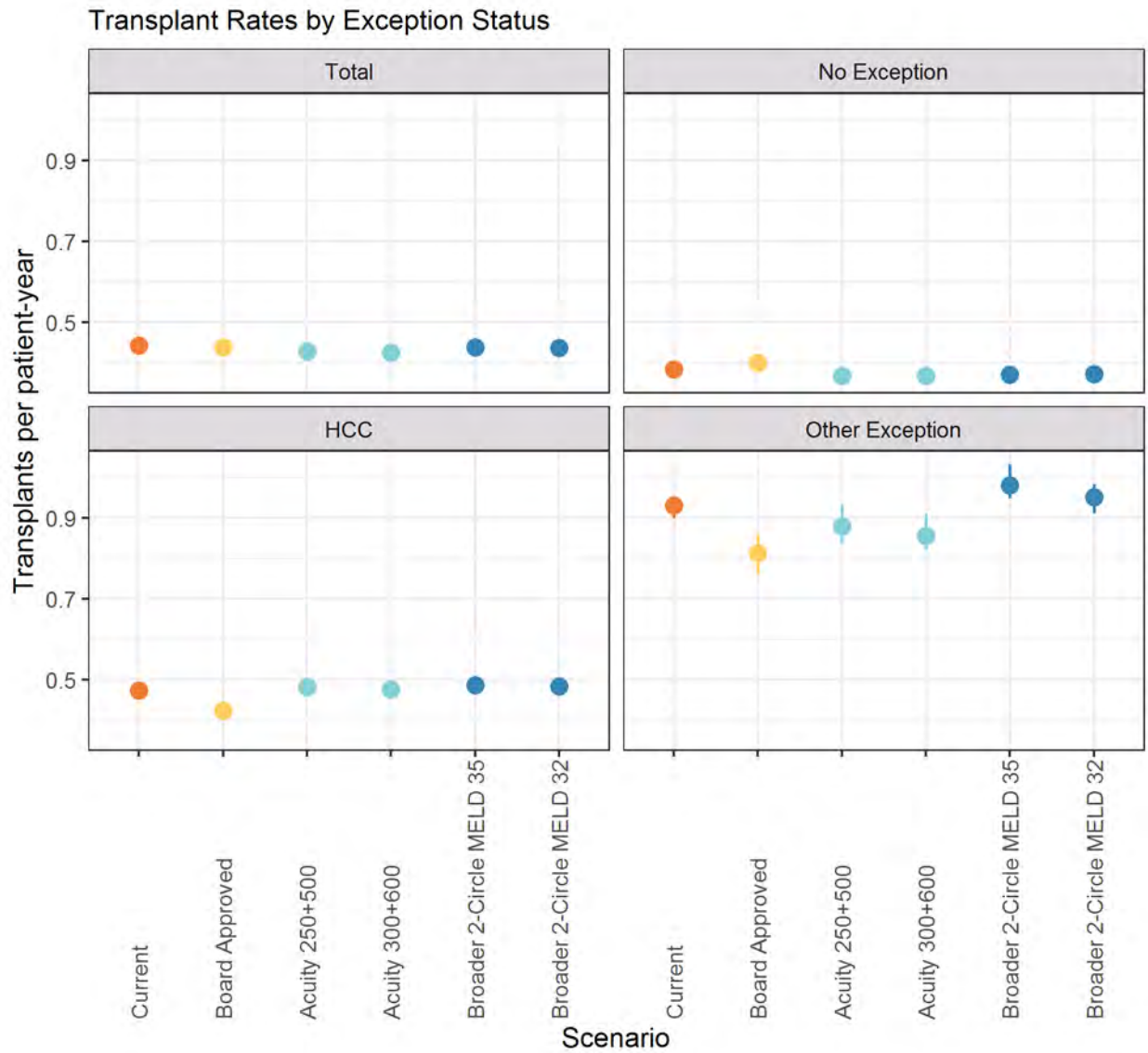


Figure 4 Transplant Rates by Exception Status

Transplant Counts by Exception Status

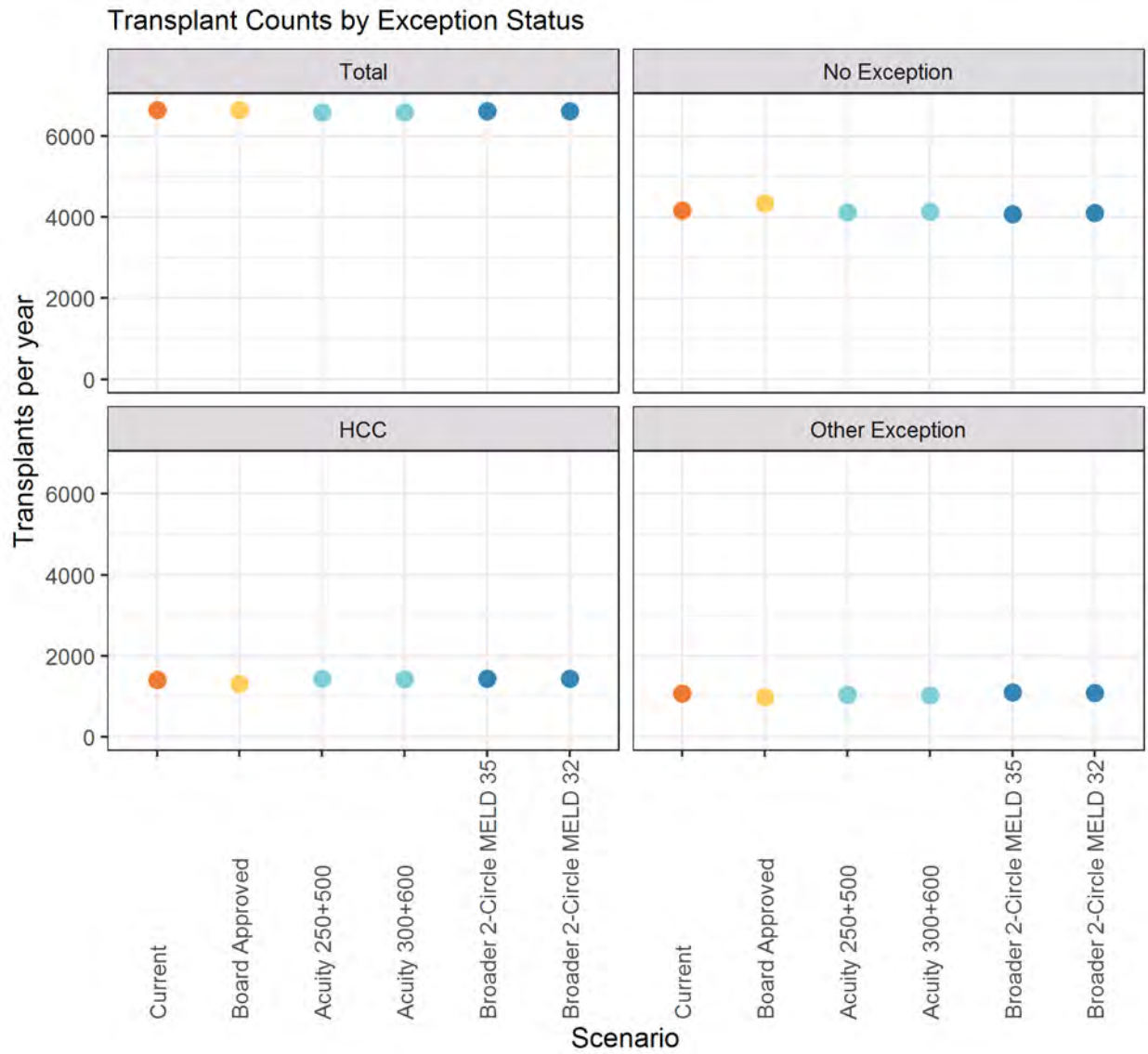


Figure 5 Transplant Counts by Exception Status

Transplant Rates by Allocation MELD/PELD

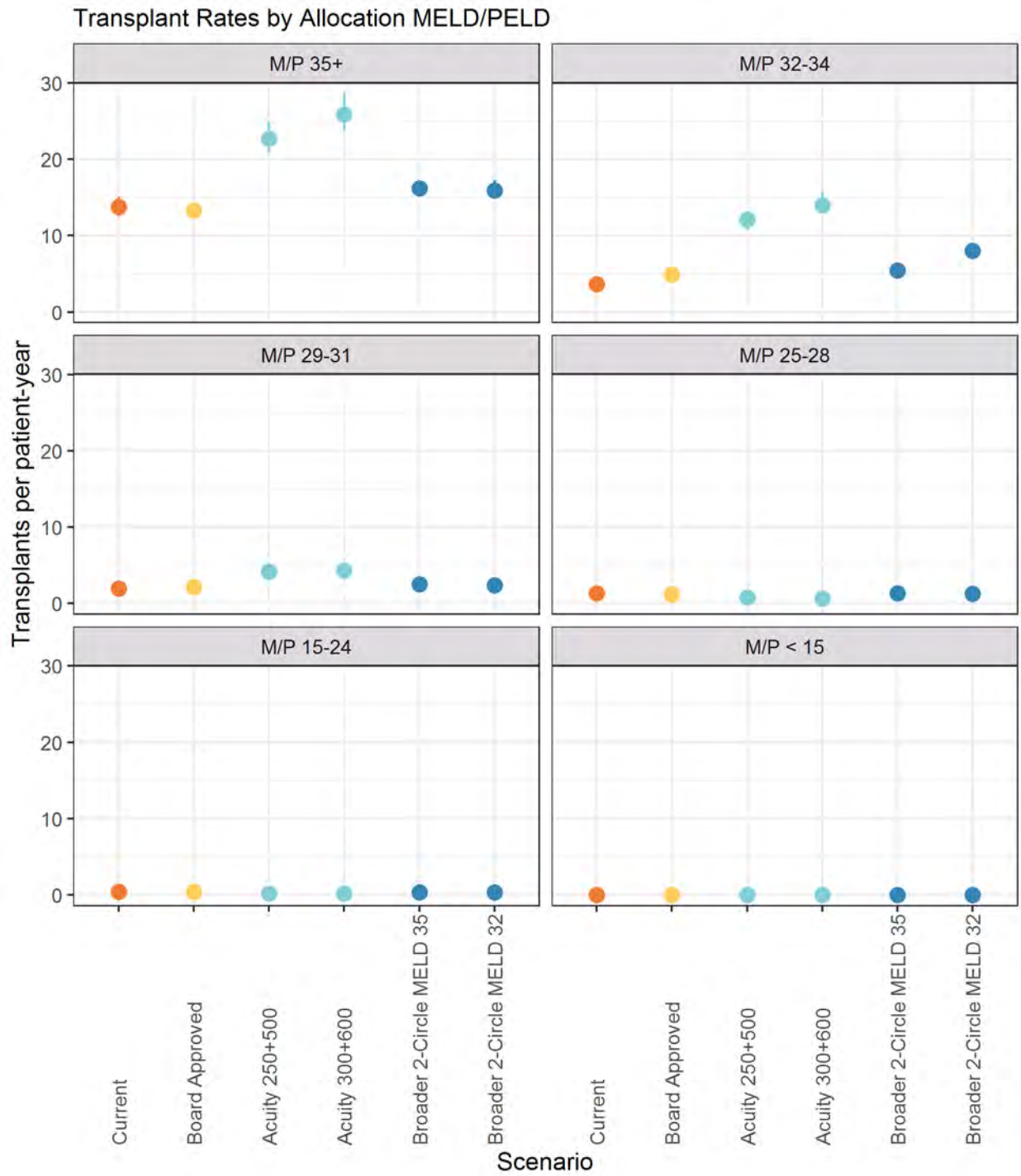


Figure 6 Transplant Rates by Allocation MELD/PELD

Transplant Counts by Allocation MELD/PELD

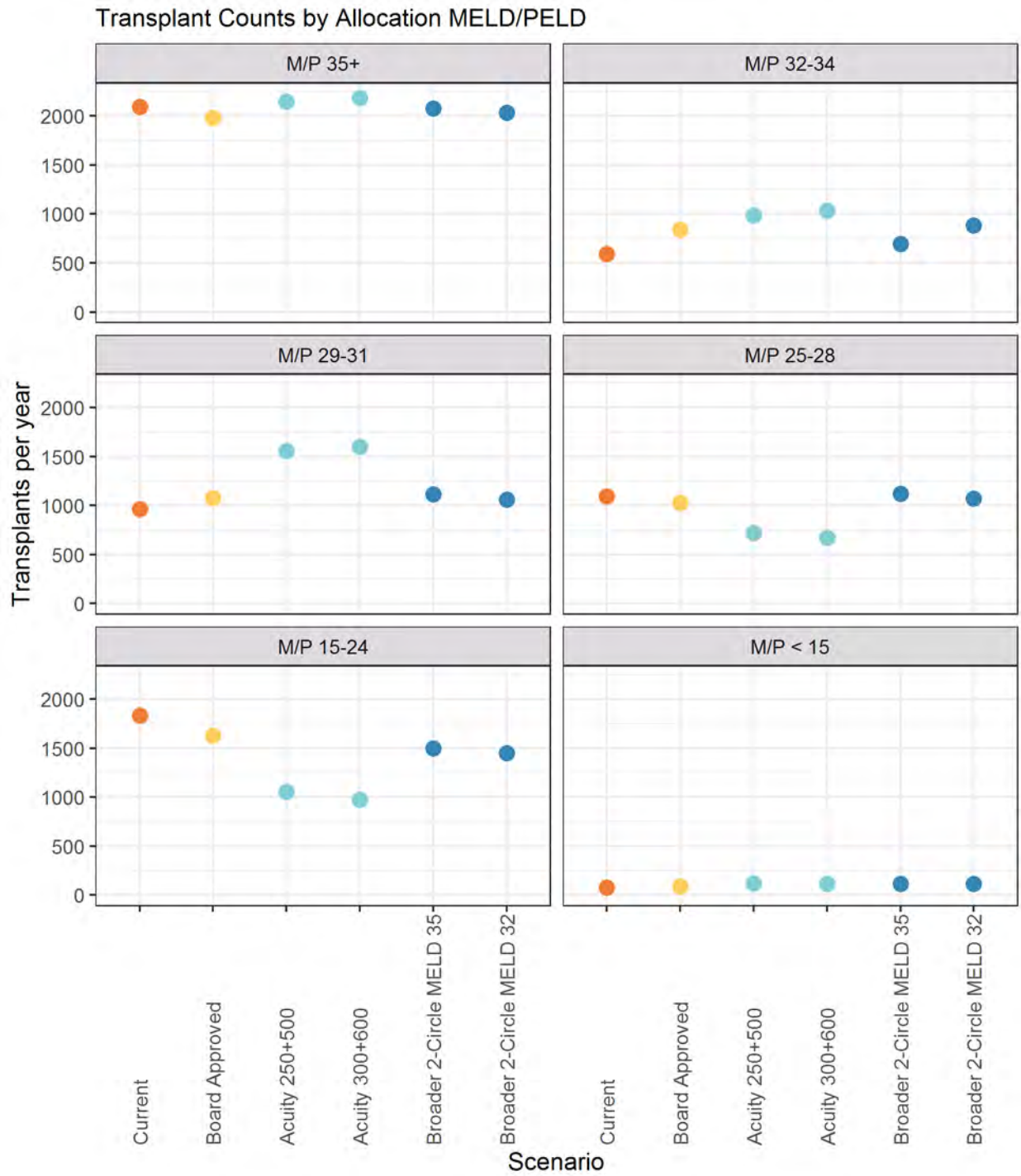


Figure 7 Transplant Counts by Allocation MELD/PELD

Variance in Transplant Rates by Exception Status and DSA

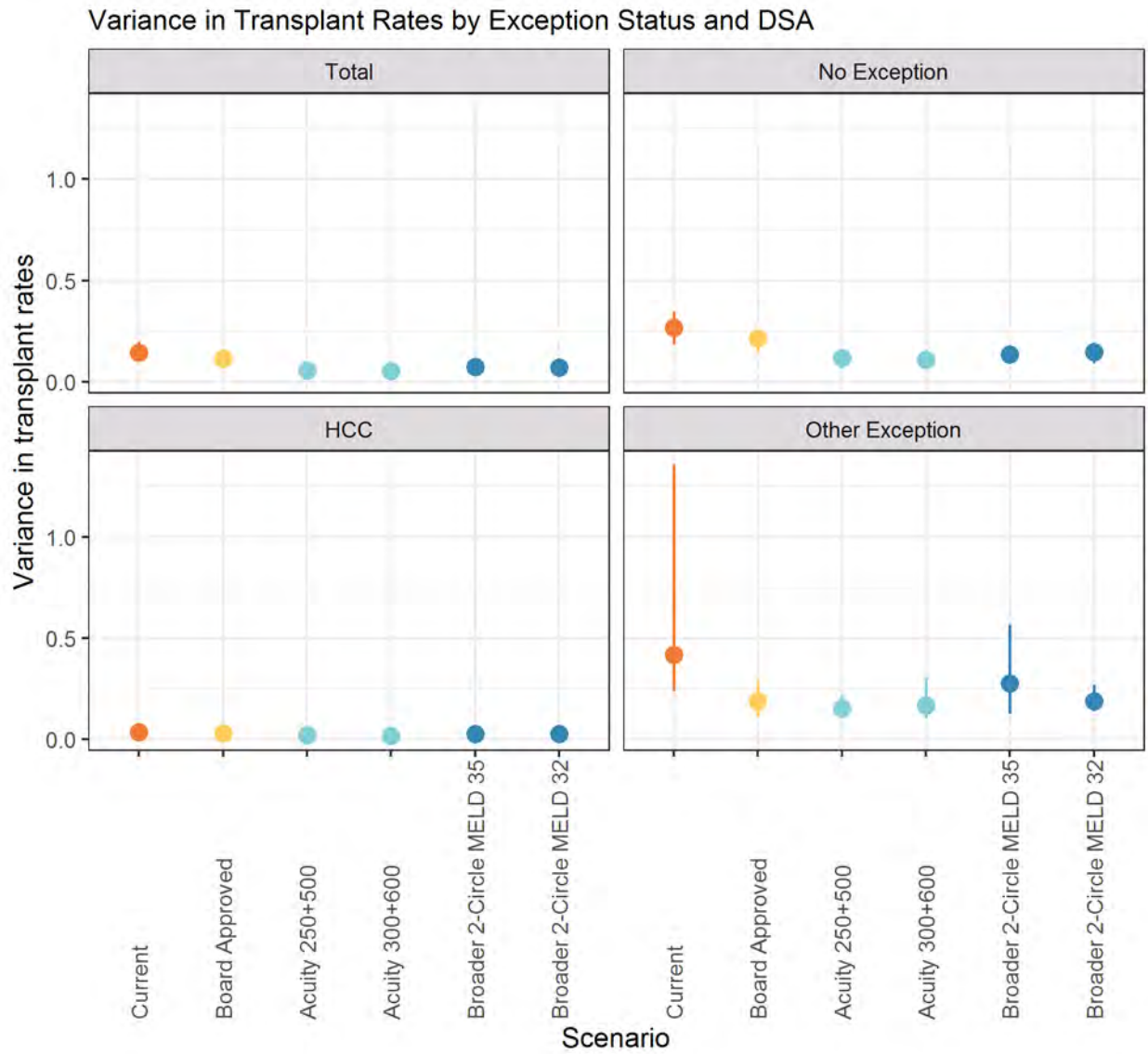


Figure 8 Variance in Transplant Rates by Exception Status and DSA

Variance in Transplant Rates by Allocation MELD/PELD and DSA

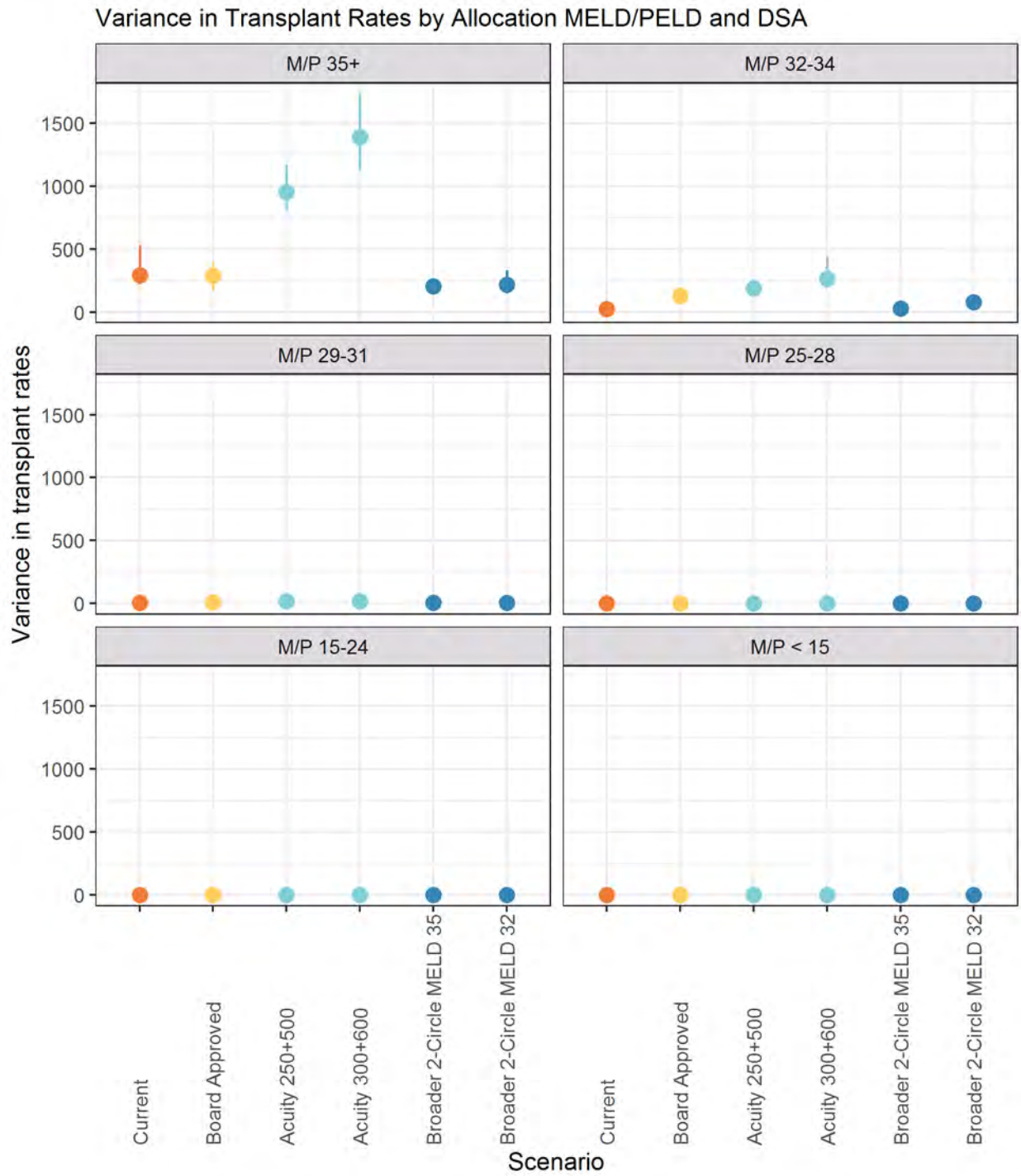


Figure 9 Variance in Transplant Rates by Allocation MELD/PELD and DSA

Maps of Transplant Rate by DSA

Maps of Transplant Rate by DSA

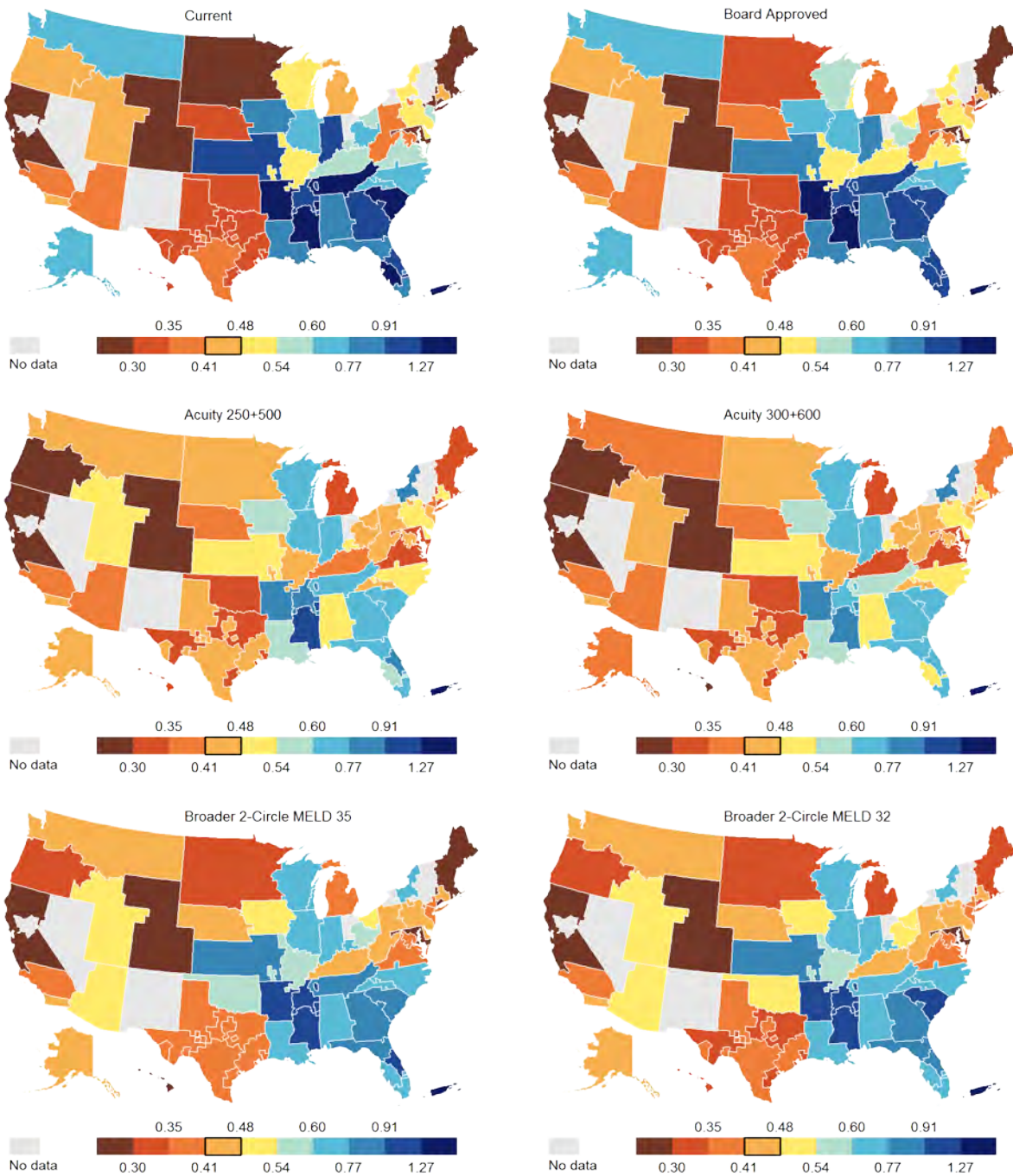


Figure 10 Maps of Transplant Rate by DSA

Waitlist Mortality

Waitlist Mortality Rates by Exception Status

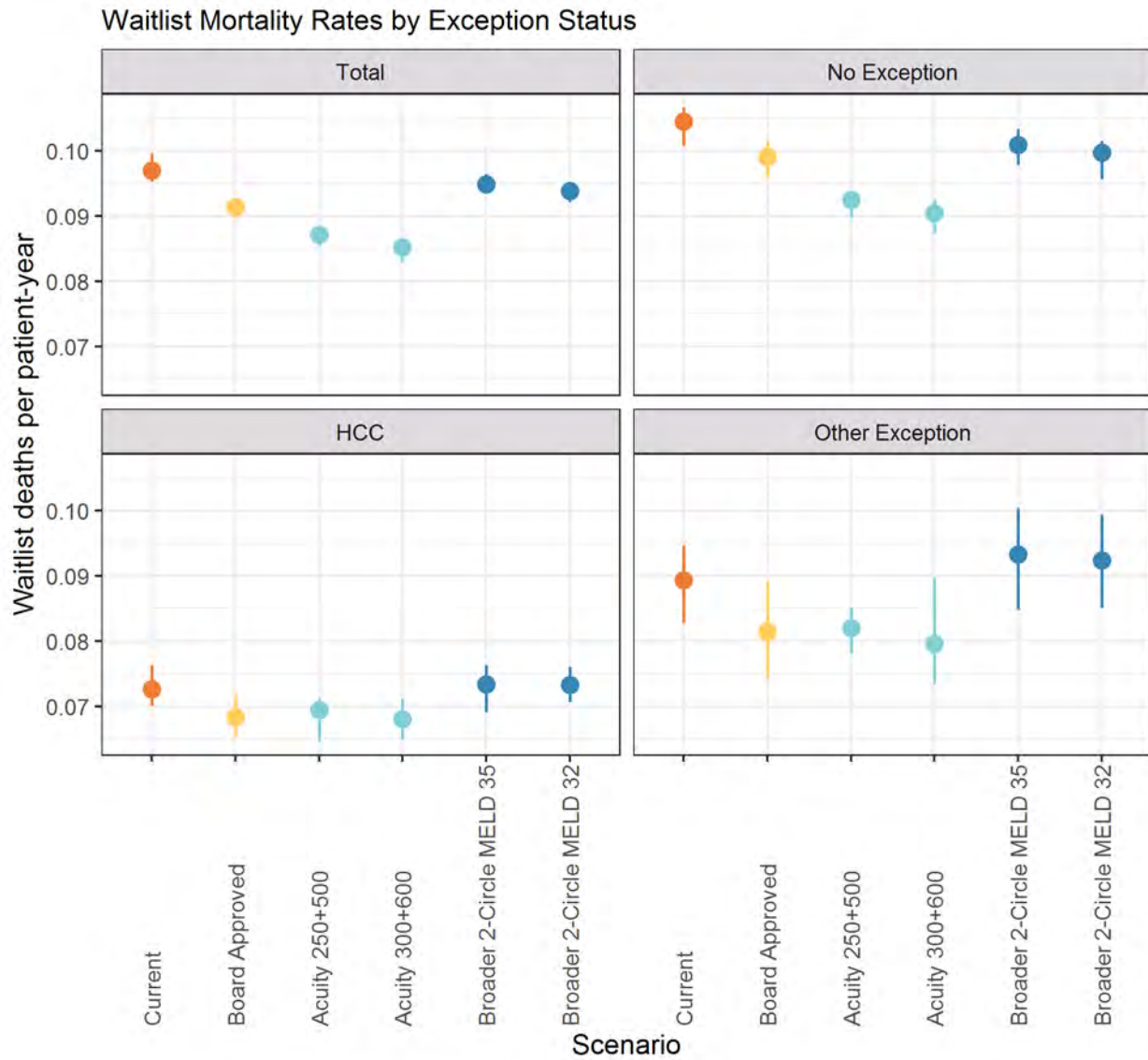


Figure 11 Waitlist Mortality Rates by Exception Status

Waitlist Mortality Counts by Exception Status

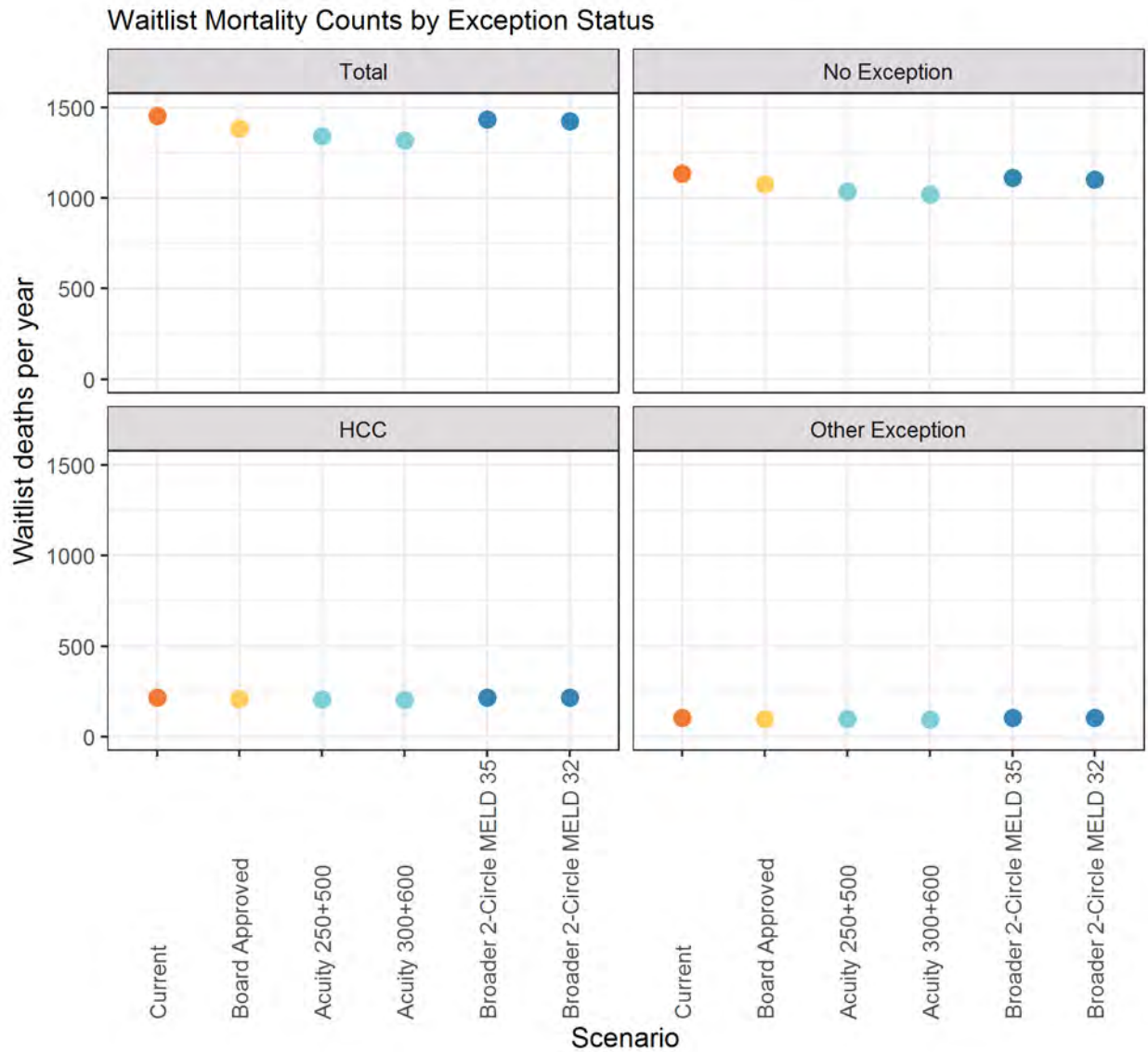


Figure 12 Waitlist Mortality Counts by Exception Status

Waitlist Mortality Rates by Allocation MELD/PELD

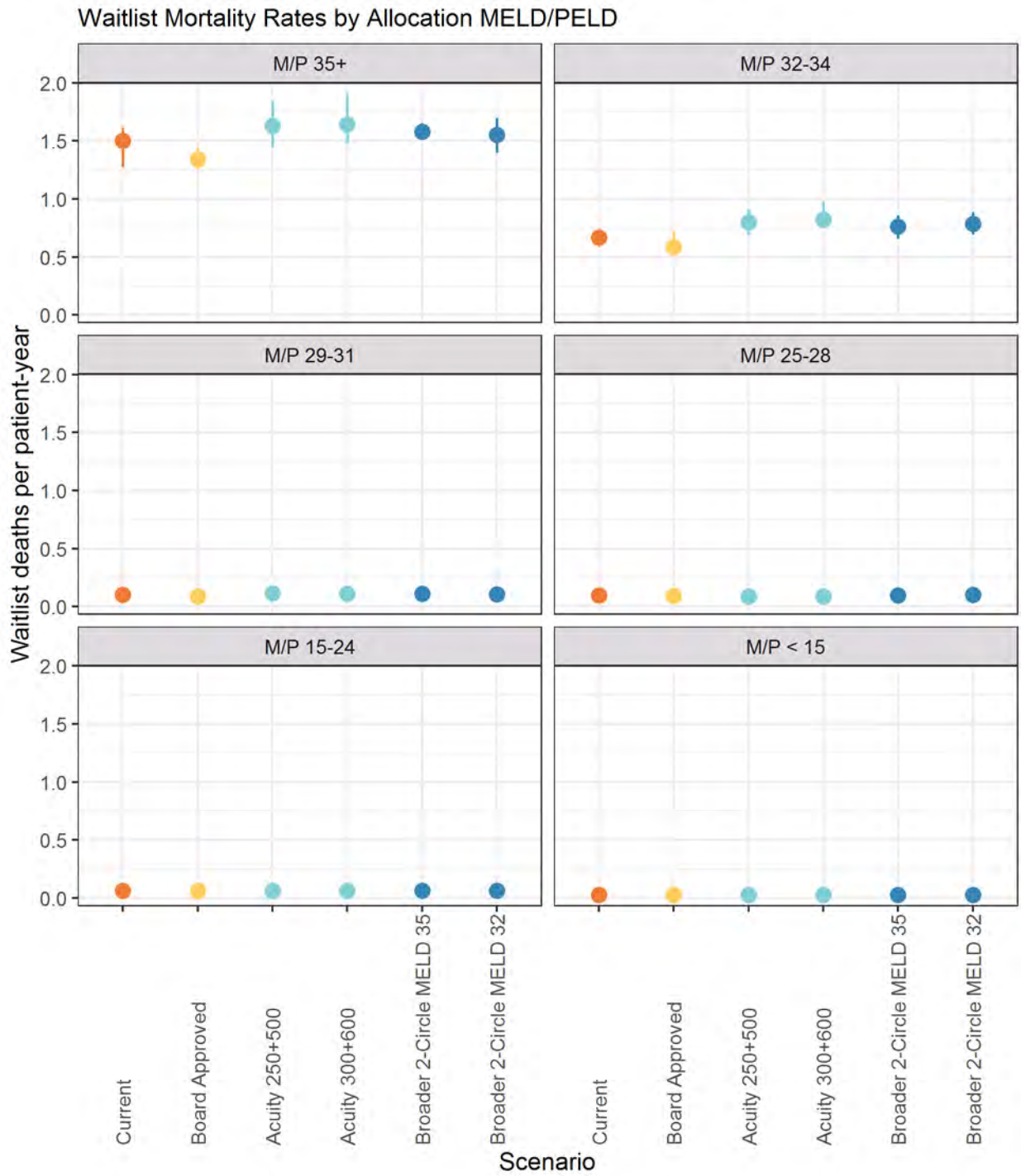


Figure 13 Waitlist Mortality Rates by Allocation MELD/PELD

Waitlist Mortality Counts by Allocation MELD/PELD

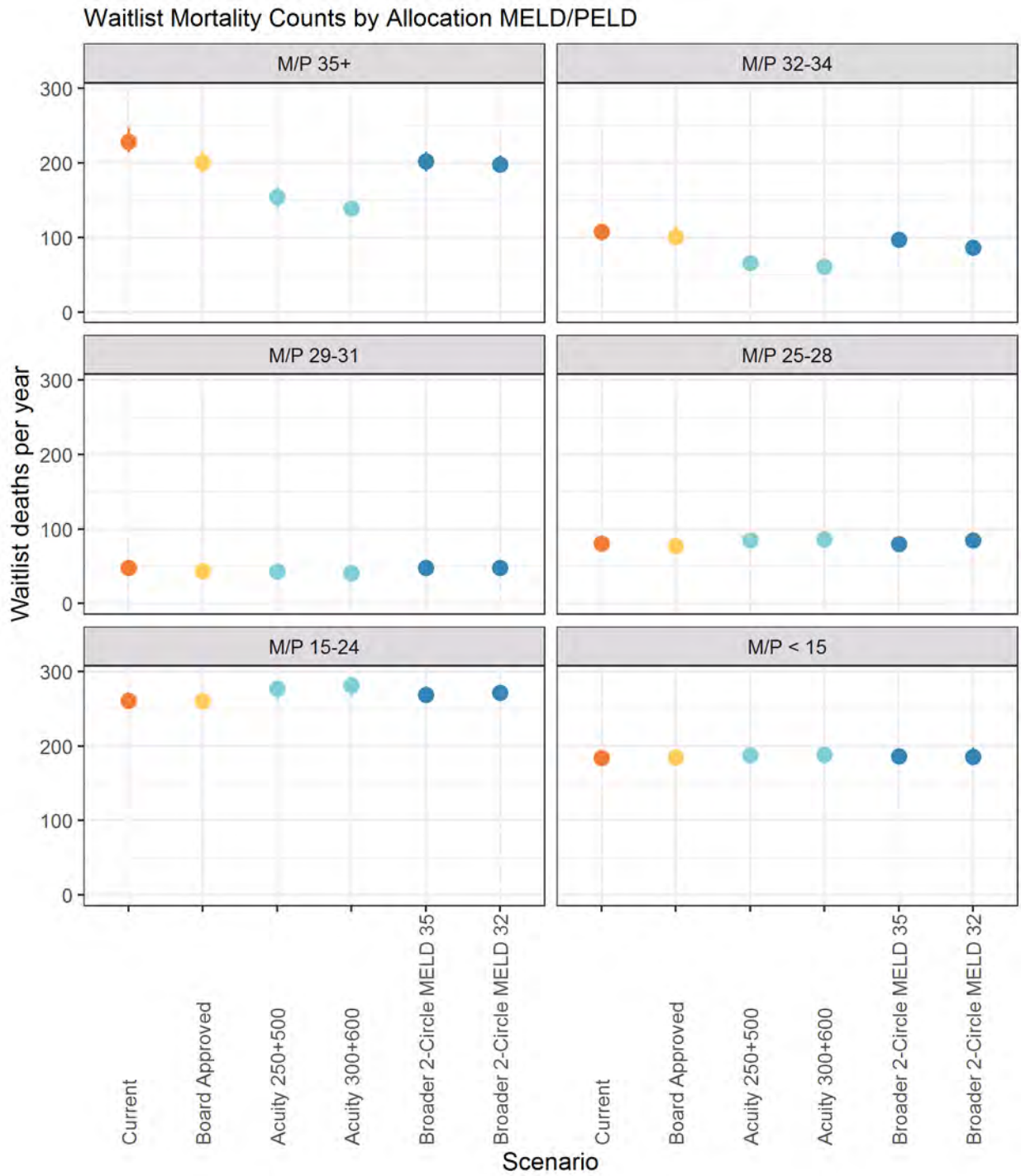


Figure 14 Waitlist Mortality Counts by Allocation MELD/PELD

Variance in Waitlist Mortality Rates by Exception Status and DSA

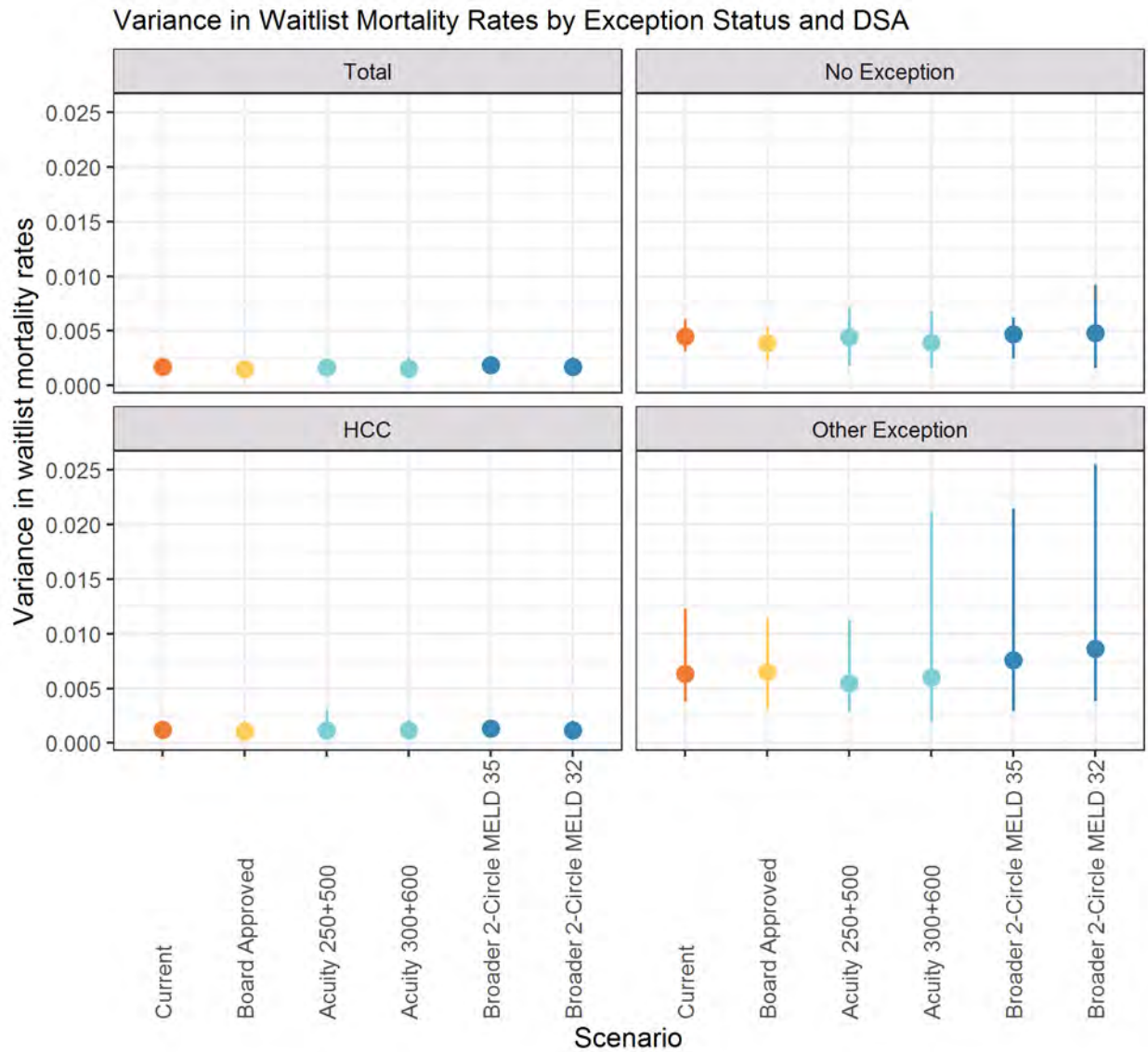


Figure 15 Variance in Waitlist Mortality Rates by Exception Status and DSA

Variance in Waitlist Mortality Rates by Allocation MELD/PELD and DSA

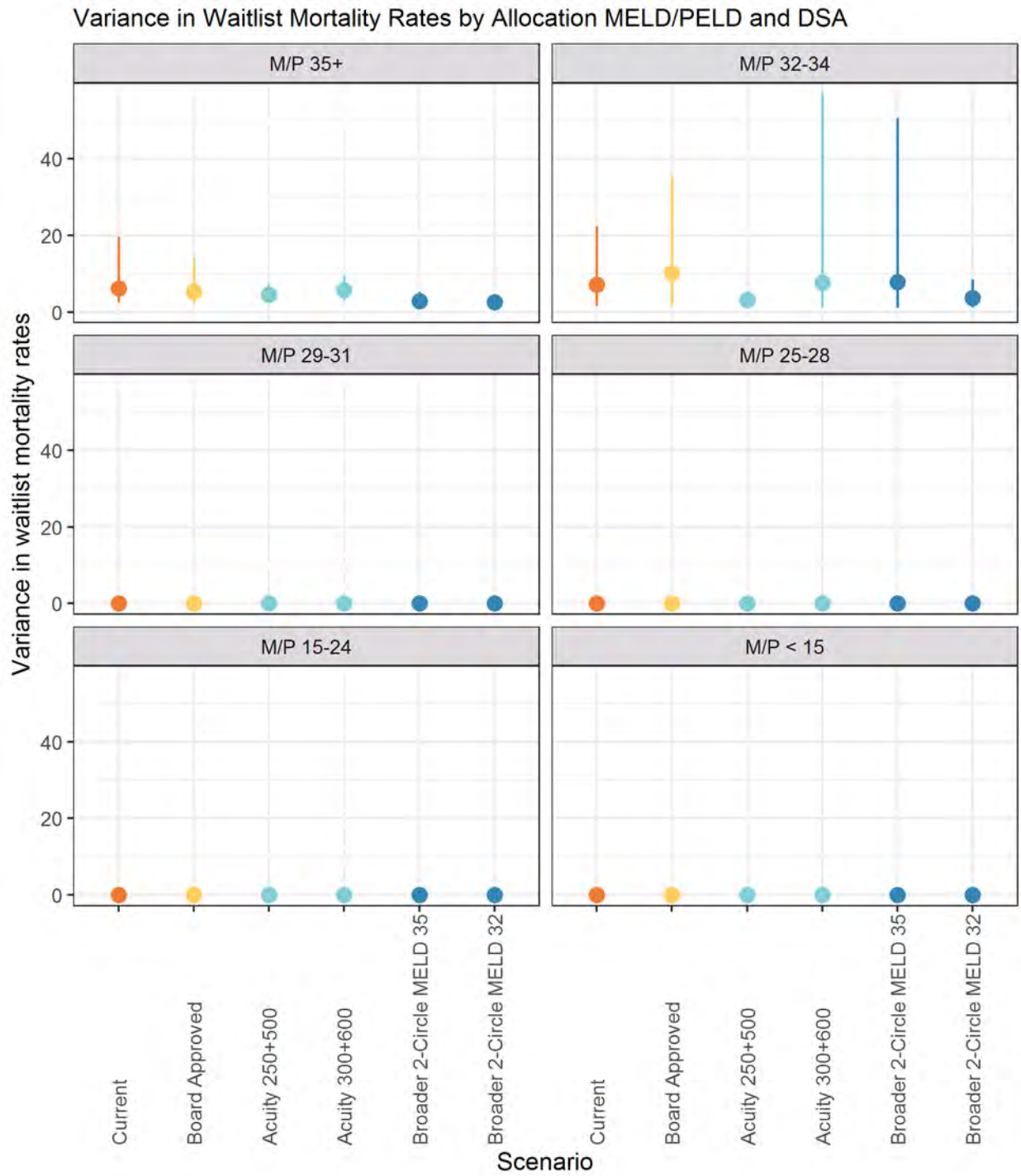


Figure 16 Variance in Waitlist Mortality Rates by Allocation MELD/PELD and DSA

Maps of Waitlist Mortality Rate by DSA

Maps of Waitlist Mortality Rate by DSA

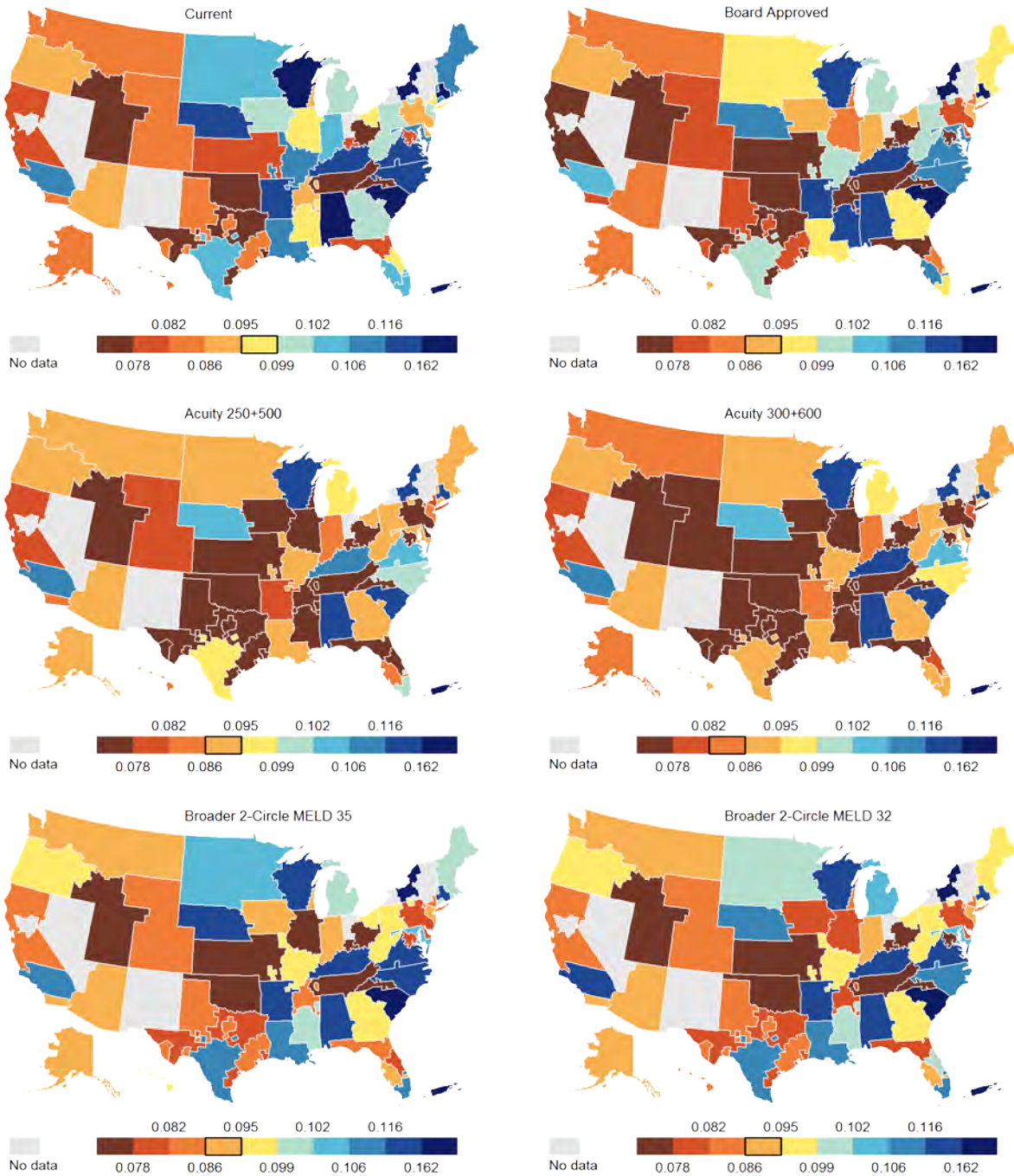


Figure 17 Maps of Waitlist Mortality Rate by DSA

Posttransplant Mortality

Posttransplant Mortality Rates by Exception Status

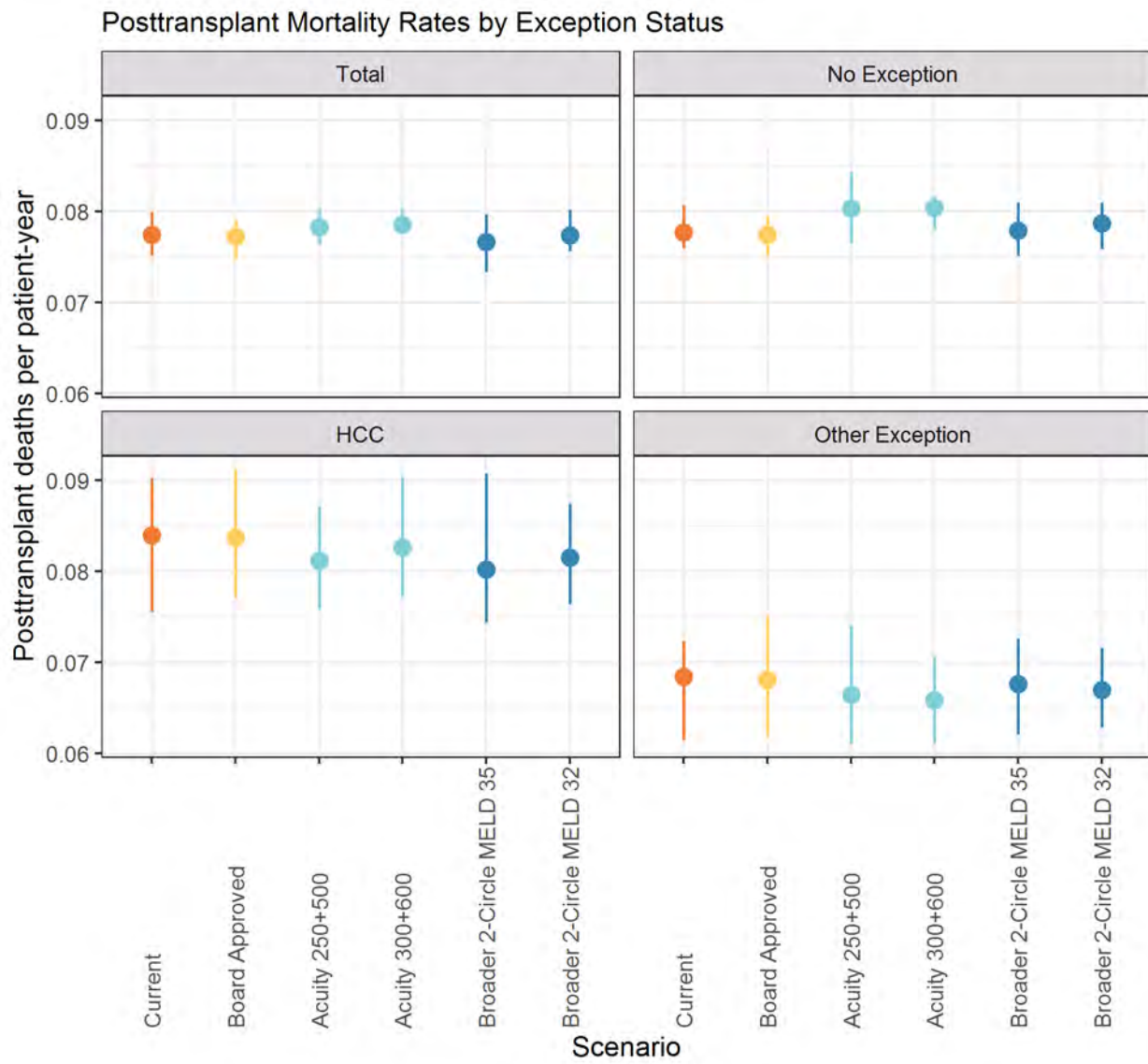


Figure 18 Posttransplant Mortality Rates by Exception Status

Posttransplant Mortality Counts by Exception Status

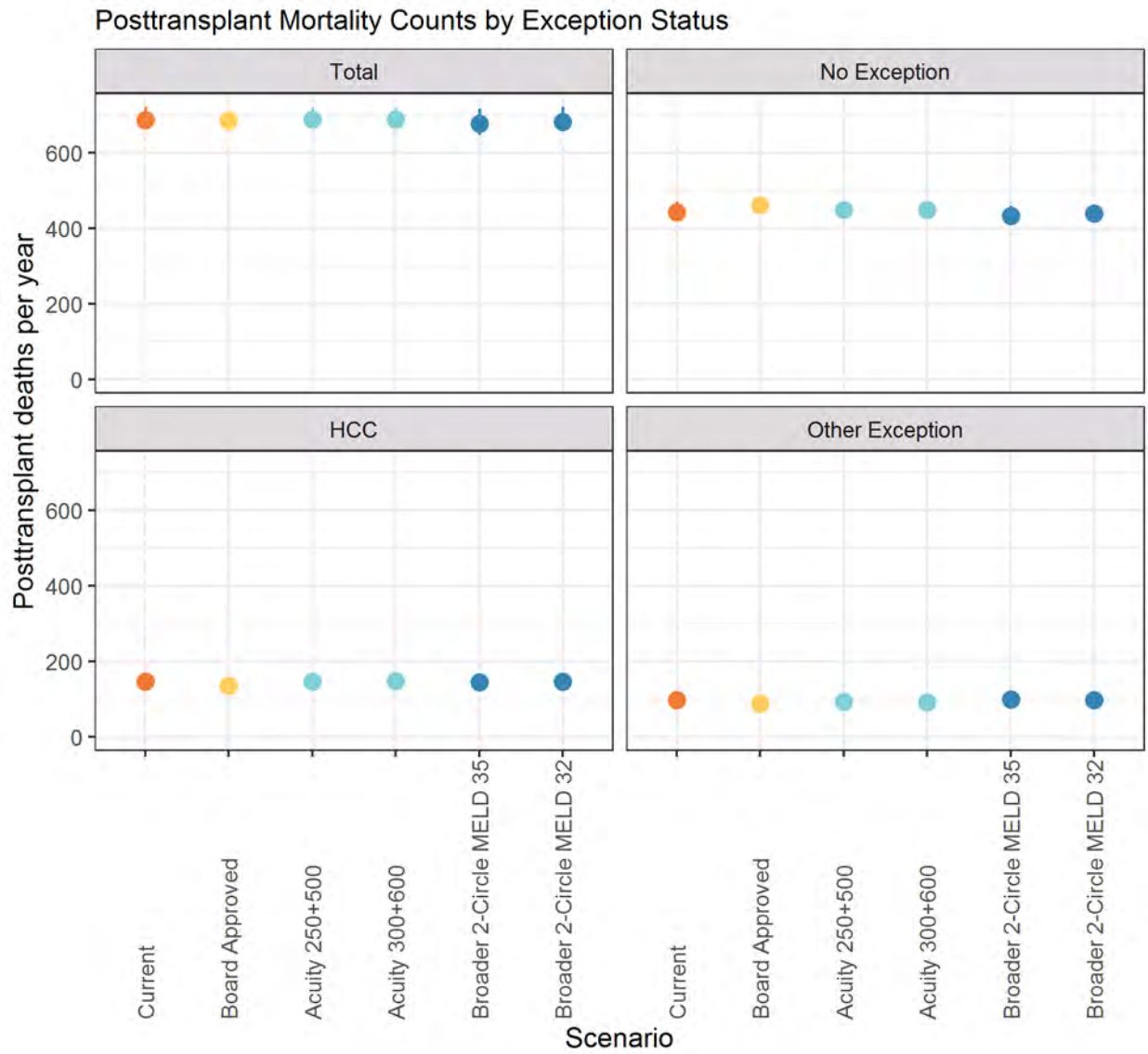


Figure 19 Posttransplant Mortality Counts by Exception Status

Posttransplant Mortality Rates by Allocation MELD/PELD

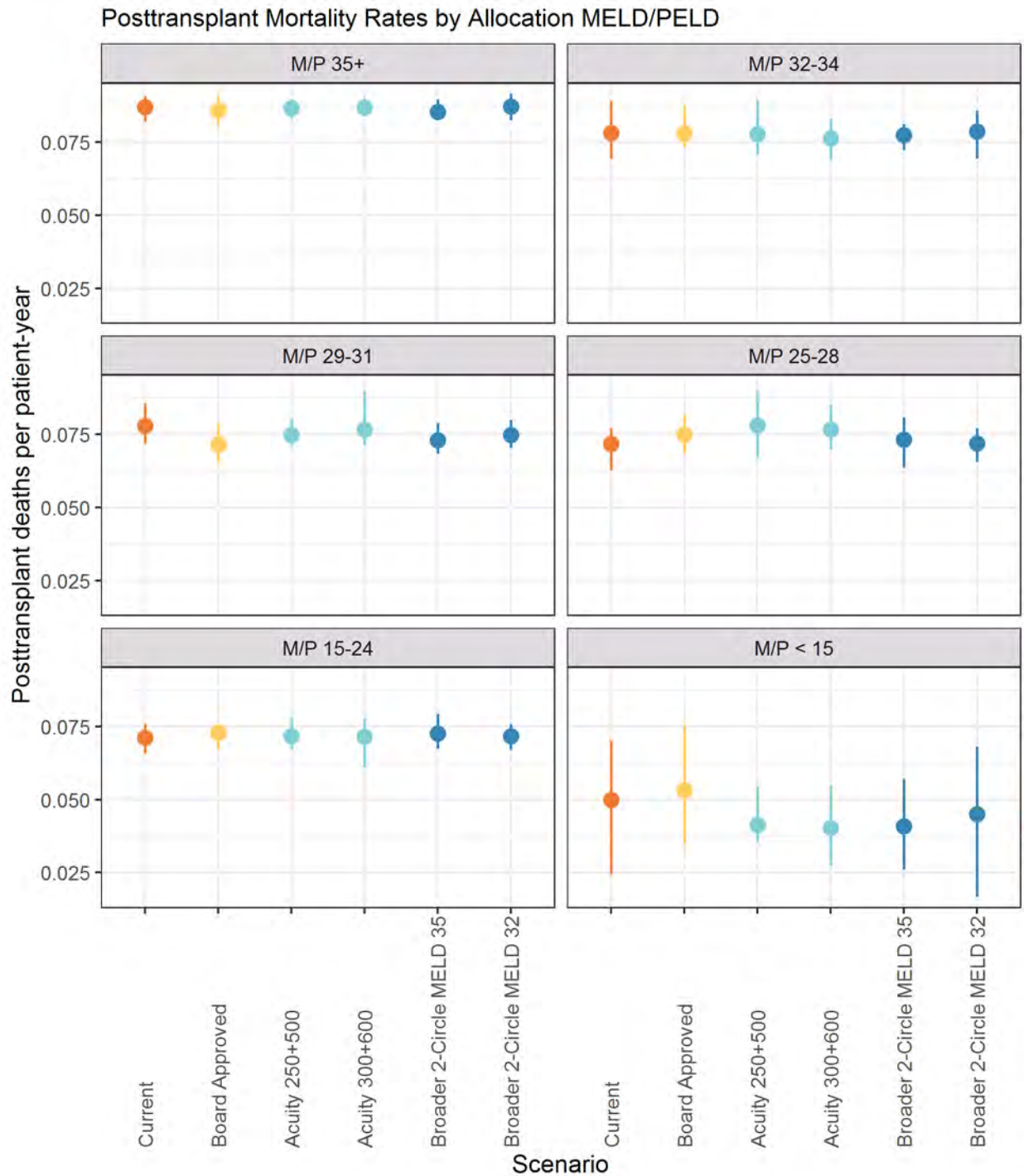


Figure 20 Posttransplant Mortality Rates by Allocation MELD/PELD

Posttransplant Mortality Counts by Allocation MELD/PELD

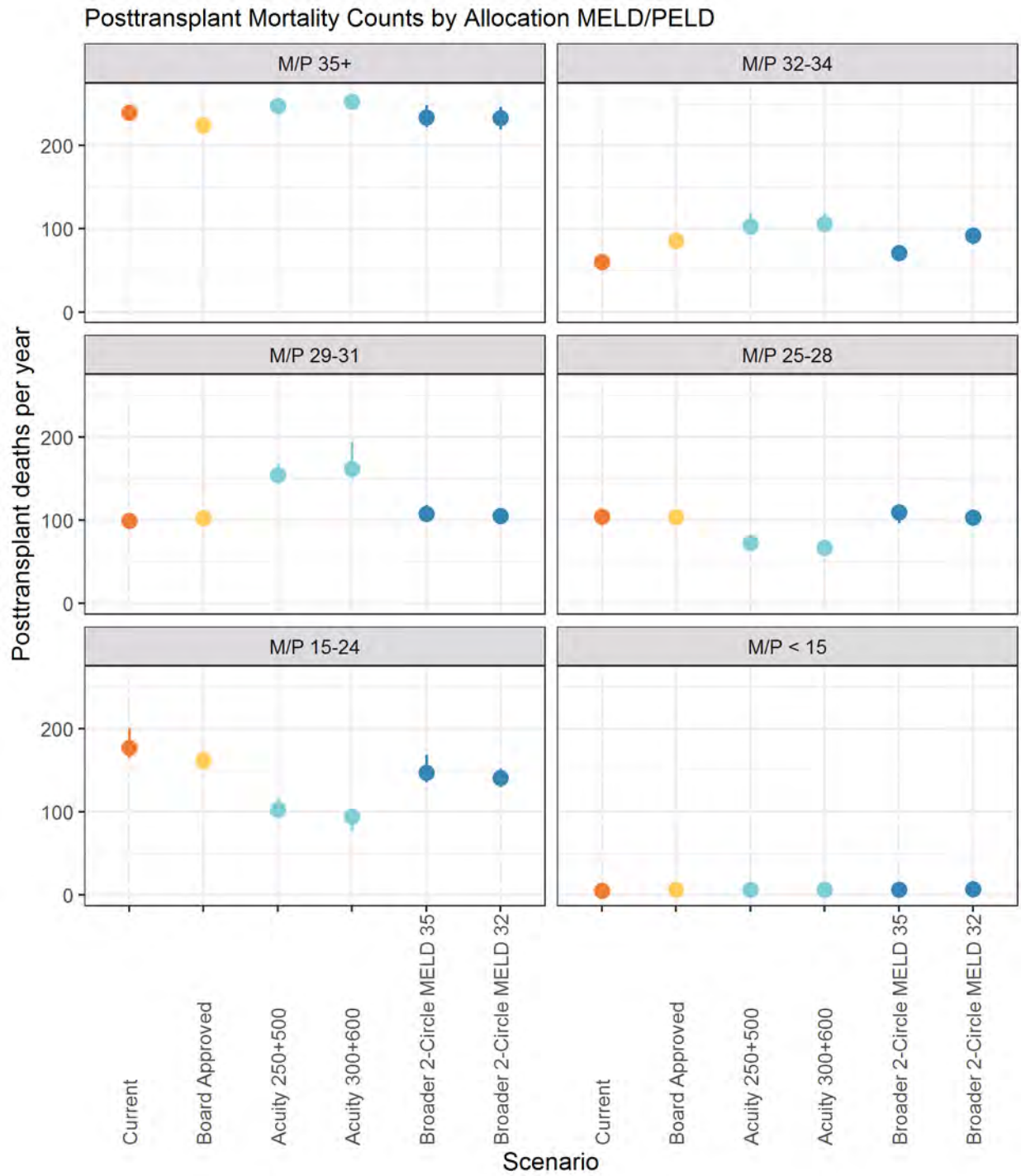


Figure 21 Posttransplant Mortality Counts by Allocation MELD/PELD

Transport

Median Transport Time by Exception Status

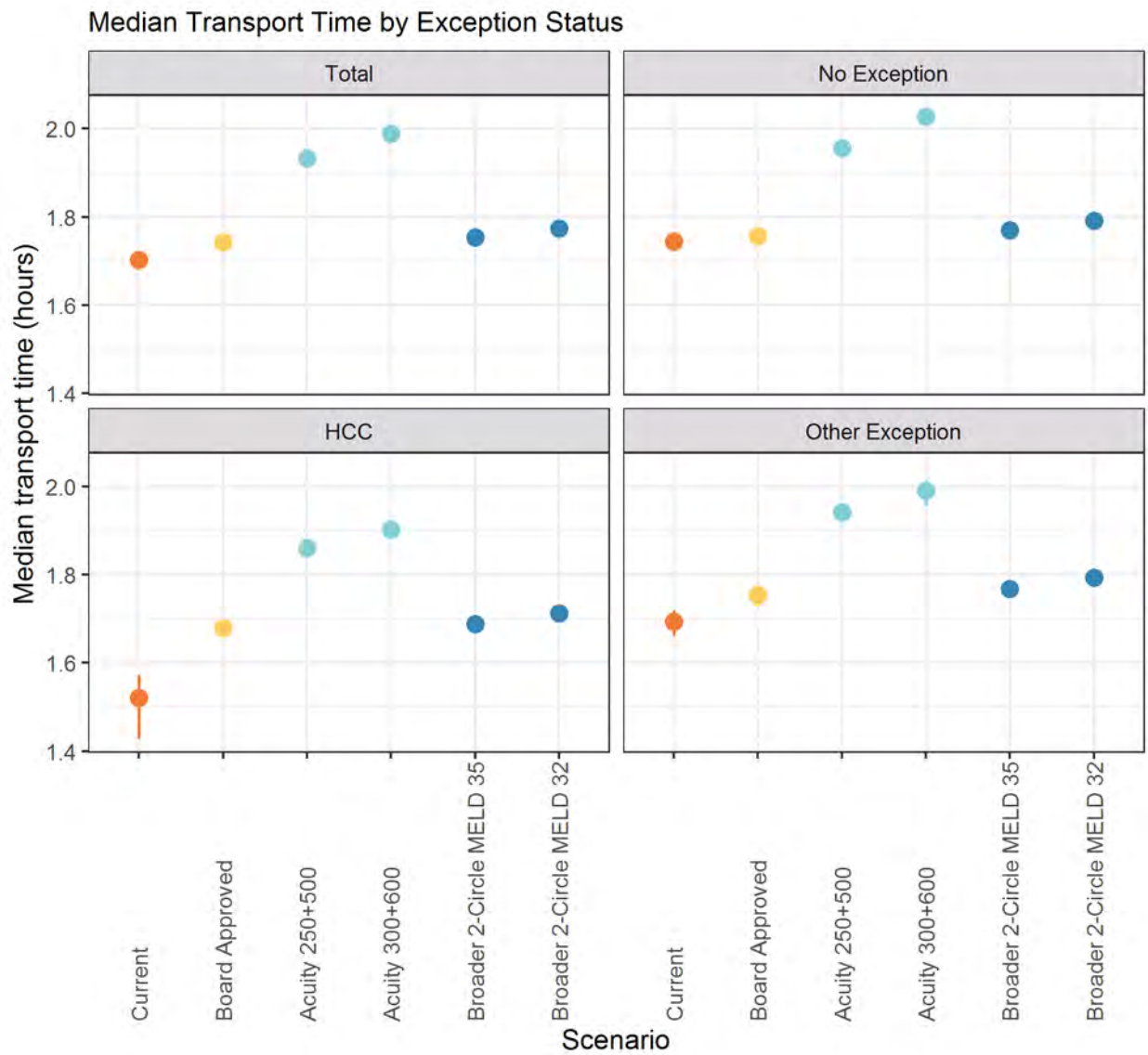


Figure 22 Median Transport Time by Exception Status

Median Transport Time by Allocation MELD/PELD

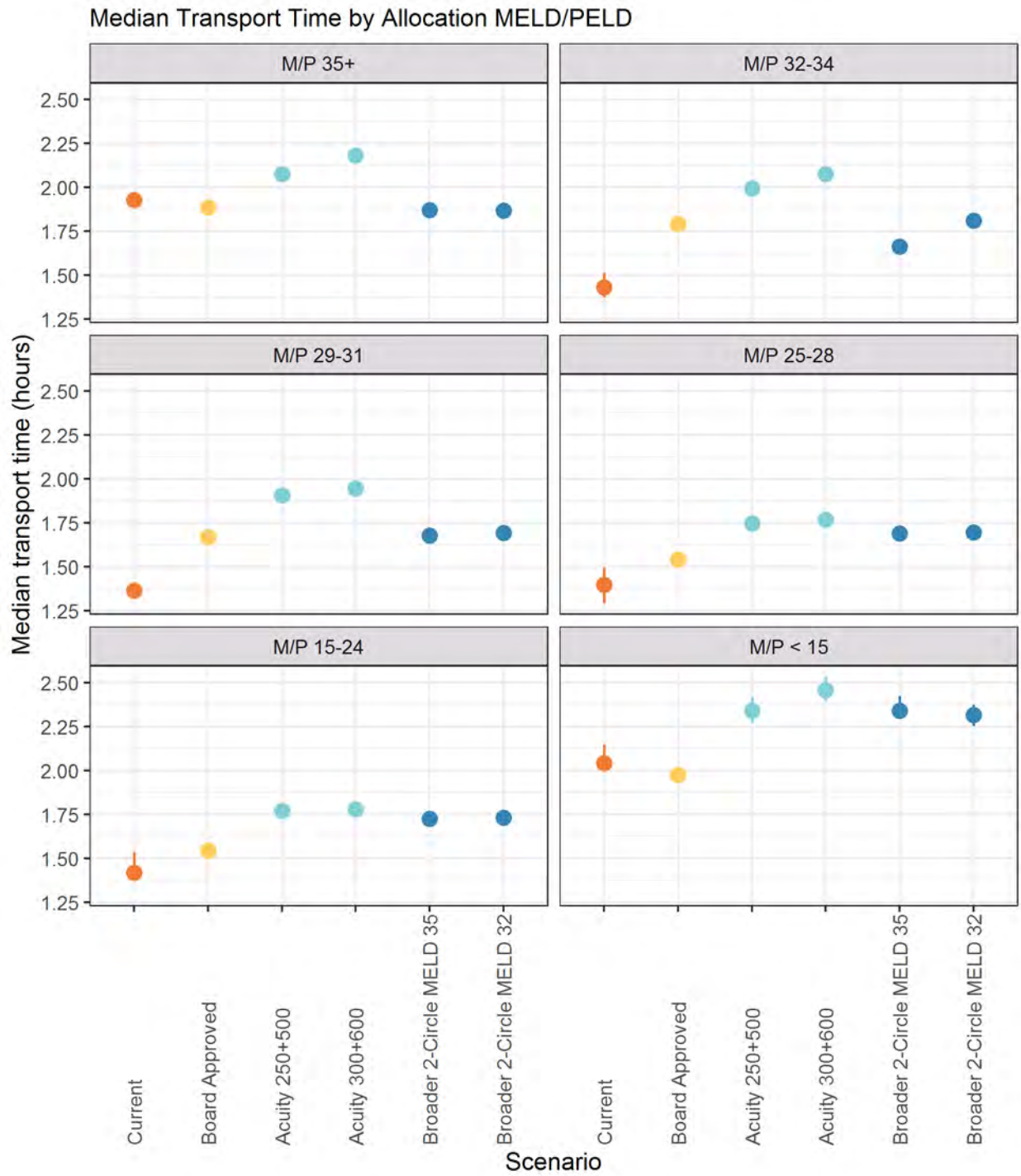


Figure 23 Median Transport Time by Allocation MELD/PELD

Median Transport Distance by Exception Status

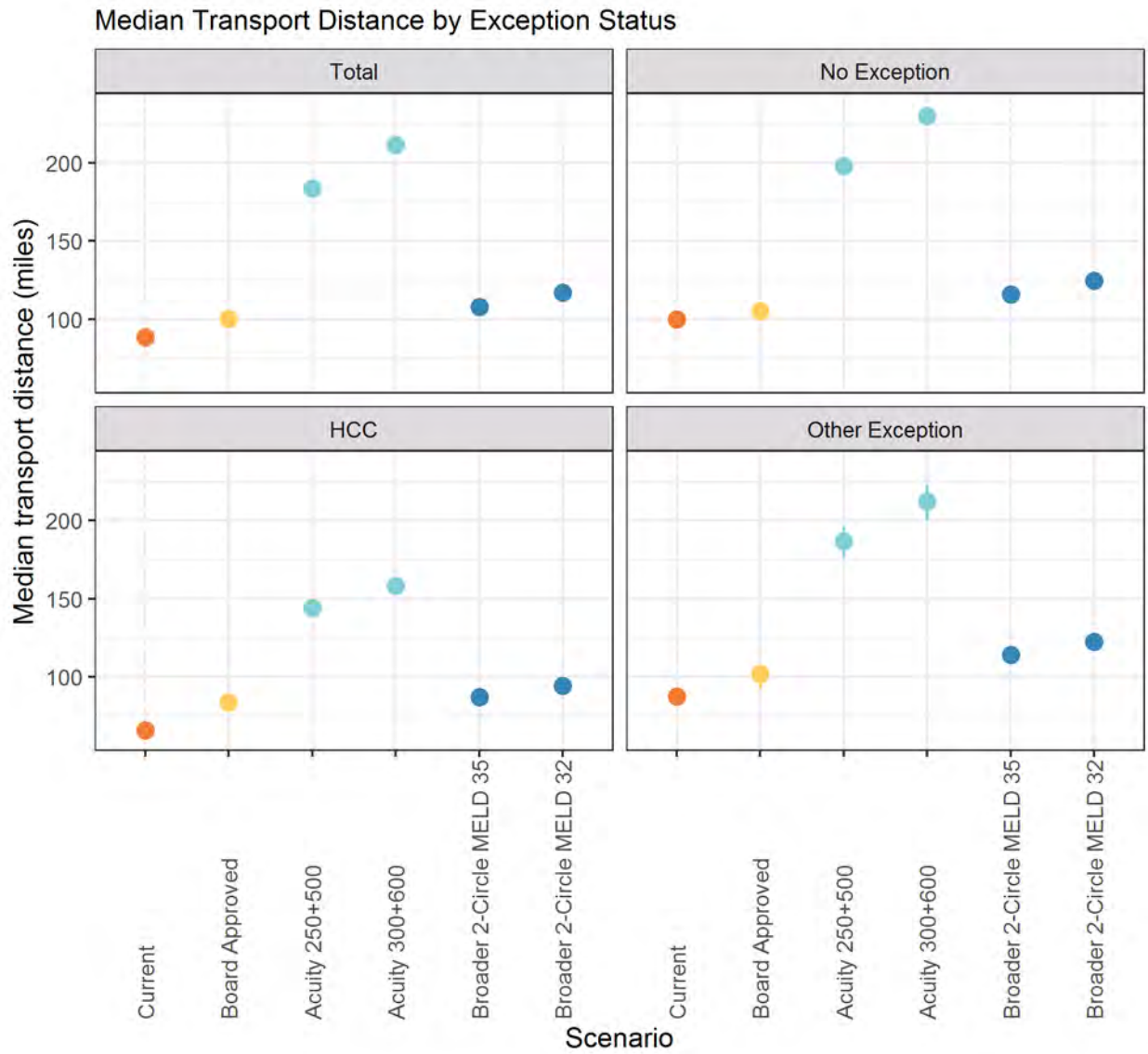


Figure 24 Median Transport Distance by Exception Status

Median Transport Distance by Allocation MELD/PELD

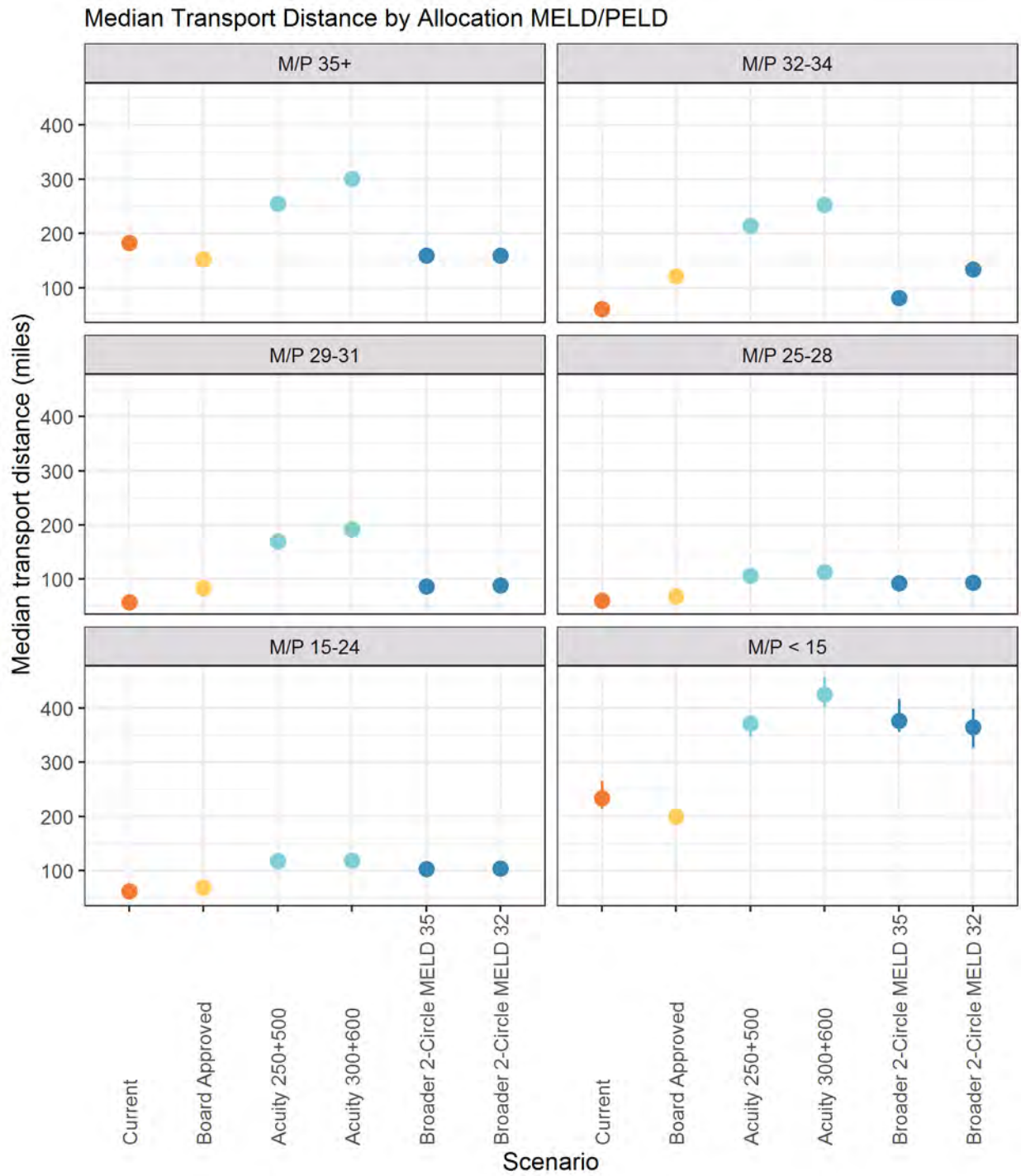


Figure 25 Median Transport Distance by Allocation MELD/PELD

Percentage of Organs Flown by Exception Status

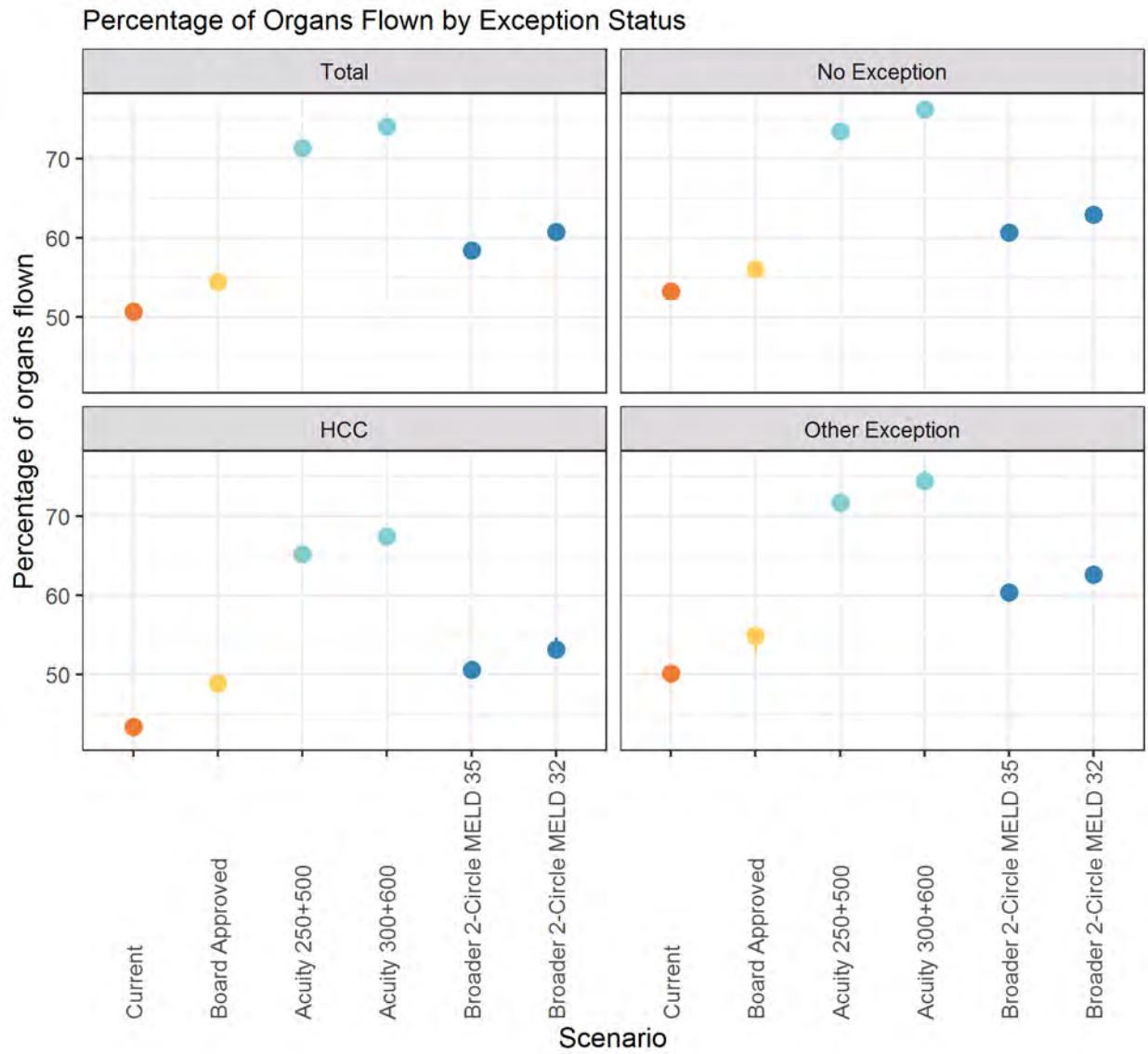


Figure 26 Percentage of Organs Flown by Exception Status

Percentage of Organs Flown by Allocation MELD/PELD

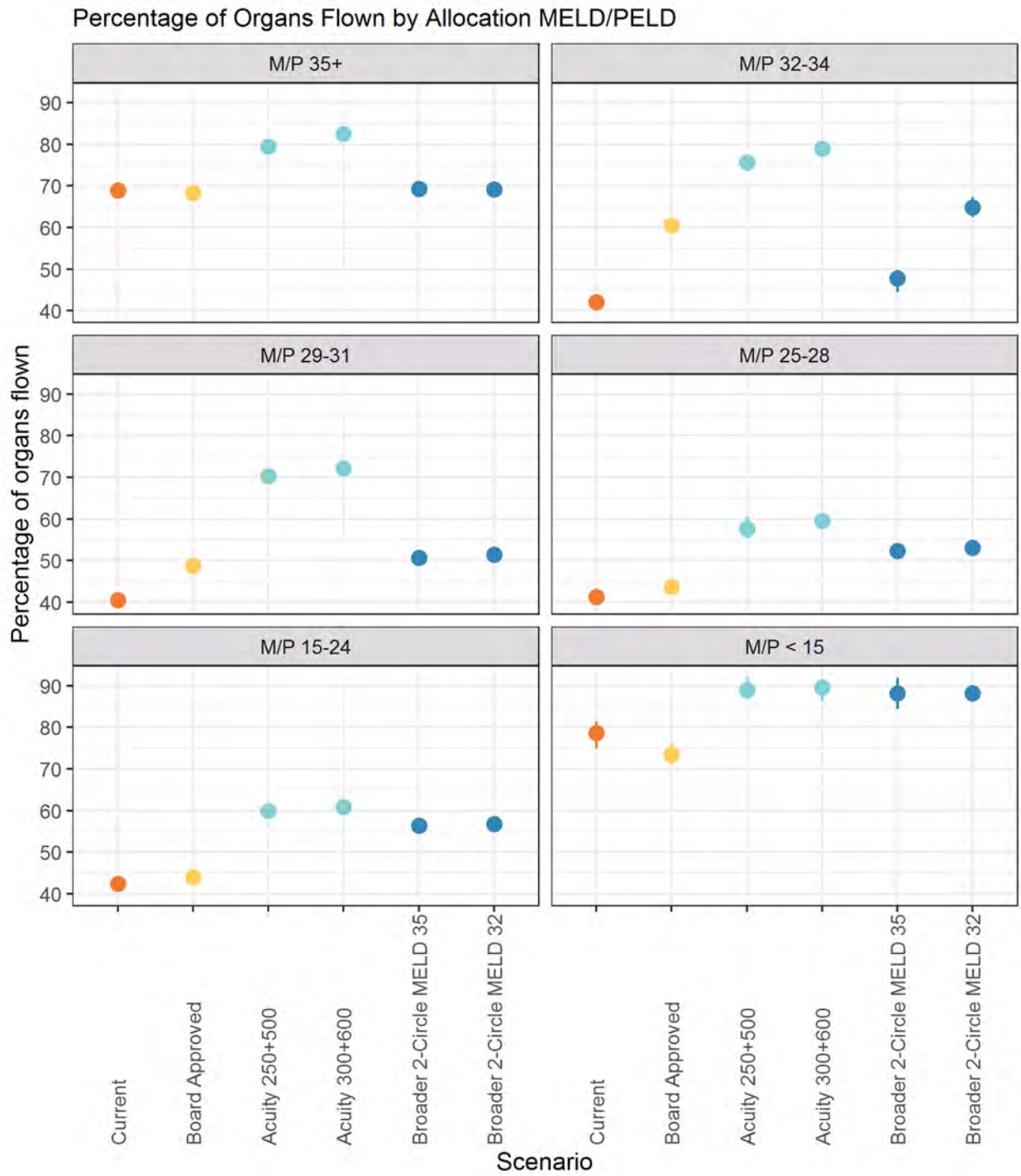


Figure 27 Percentage of Organs Flown by Allocation MELD/PELD

Maps of Percentage of Organs Flown by Transplant DSA

Maps of Percentage of Organs Flown by Transplant DSA

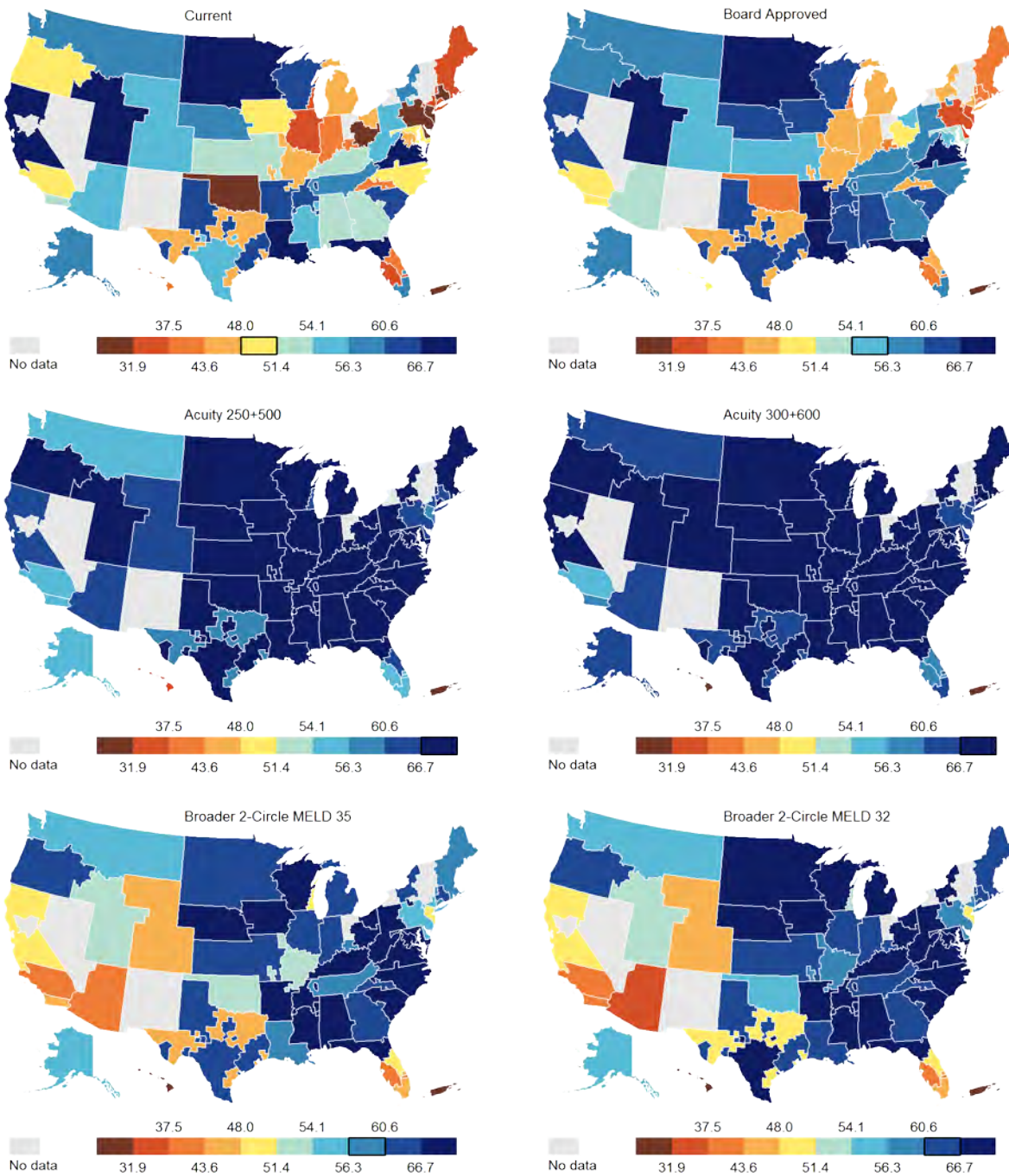


Figure 28 Maps of Percentage of Organs Flown by Transplant DSA

Maps of Percentage of Organs Flown by Donor DSA

Maps of Percentage of Organs Flown by Donor DSA

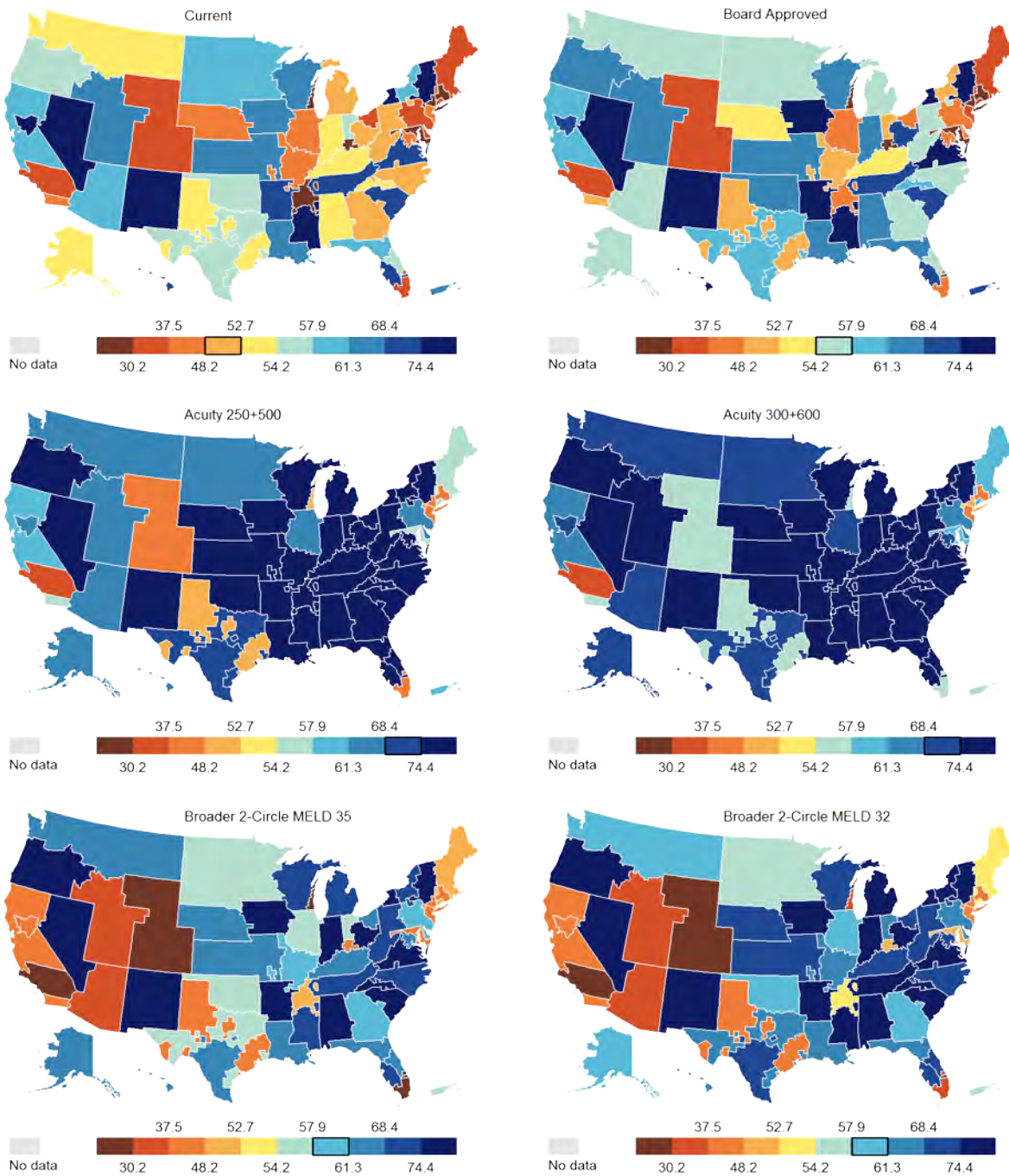


Figure 29 Maps of Percentage of Organs Flown by Donor DSA

Appendices

Appendix A: Results by OPTN Region

Allocation MELD/PELD at Transplant

Median Allocation MELD/PELD at Transplant

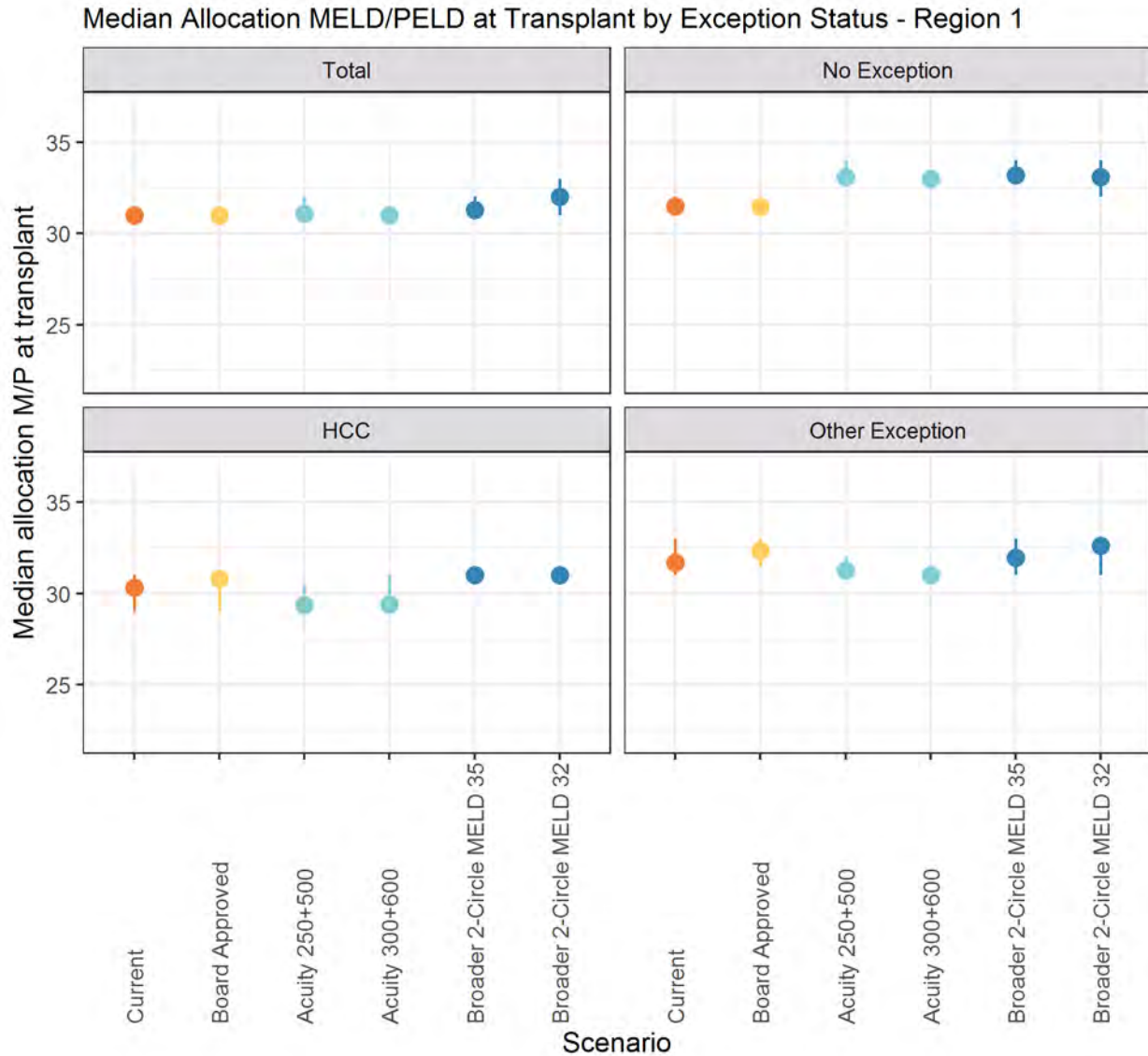


Figure 30 Median Allocation MELD/PELD at Transplant by Exception Status - Region 1

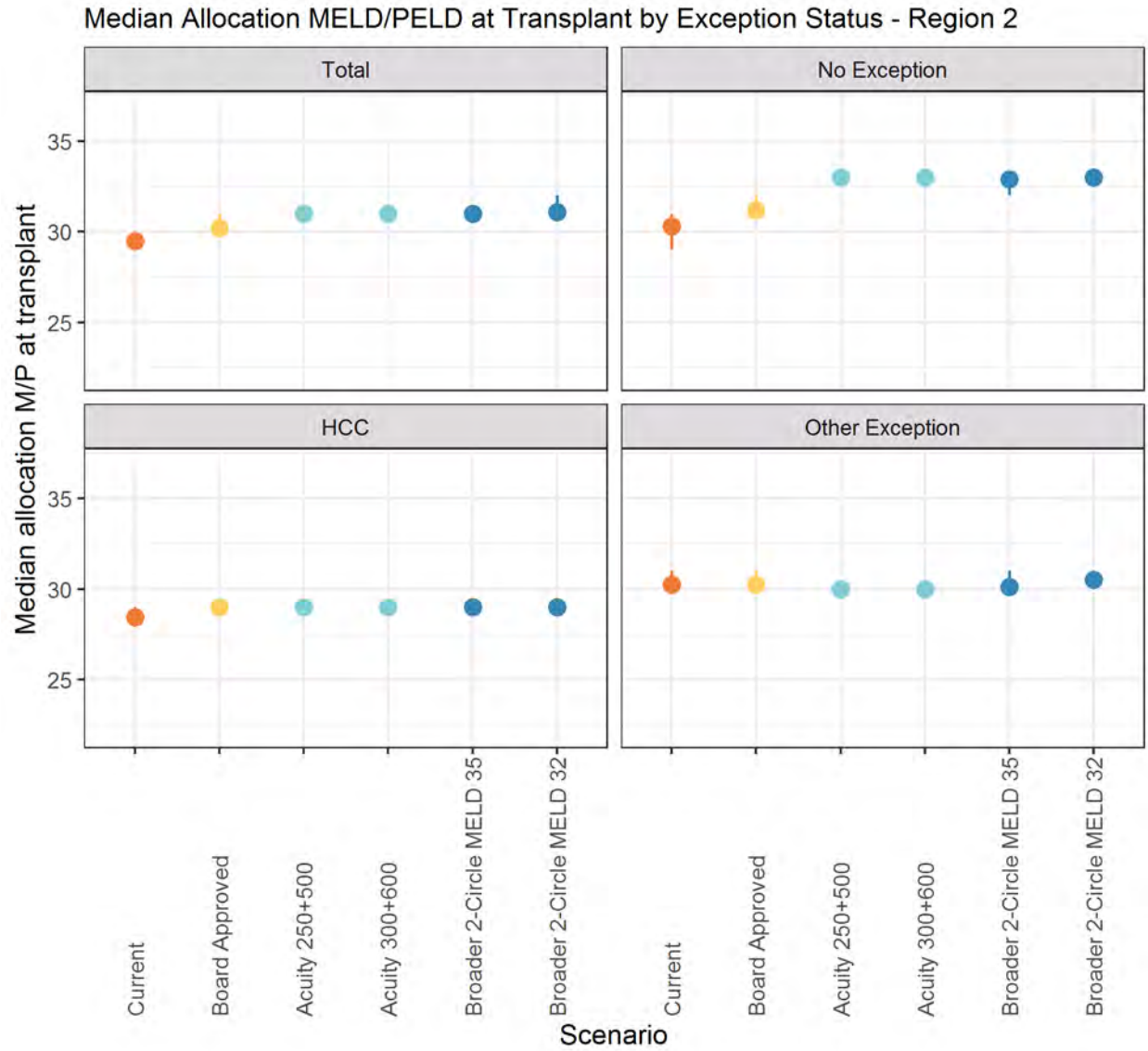


Figure 31 Median Allocation MELD/PELD at Transplant by Exception Status - Region 2

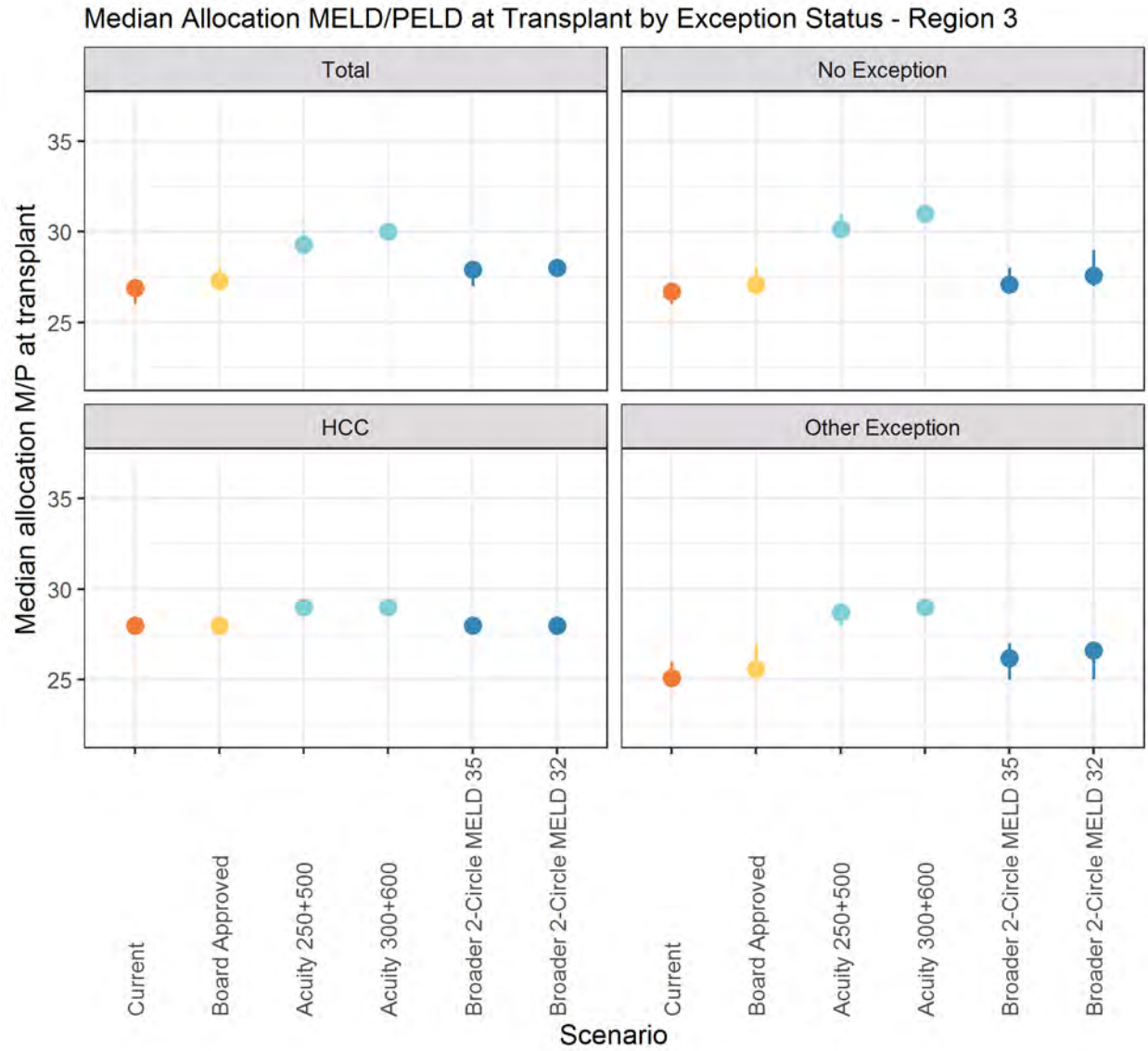


Figure 32 Median Allocation MELD/PELD at Transplant by Exception Status - Region 3

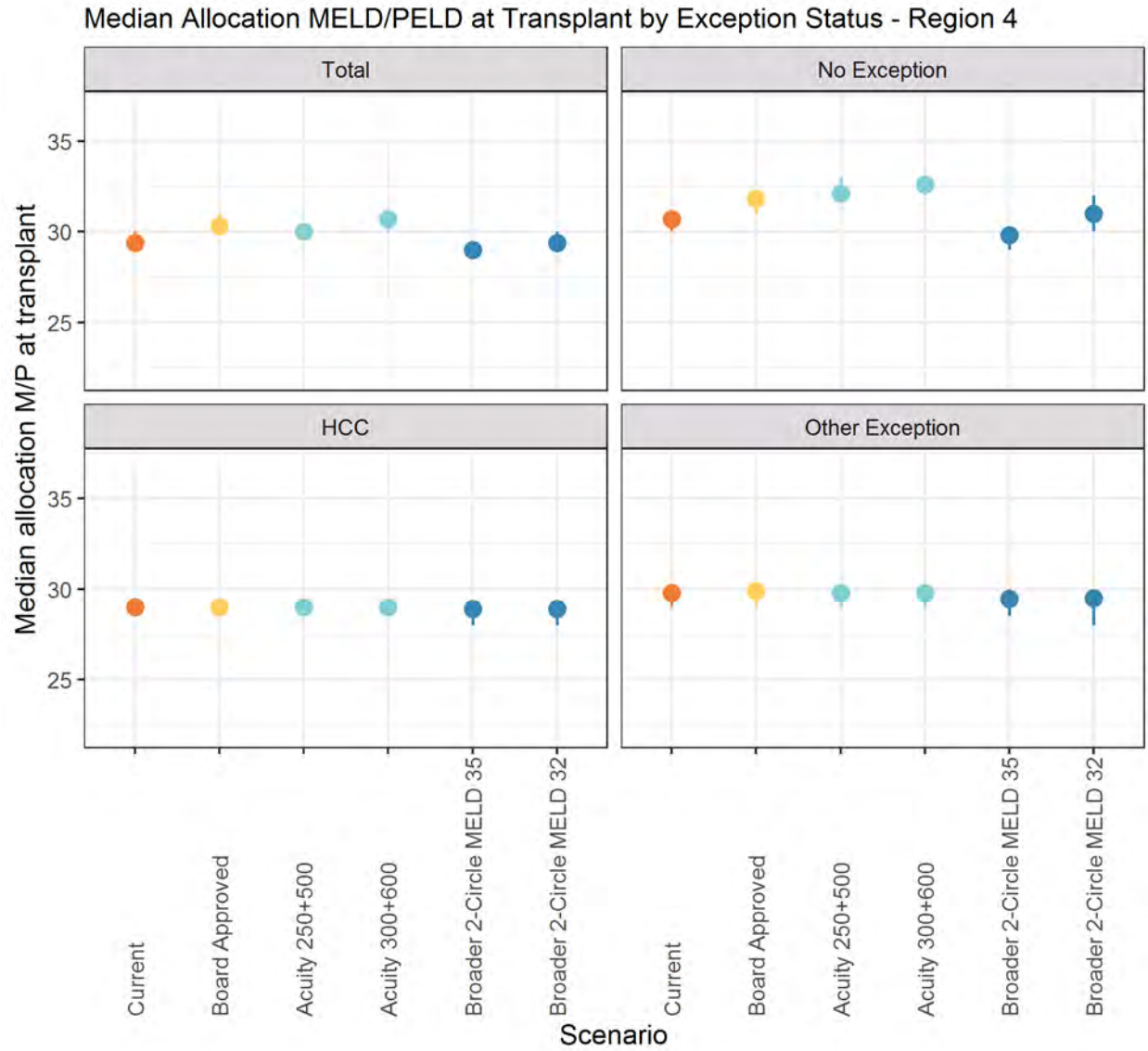


Figure 33 Median Allocation MELD/PELD at Transplant by Exception Status - Region 4

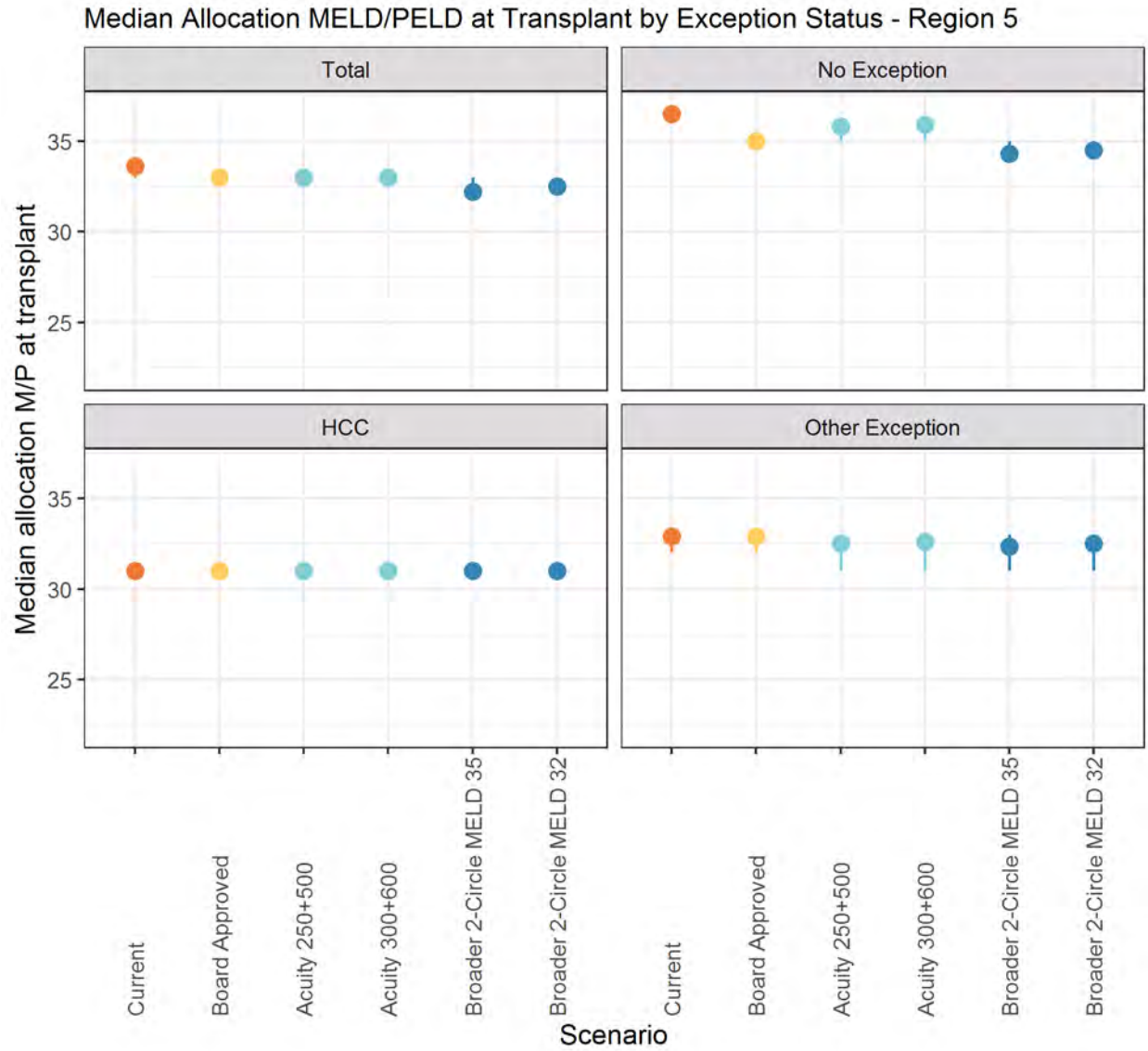


Figure 34 Median Allocation MELD/PELD at Transplant by Exception Status - Region 5

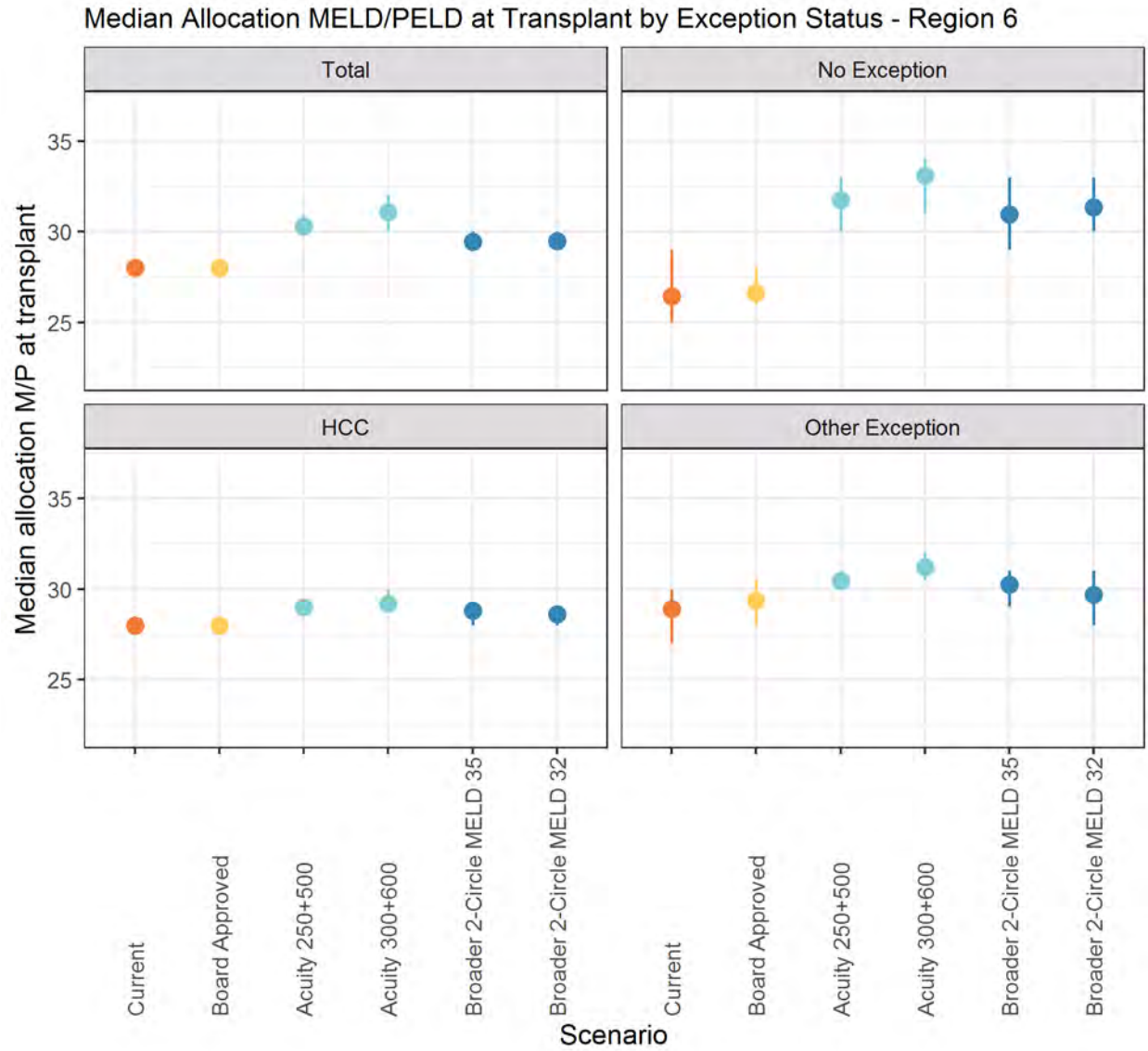


Figure 35 Median Allocation MELD/PELD at Transplant by Exception Status - Region 6

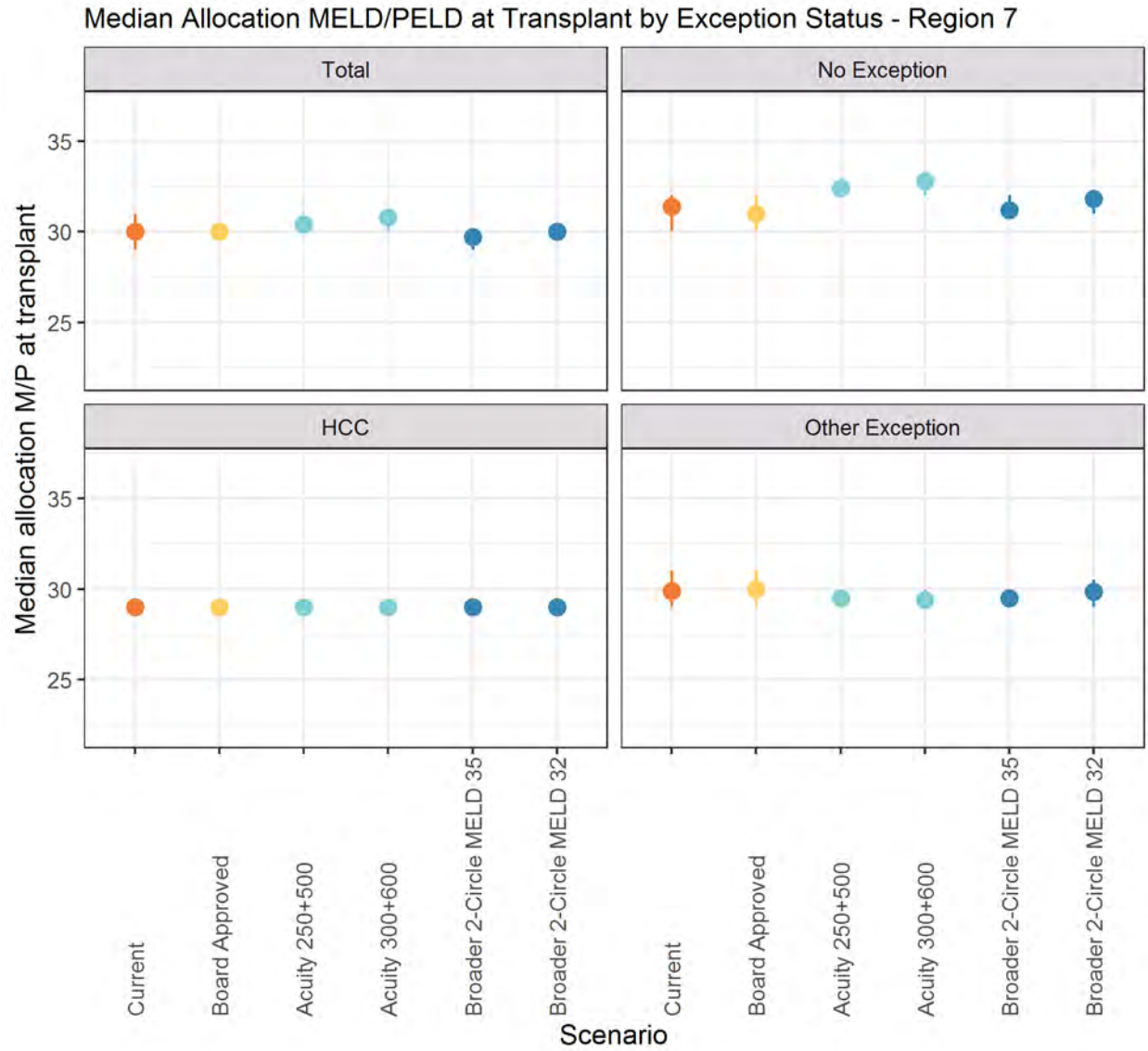


Figure 36 Median Allocation MELD/PELD at Transplant by Exception Status - Region 7

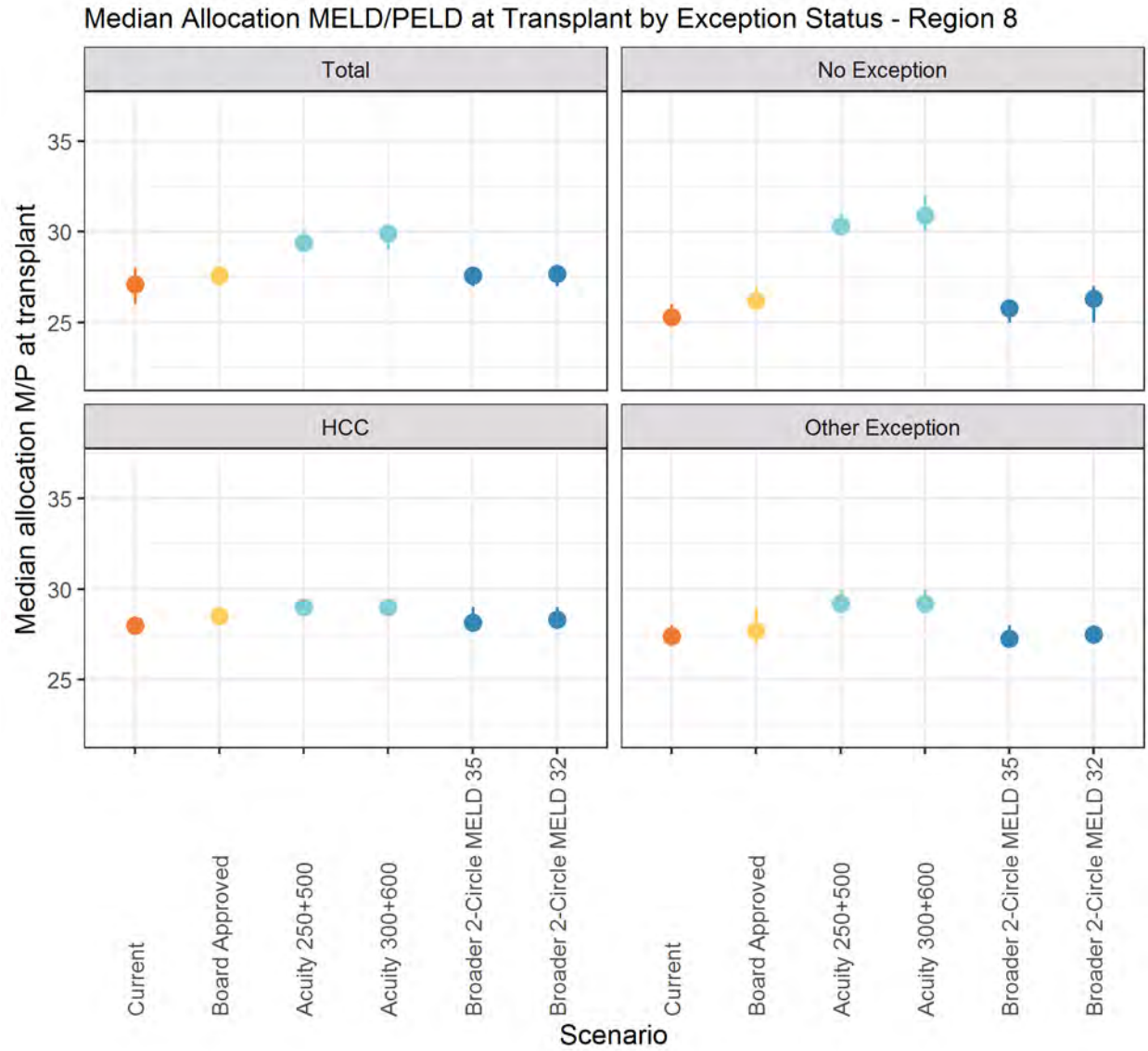


Figure 37 Median Allocation MELD/PELD at Transplant by Exception Status - Region 8

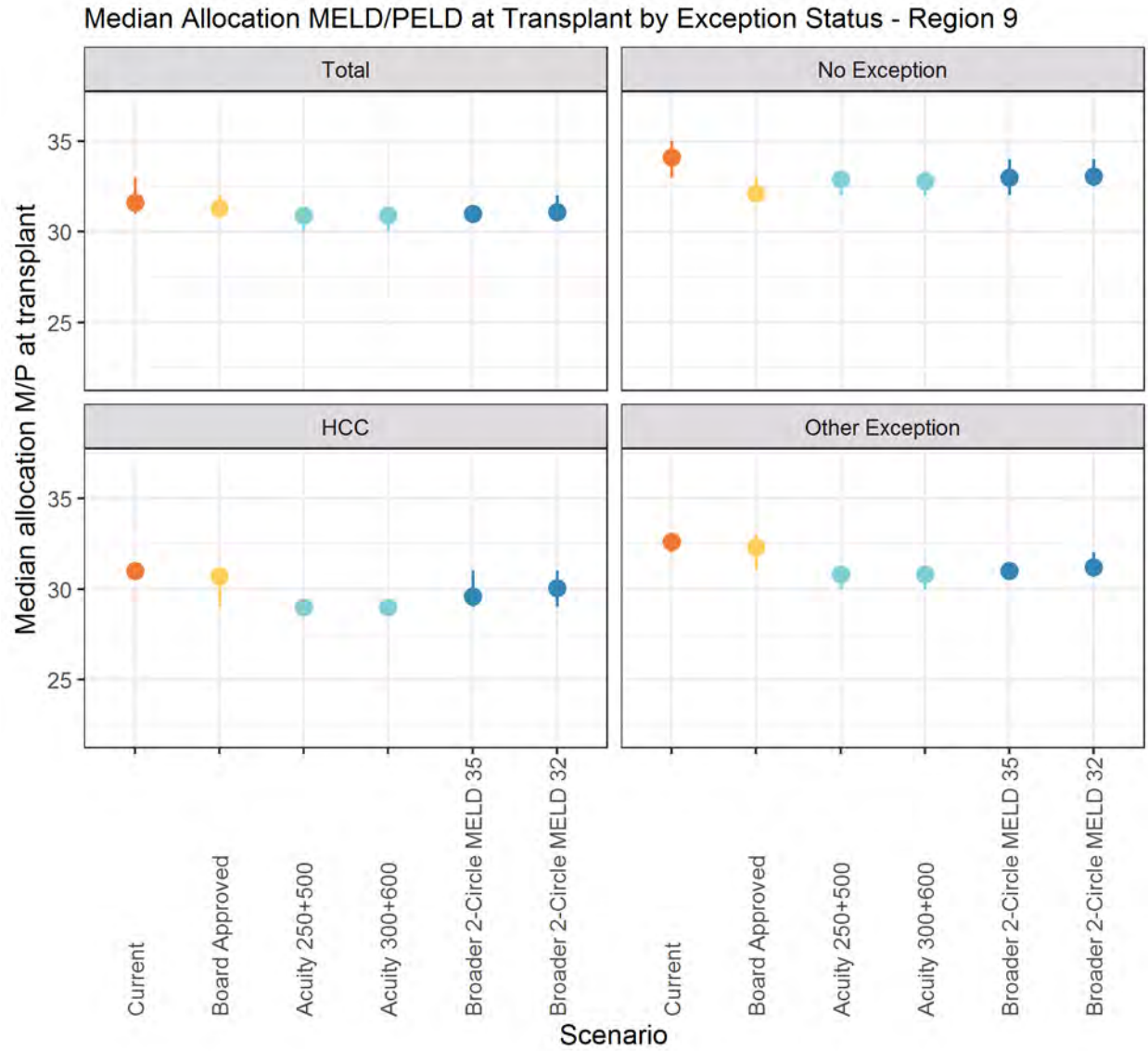


Figure 38 Median Allocation MELD/PELD at Transplant by Exception Status - Region 9

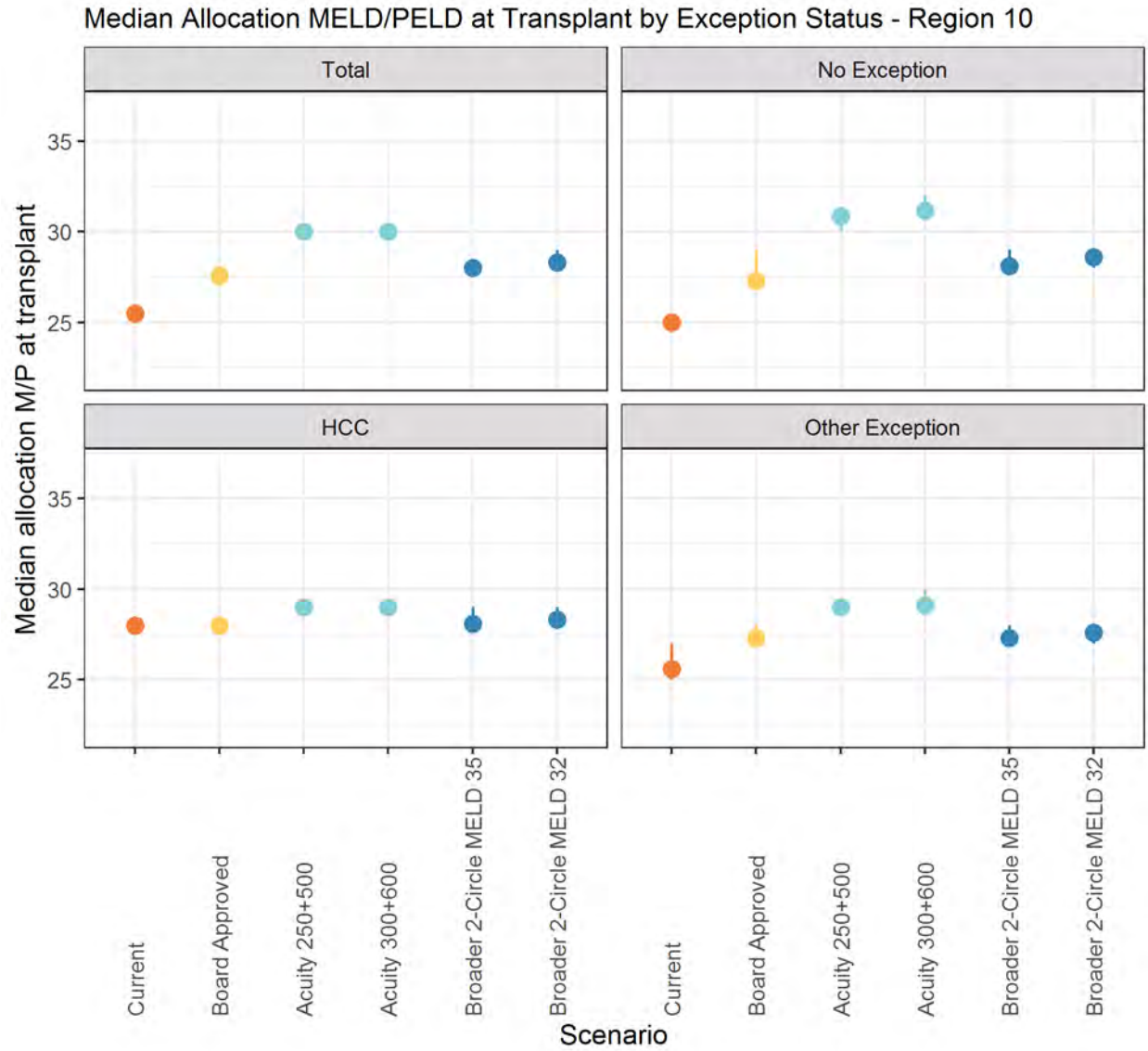


Figure 39 Median Allocation MELD/PELD at Transplant by Exception Status - Region 10

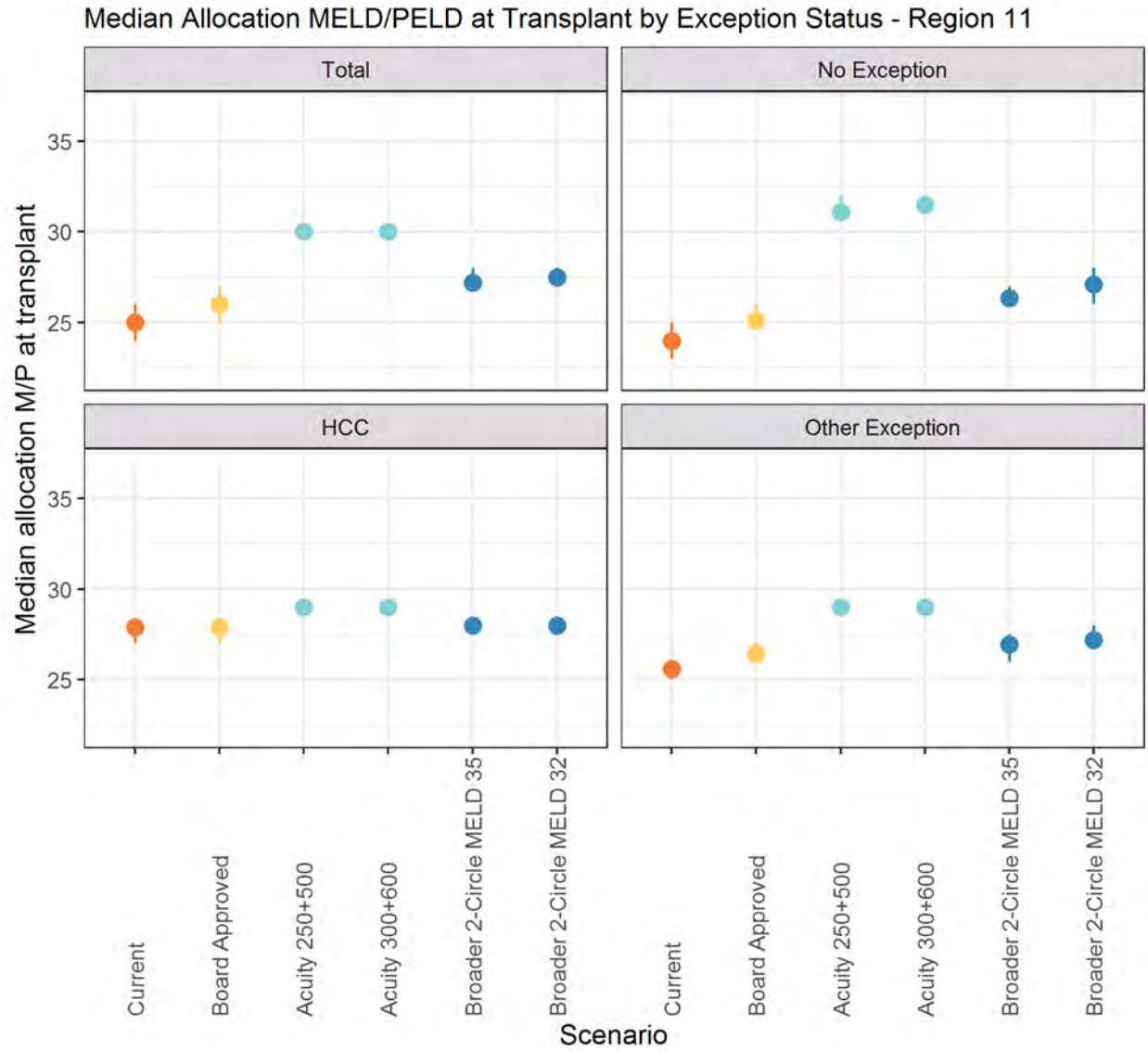


Figure 40 Median Allocation MELD/PELD at Transplant by Exception Status - Region 11

Transplant

Transplant Rates by Exception Status

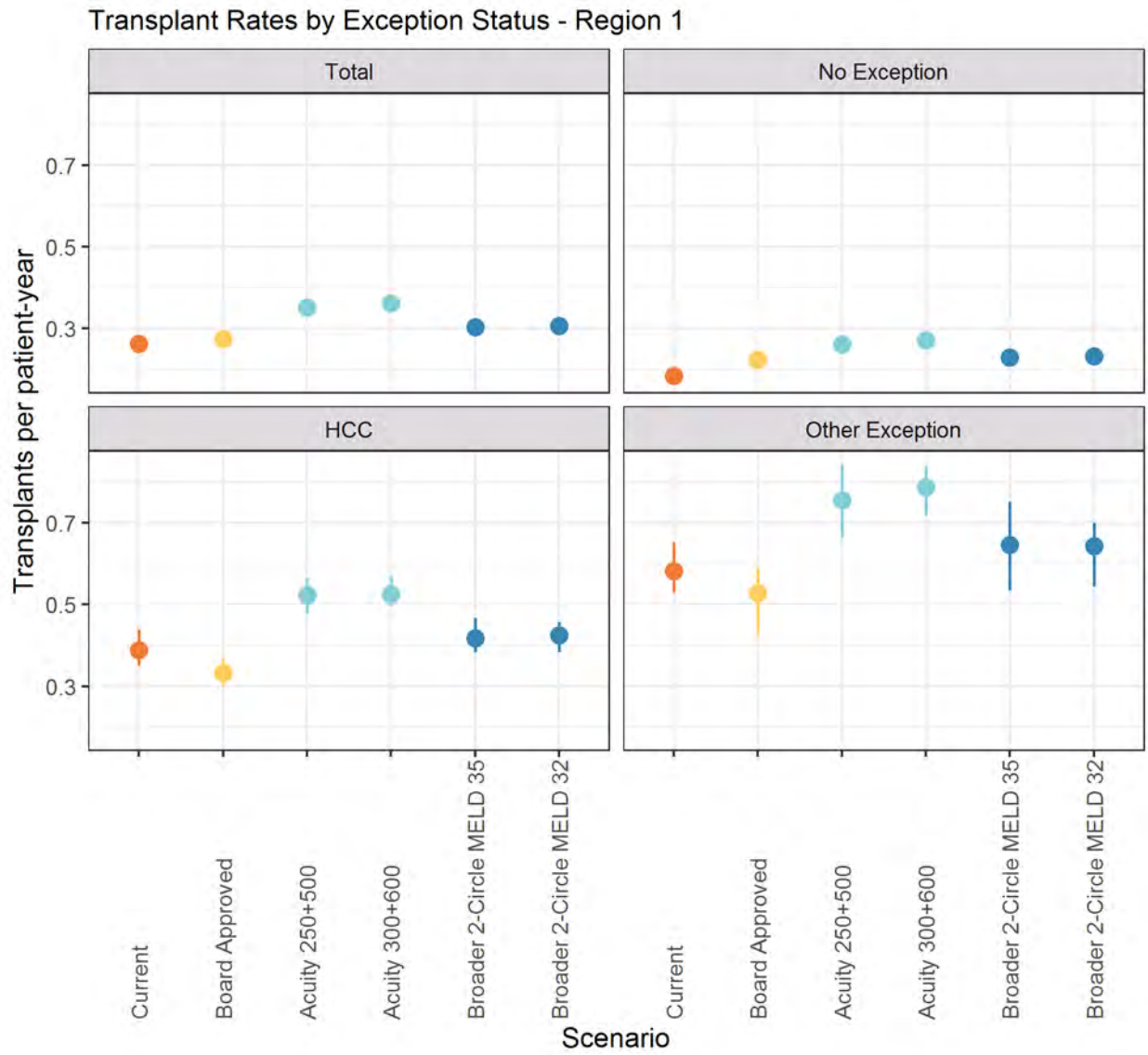


Figure 41 Transplant Rates by Exception Status - Region 1

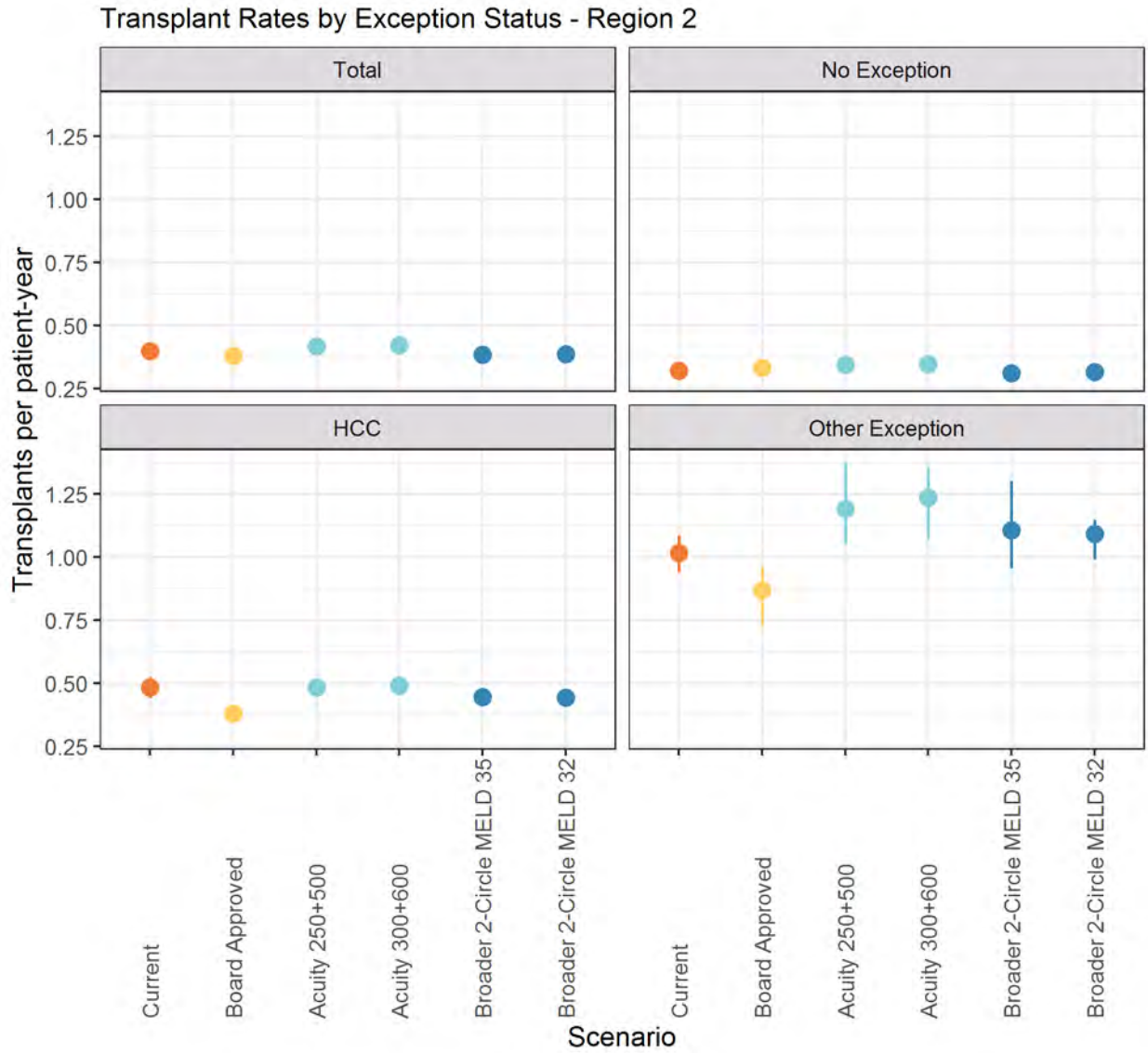


Figure 42 Transplant Rates by Exception Status - Region 2

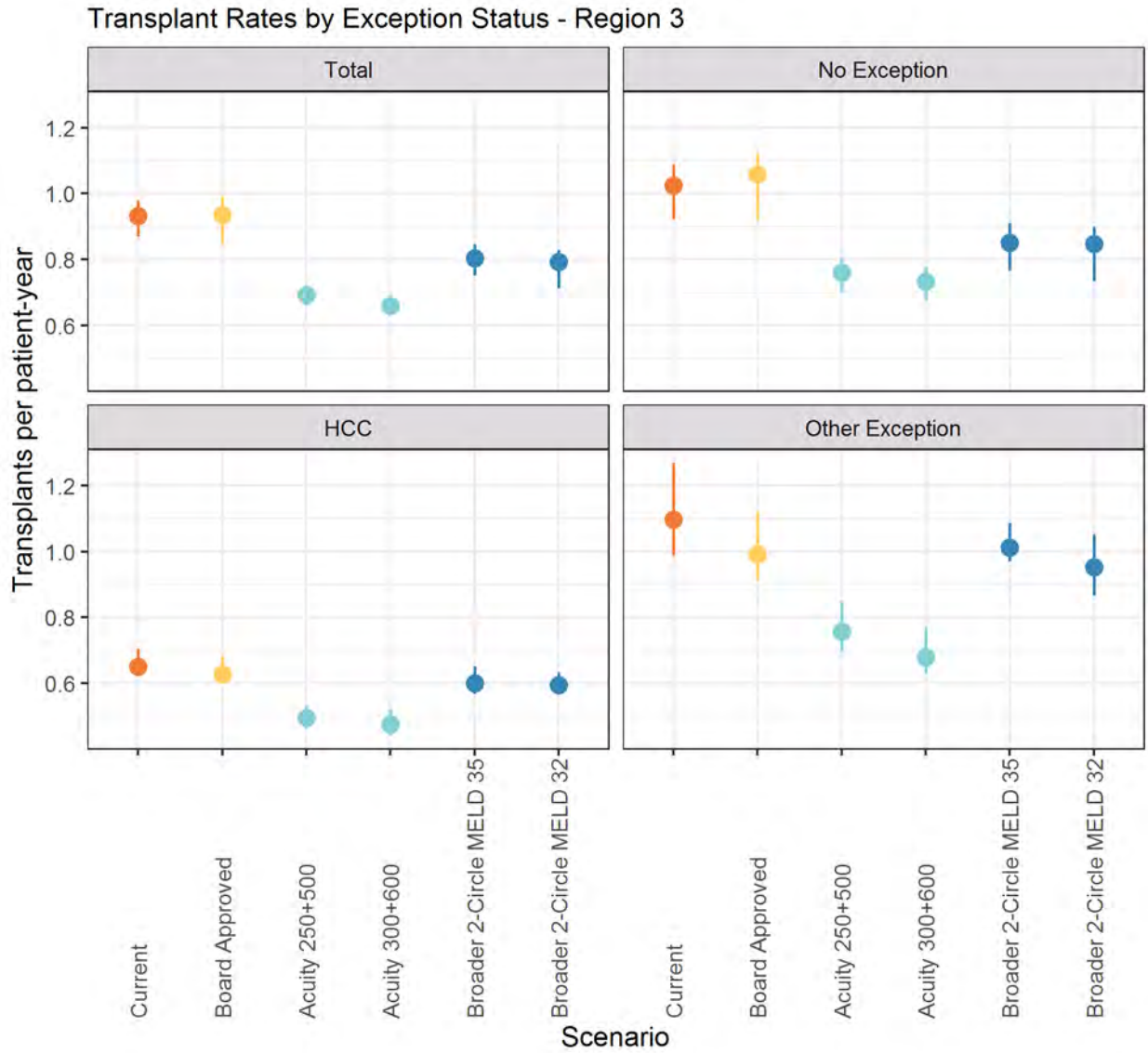


Figure 43 Transplant Rates by Exception Status - Region 3

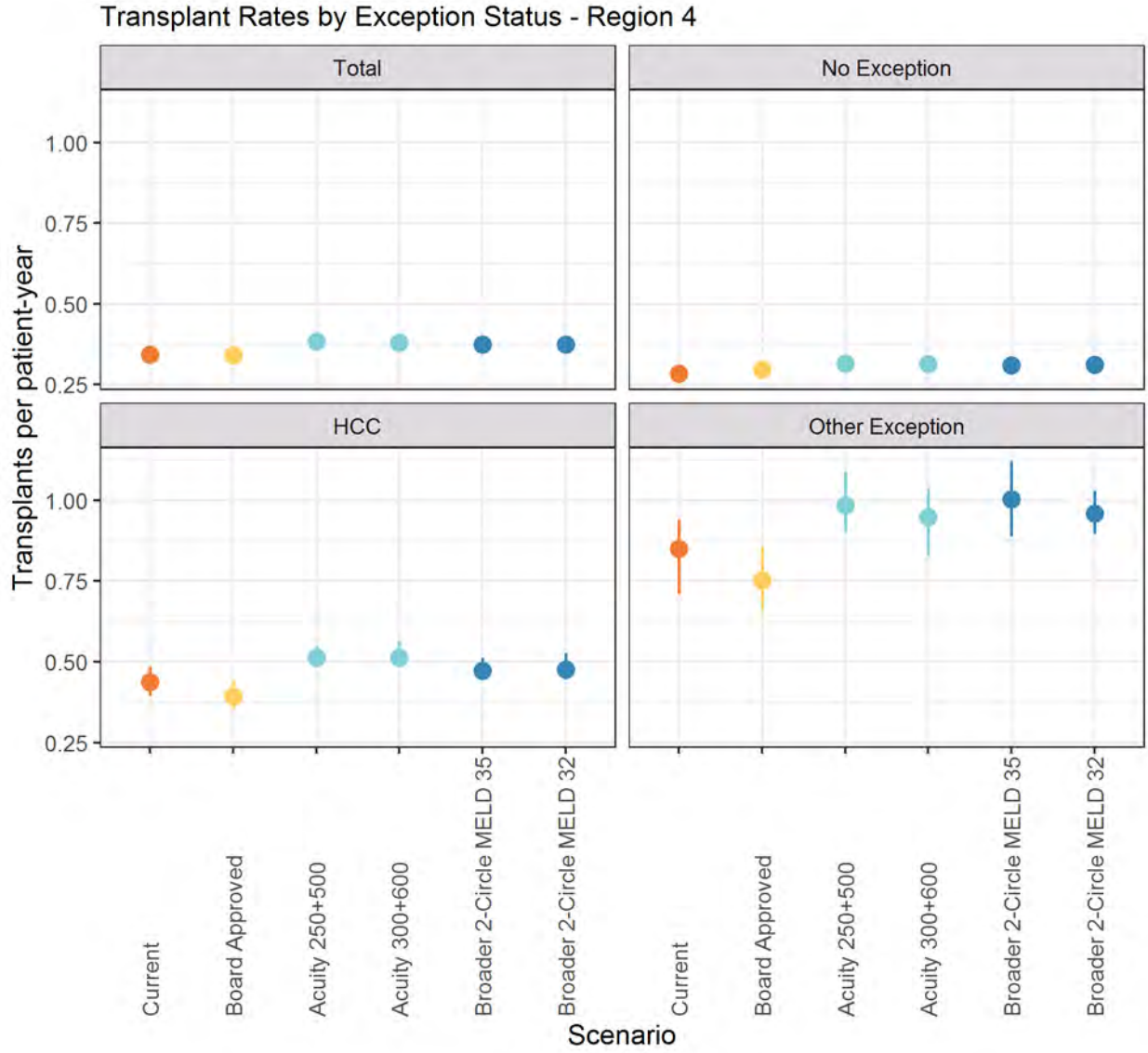


Figure 44 Transplant Rates by Exception Status - Region 4

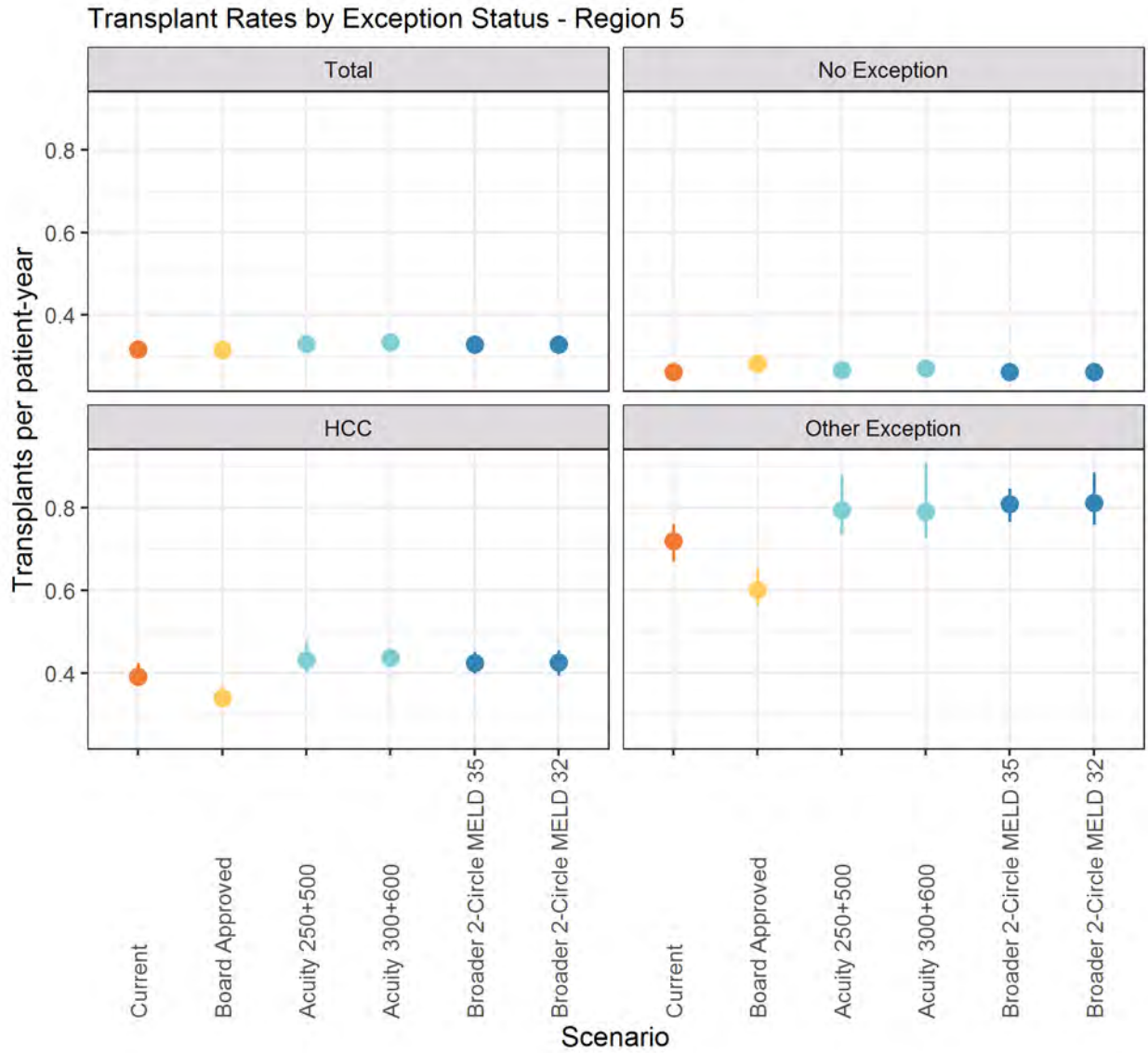


Figure 45 Transplant Rates by Exception Status - Region 5

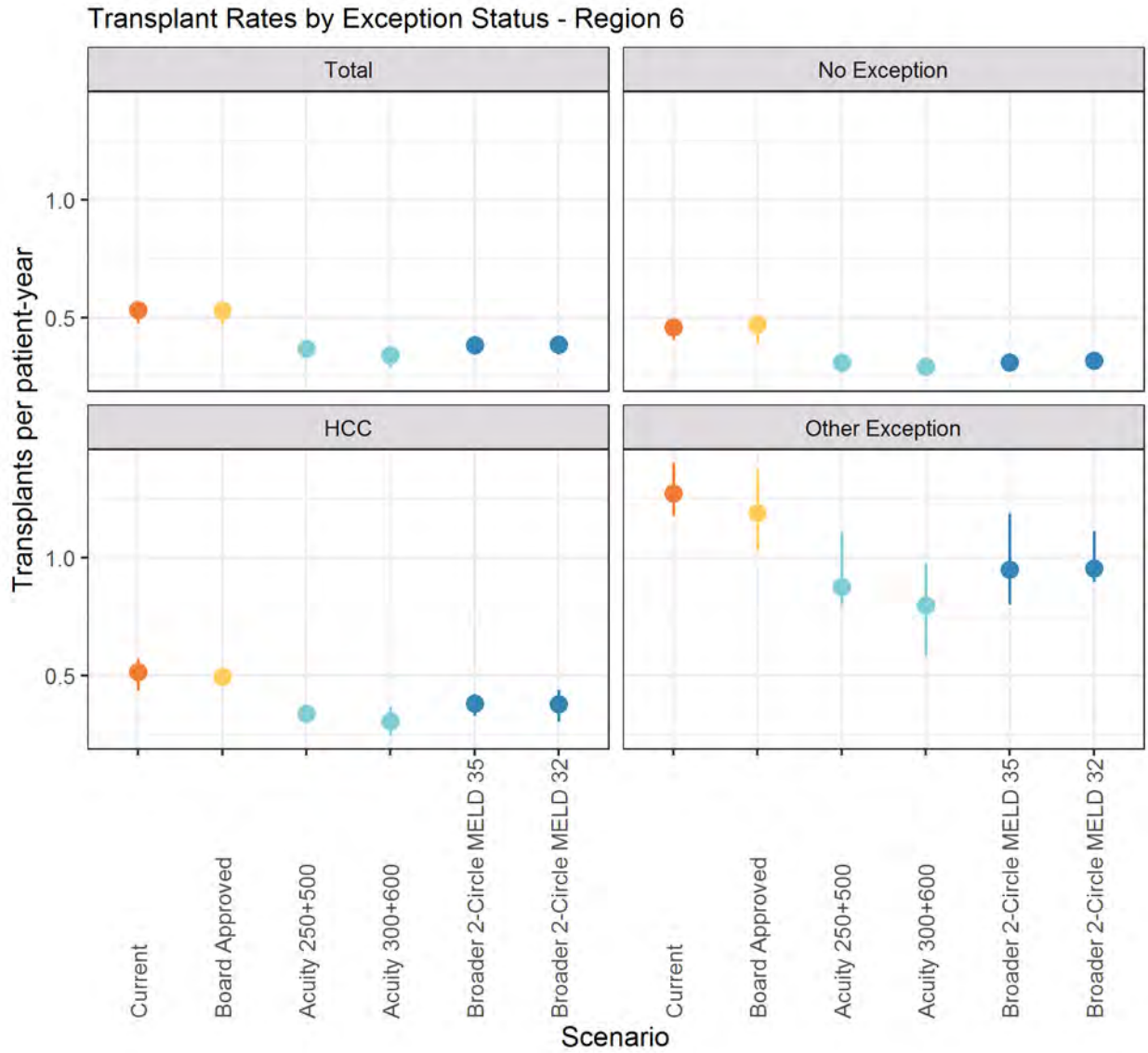


Figure 46 Transplant Rates by Exception Status - Region 6

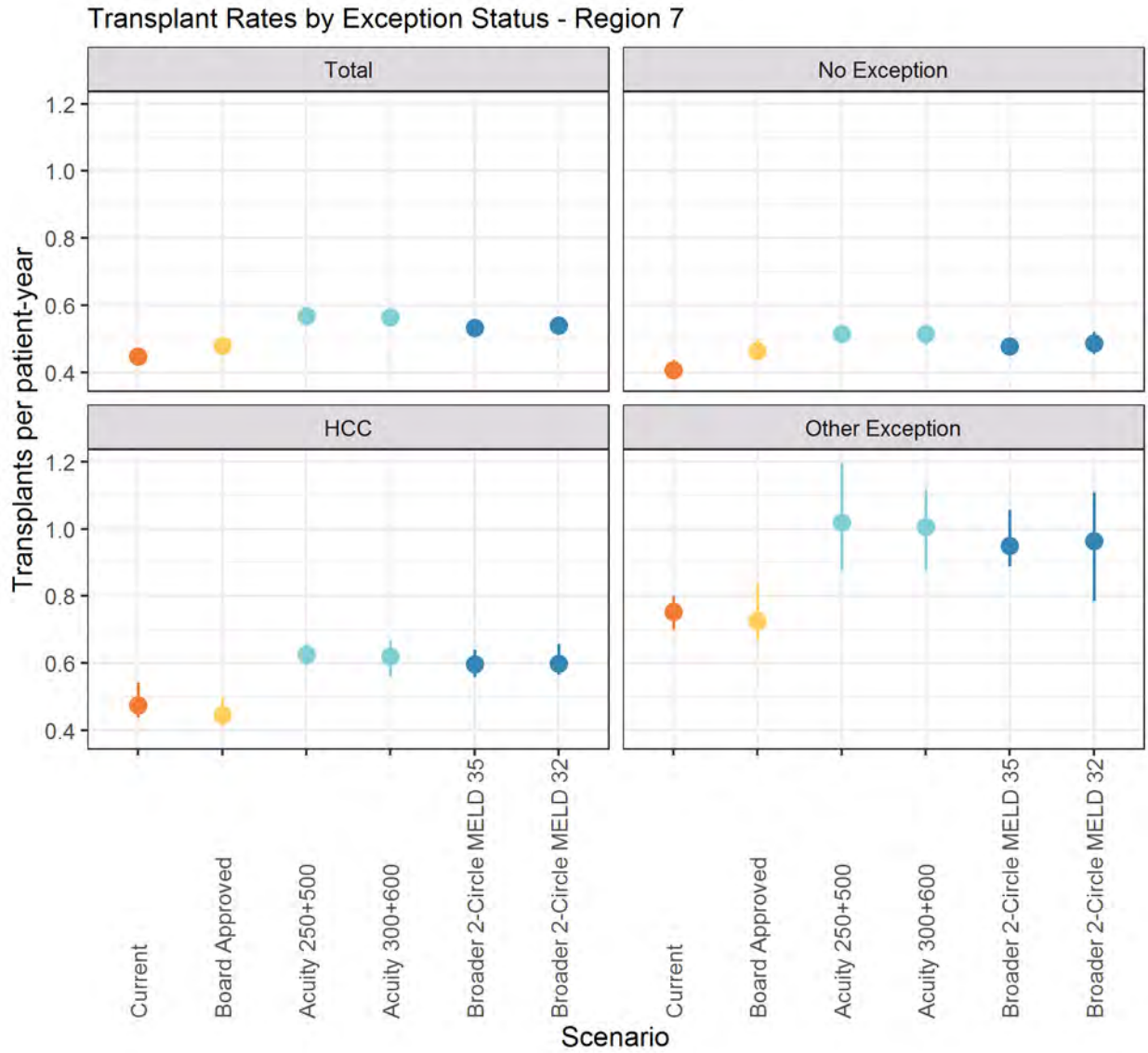


Figure 47 Transplant Rates by Exception Status - Region 7

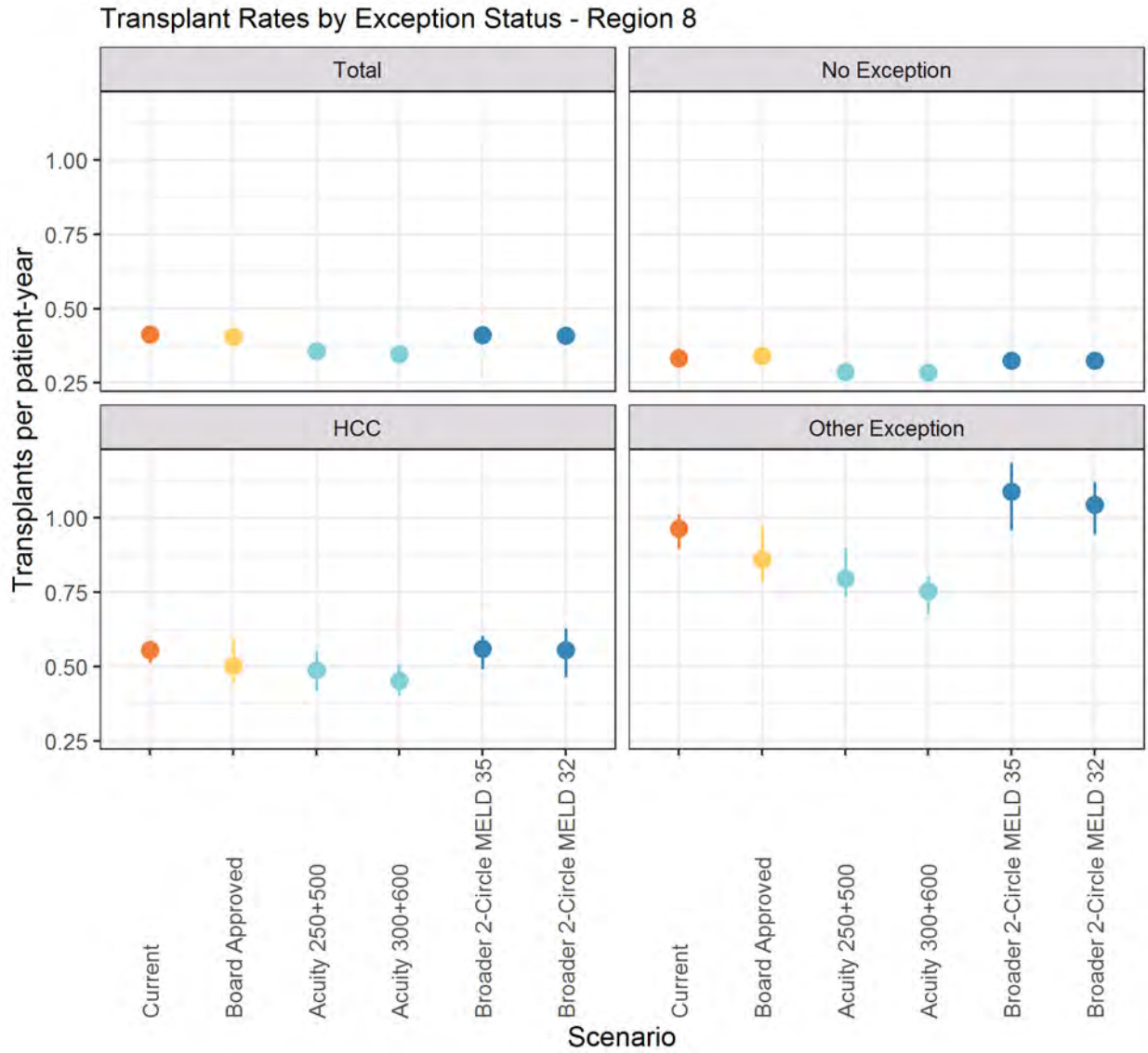


Figure 48 Transplant Rates by Exception Status - Region 8

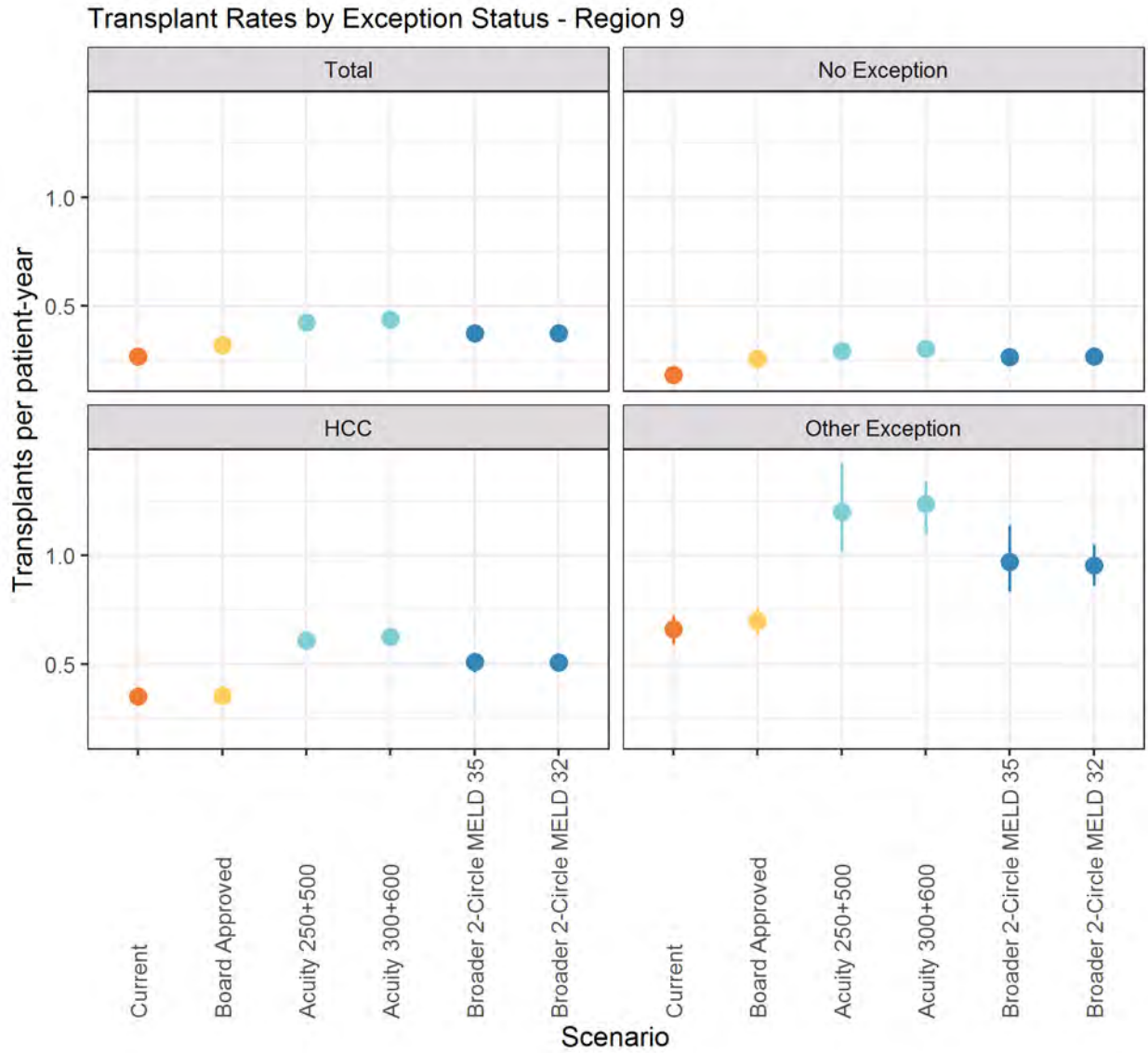


Figure 49 Transplant Rates by Exception Status - Region 9

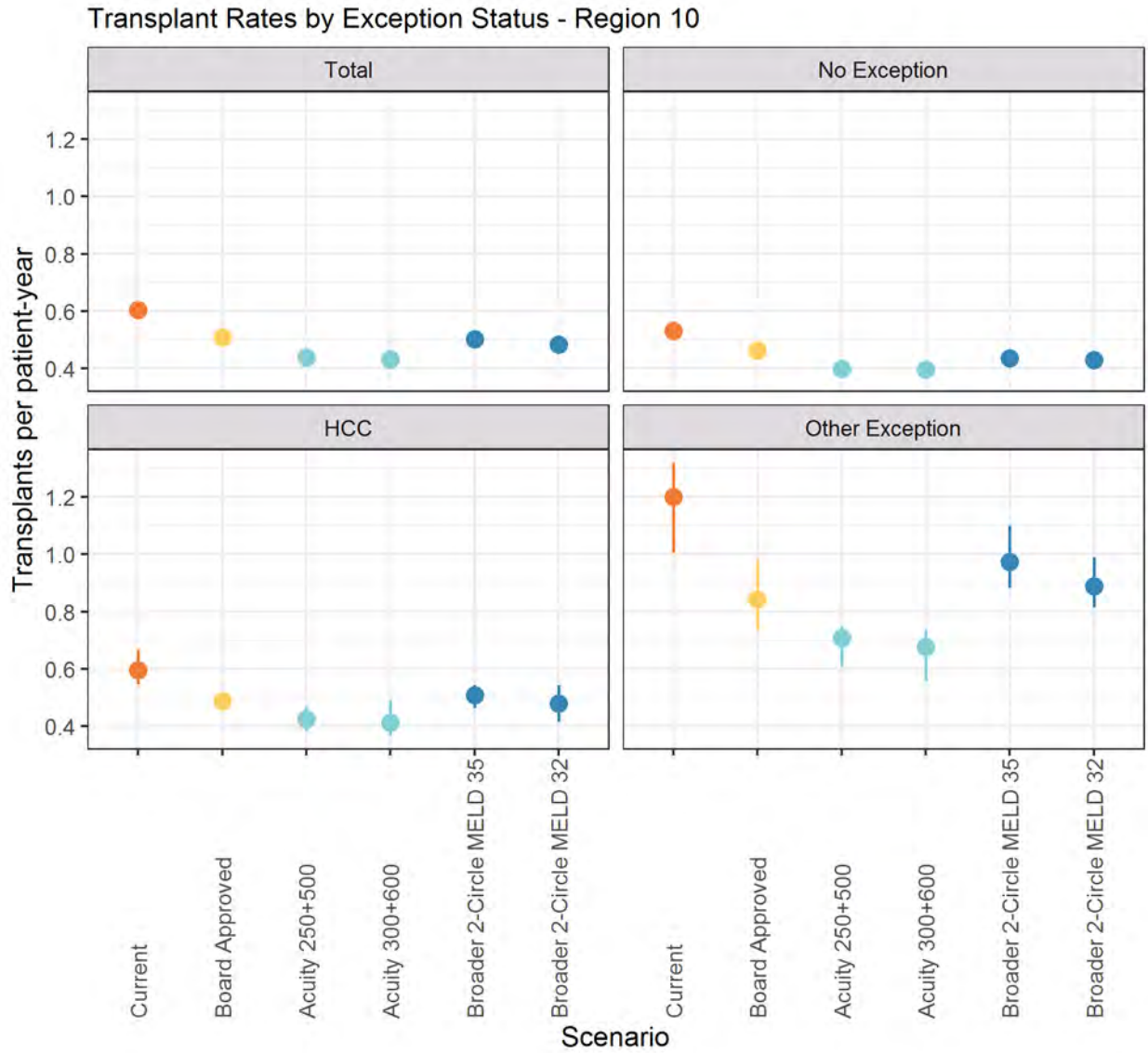


Figure 50 Transplant Rates by Exception Status - Region 10

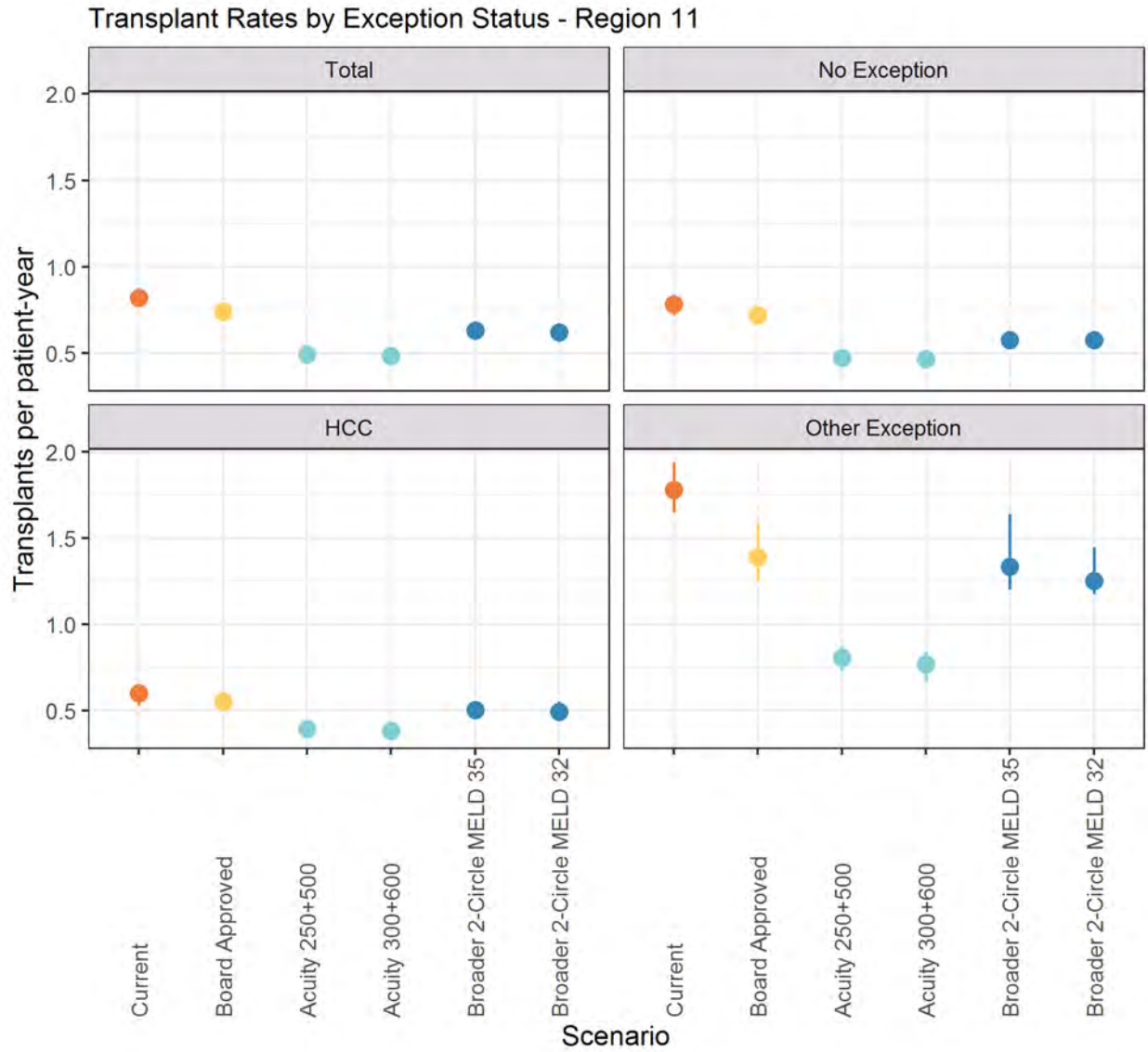


Figure 51 Transplant Rates by Exception Status - Region 11

Transplant Counts by Exception Status

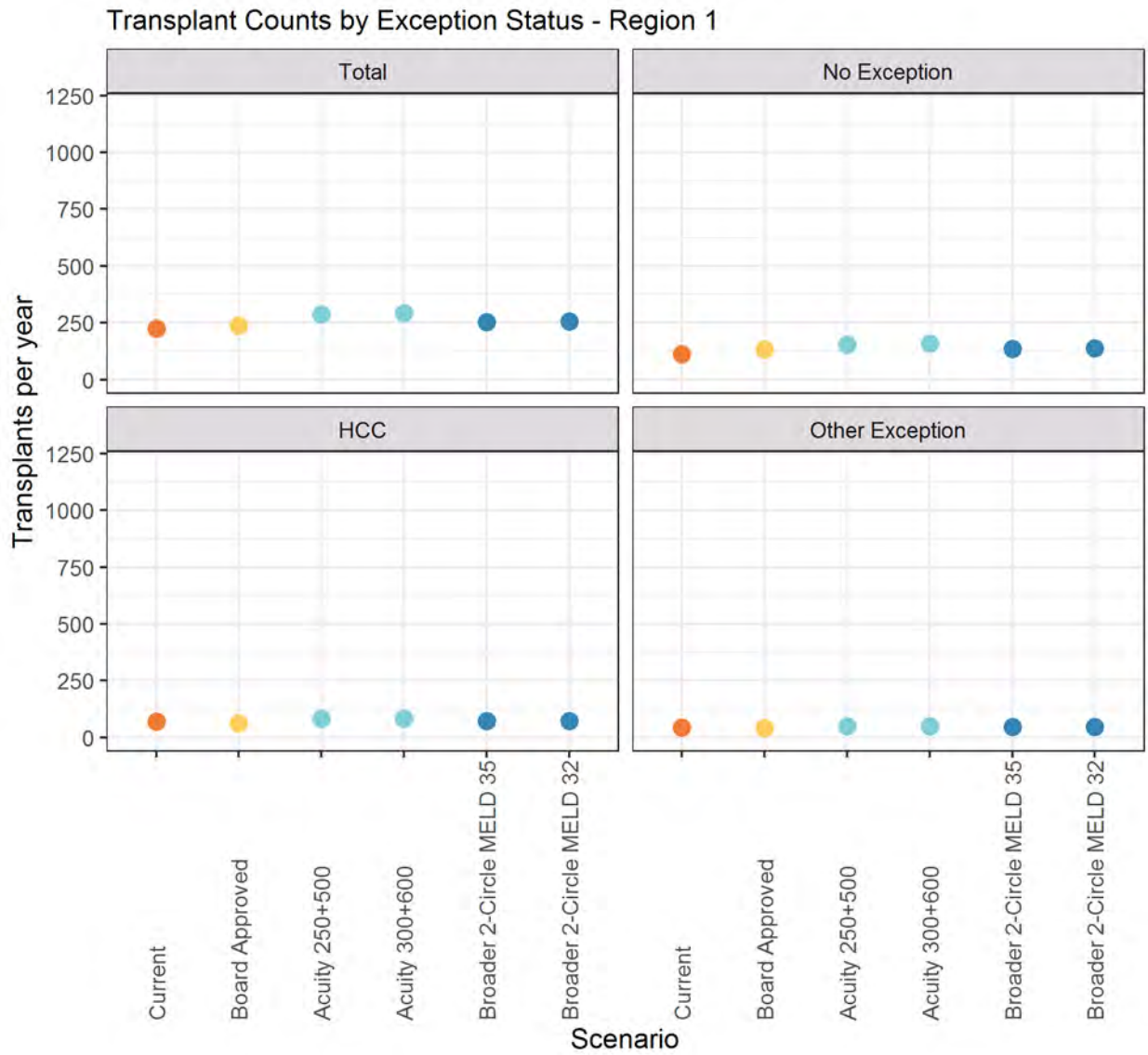


Figure 52 Transplant Counts by Exception Status - Region 1

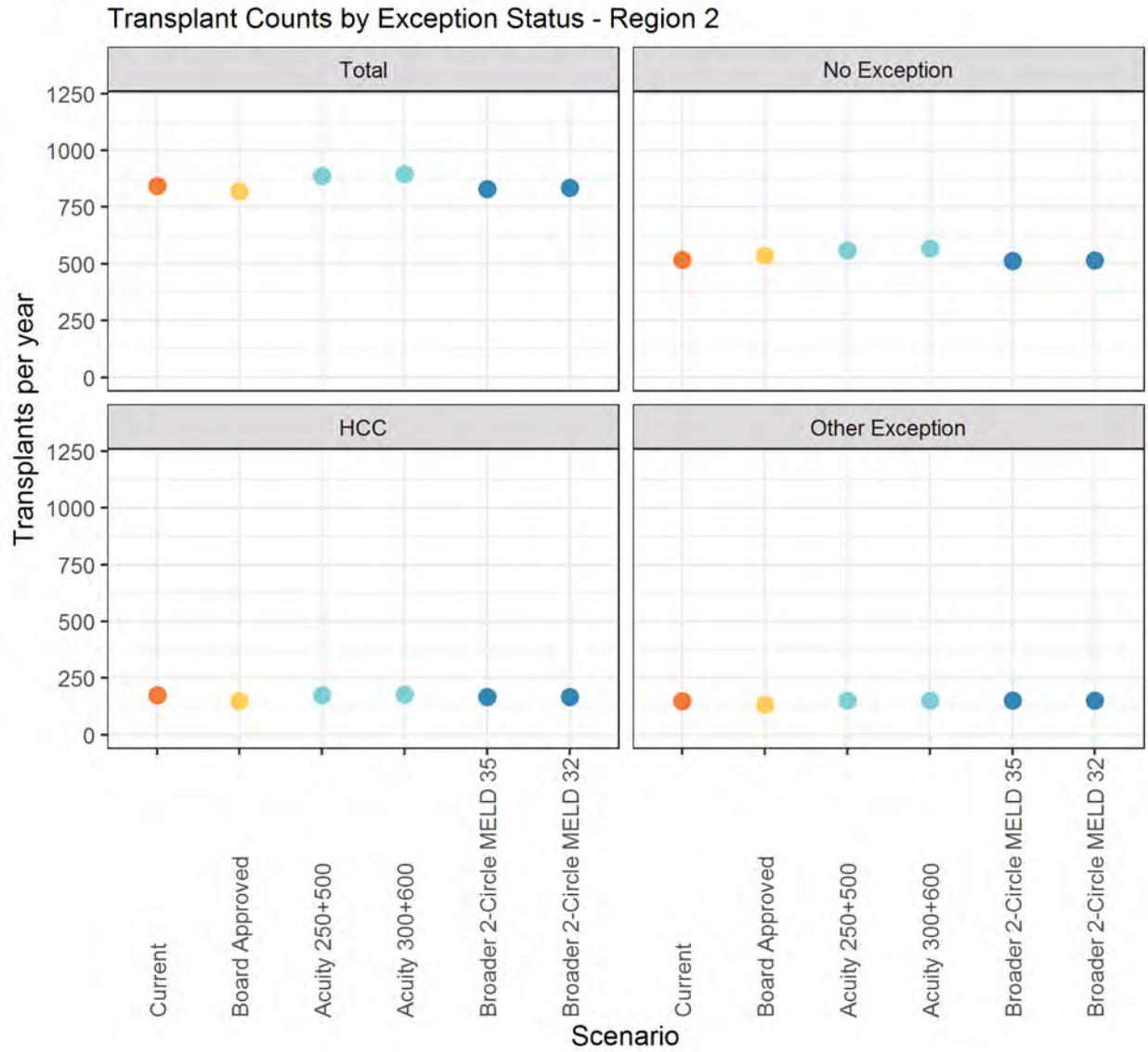


Figure 53 Transplant Counts by Exception Status - Region 2

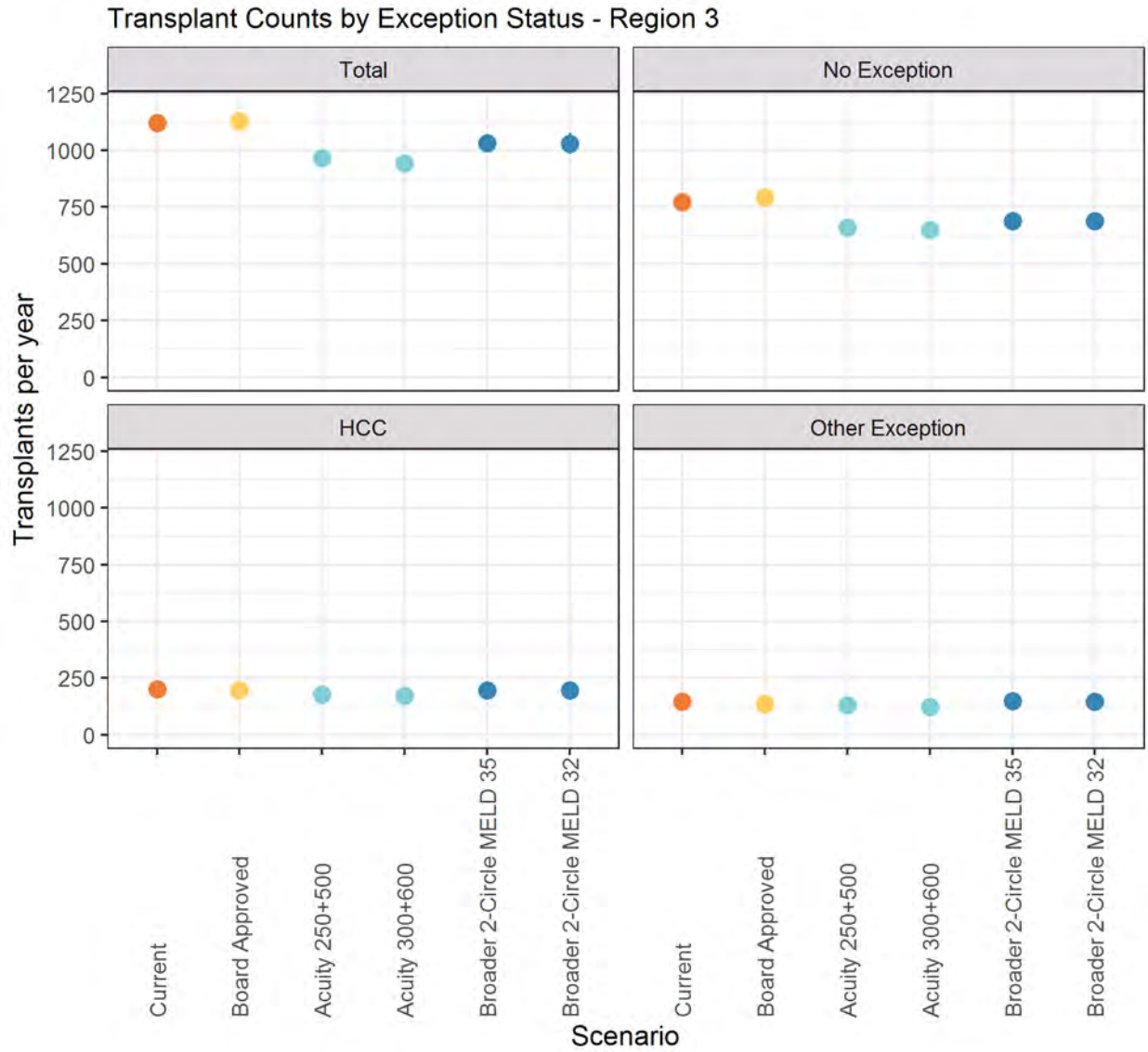


Figure 54 Transplant Counts by Exception Status - Region 3

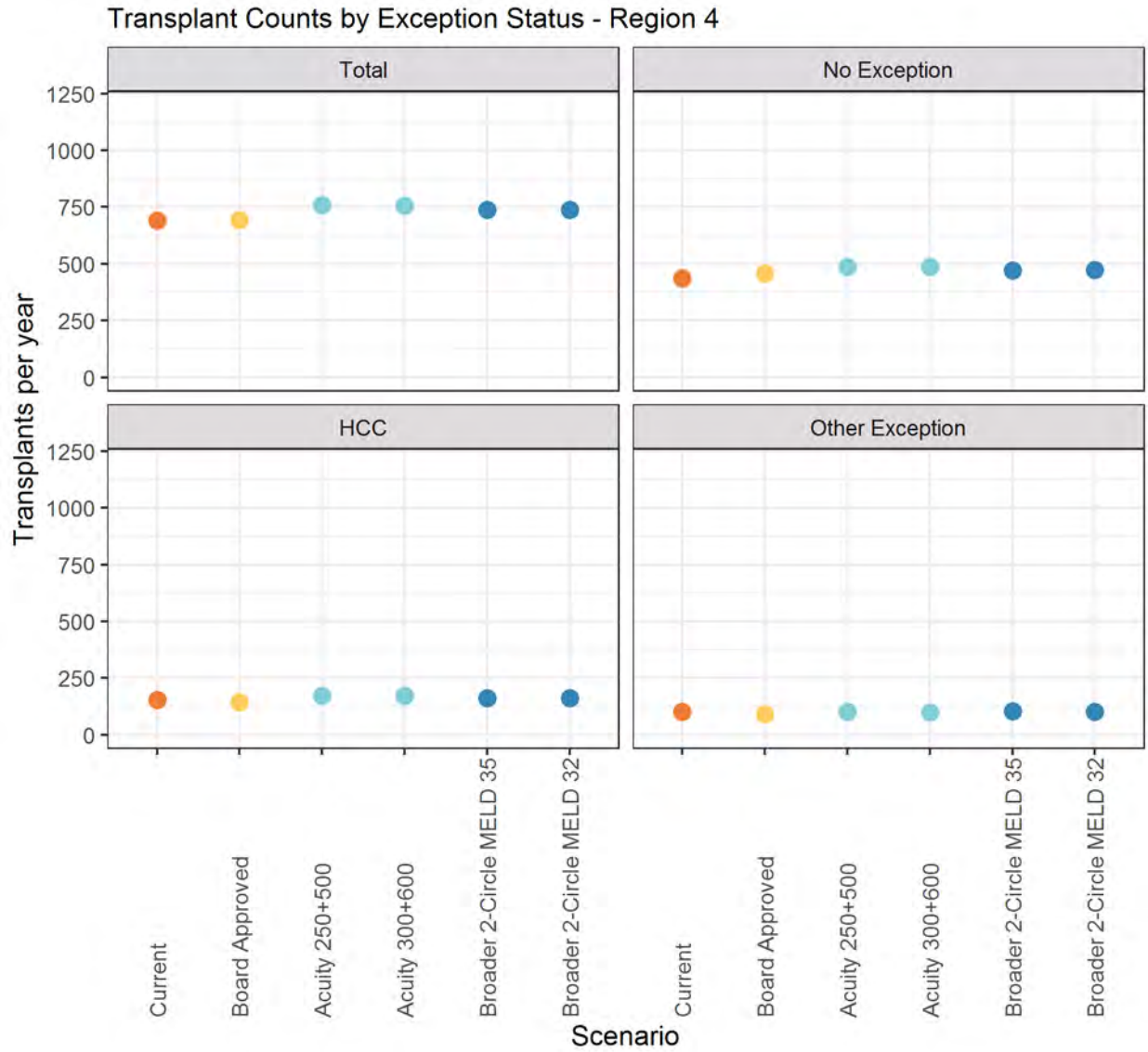


Figure 55 Transplant Counts by Exception Status - Region 4

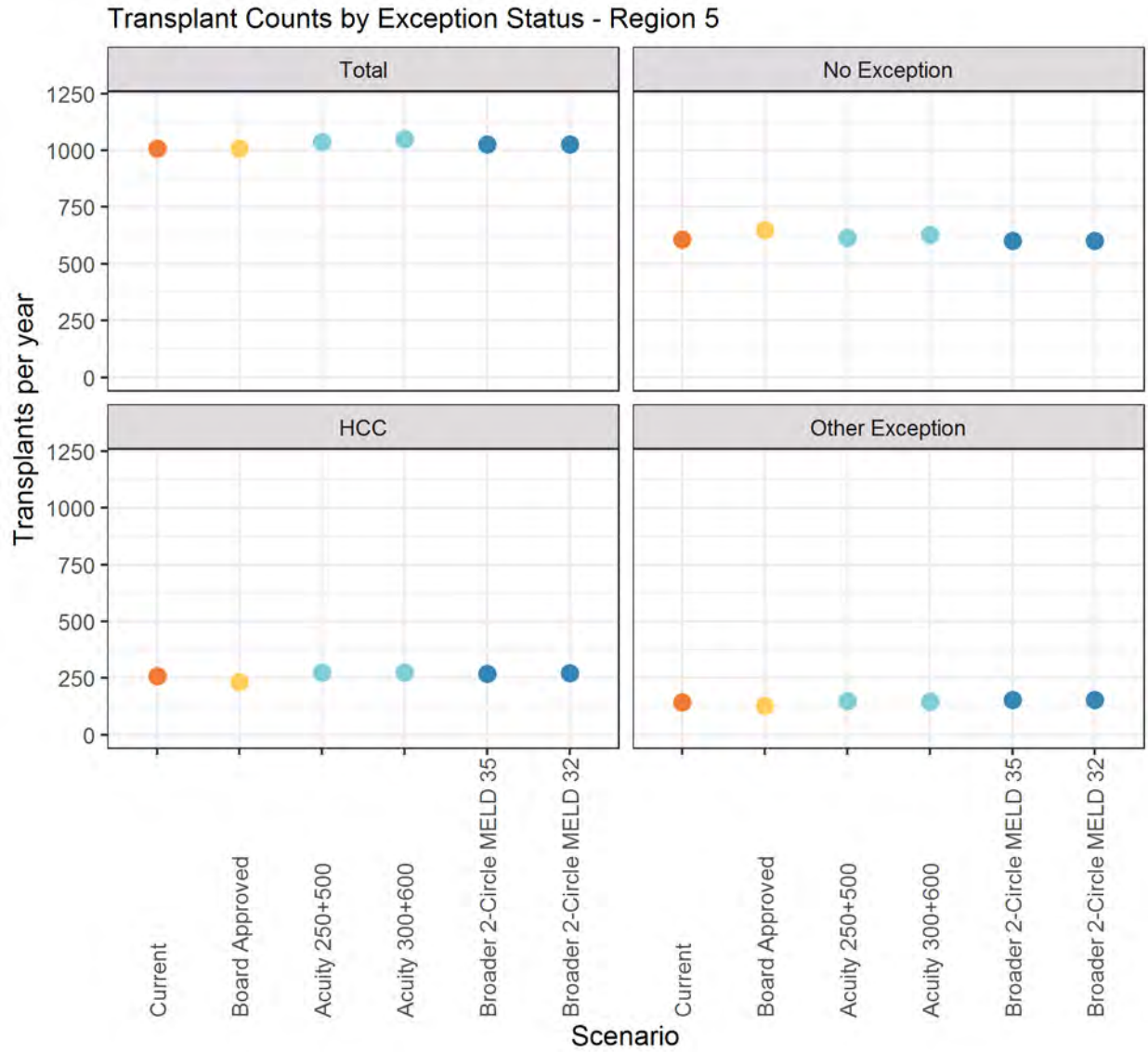


Figure 56 Transplant Counts by Exception Status - Region 5

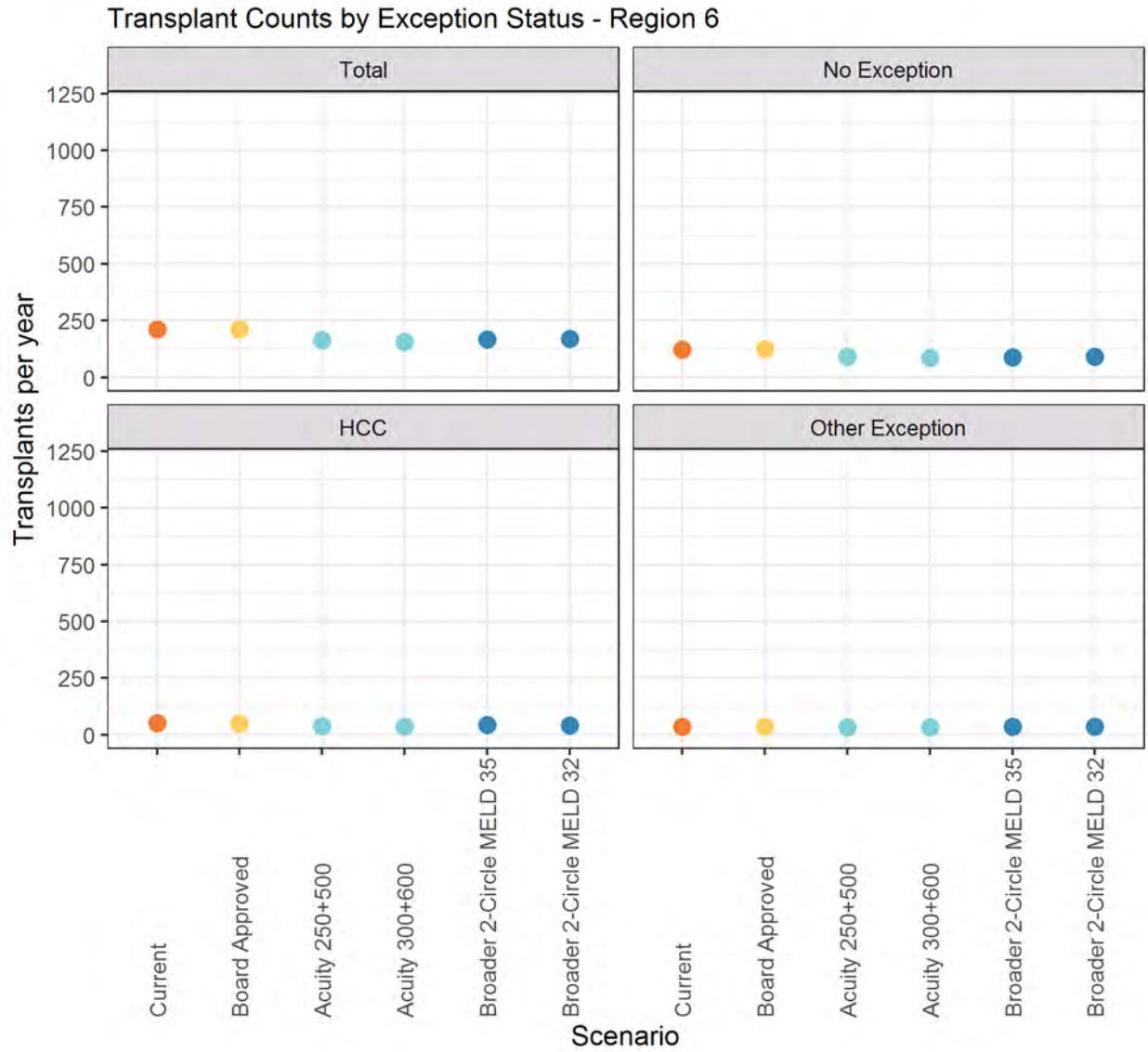


Figure 57 Transplant Counts by Exception Status - Region 6

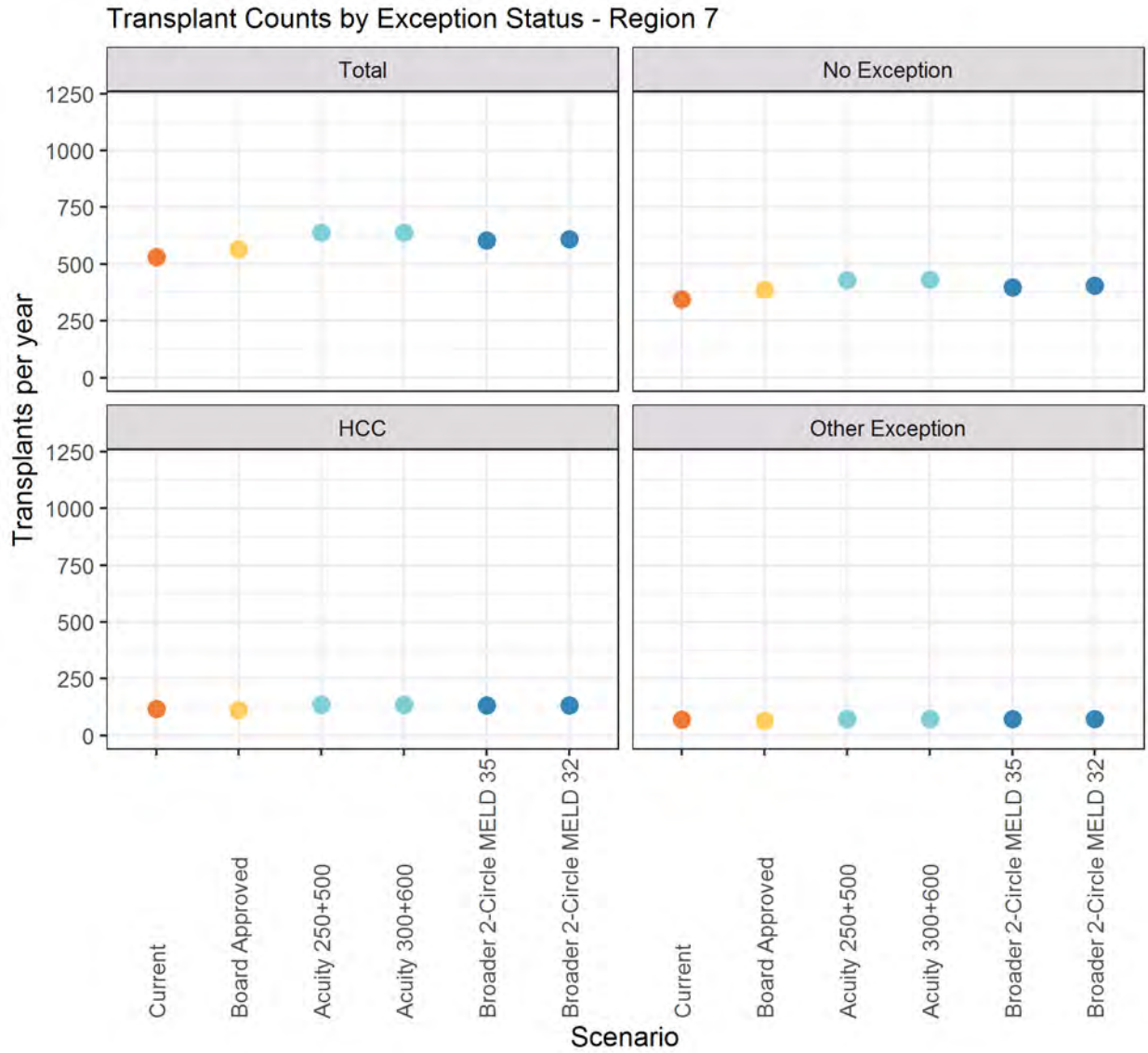


Figure 58 Transplant Counts by Exception Status - Region 7

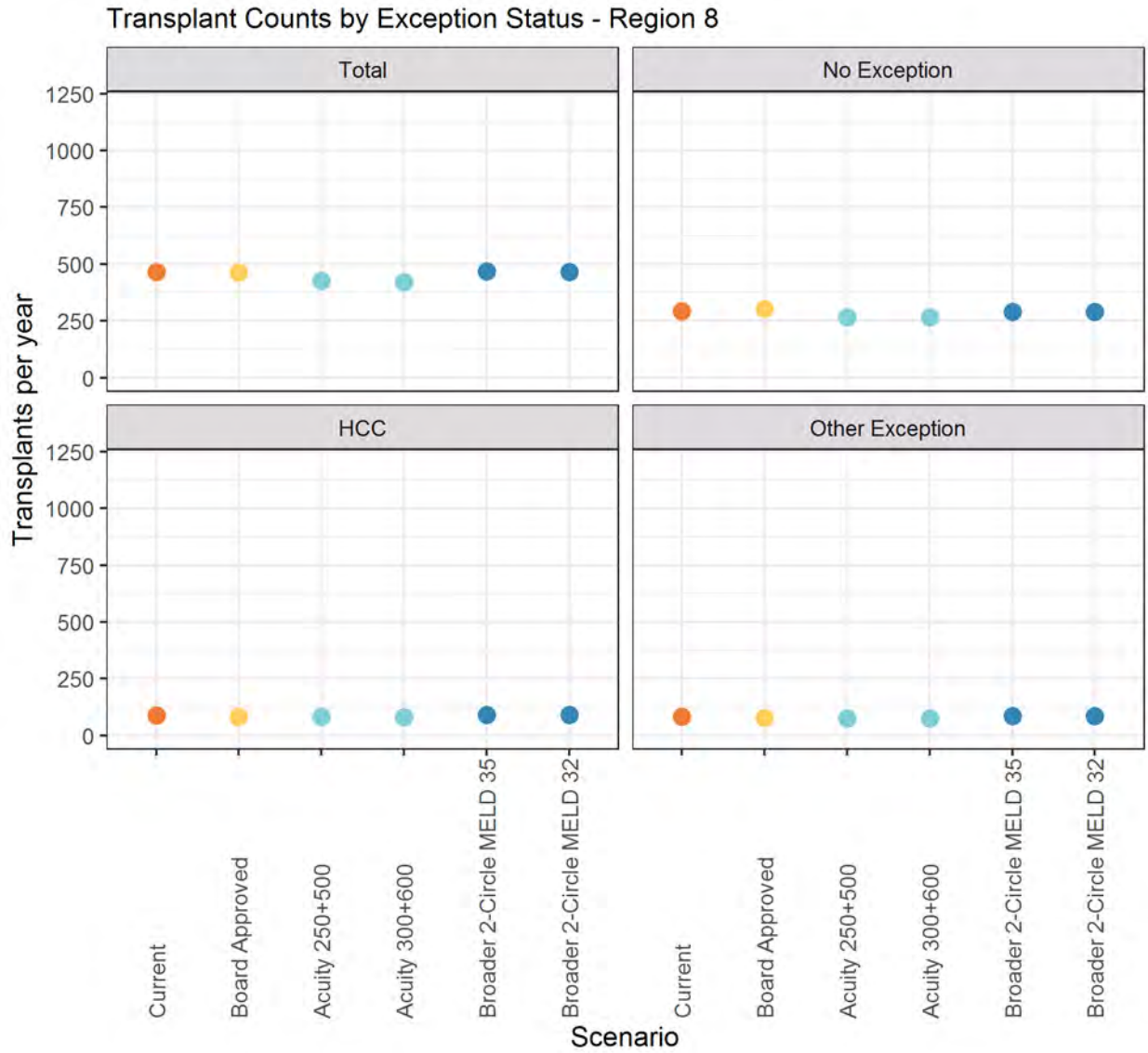


Figure 59 Transplant Counts by Exception Status - Region 8

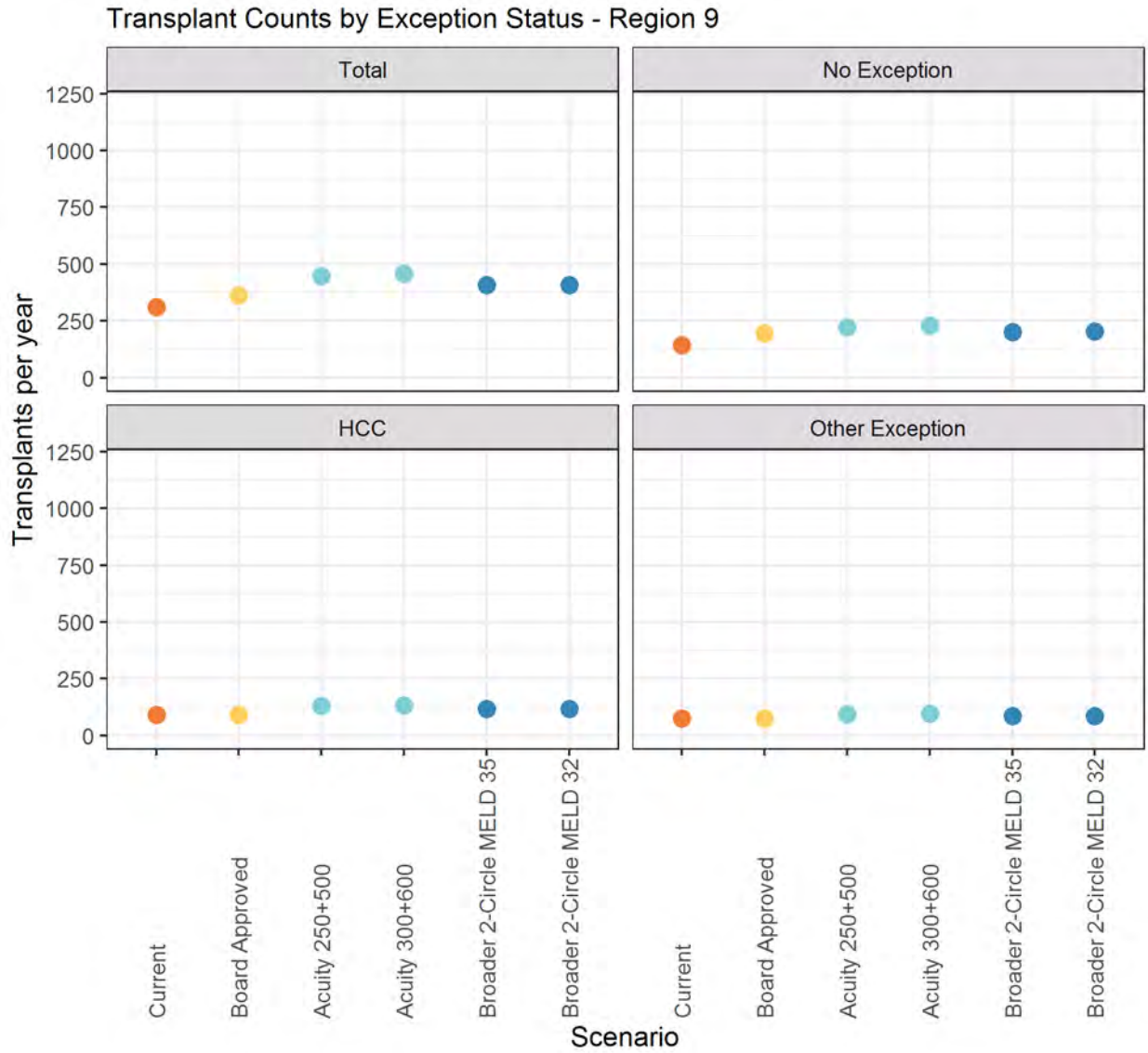


Figure 60 Transplant Counts by Exception Status - Region 9

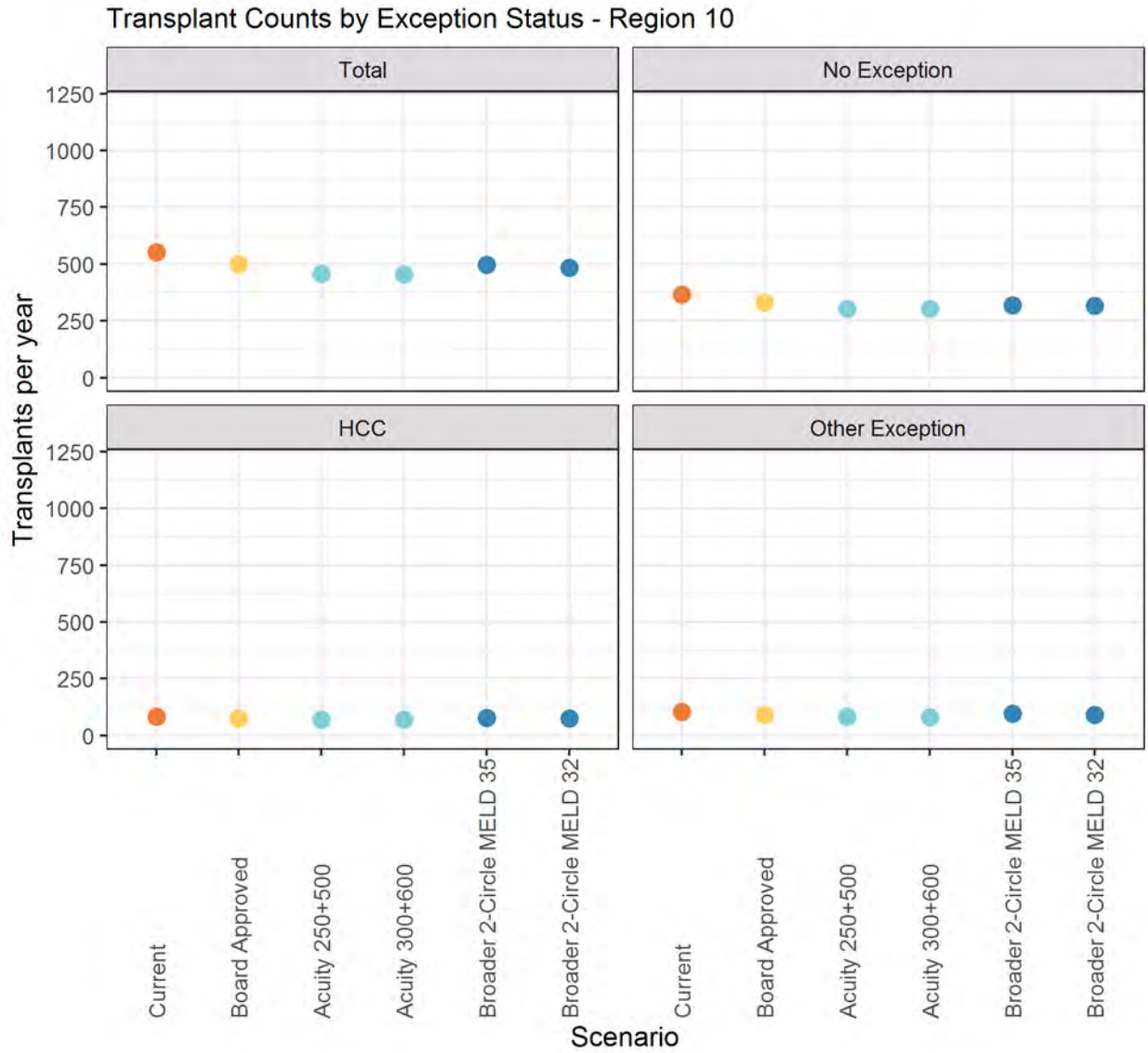


Figure 61 Transplant Counts by Exception Status - Region 10

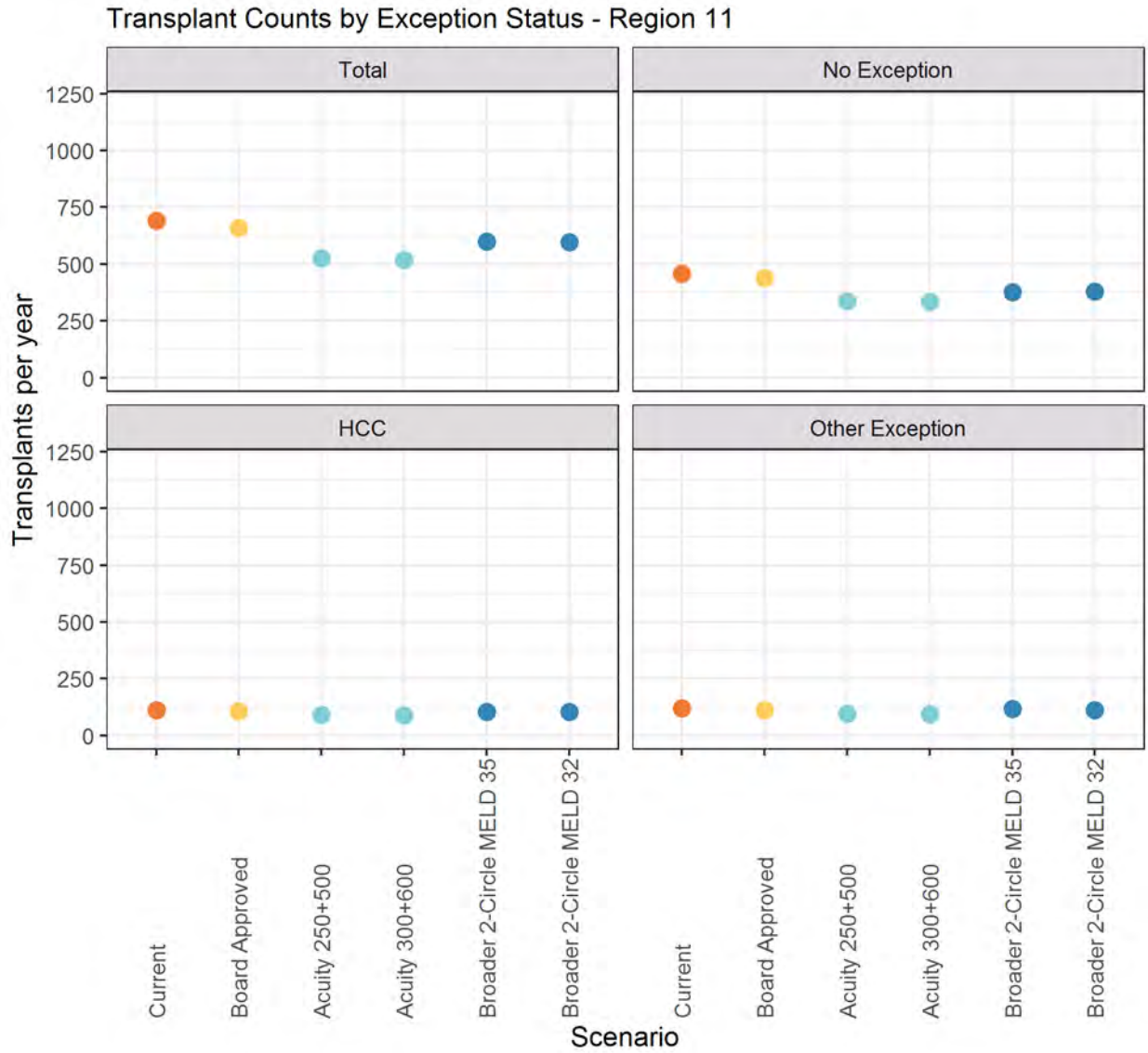


Figure 62 Transplant Counts by Exception Status - Region 11

Transplant Rates by Allocation MELD/PELD

Transplant Rates by Allocation MELD/PELD - Region 1

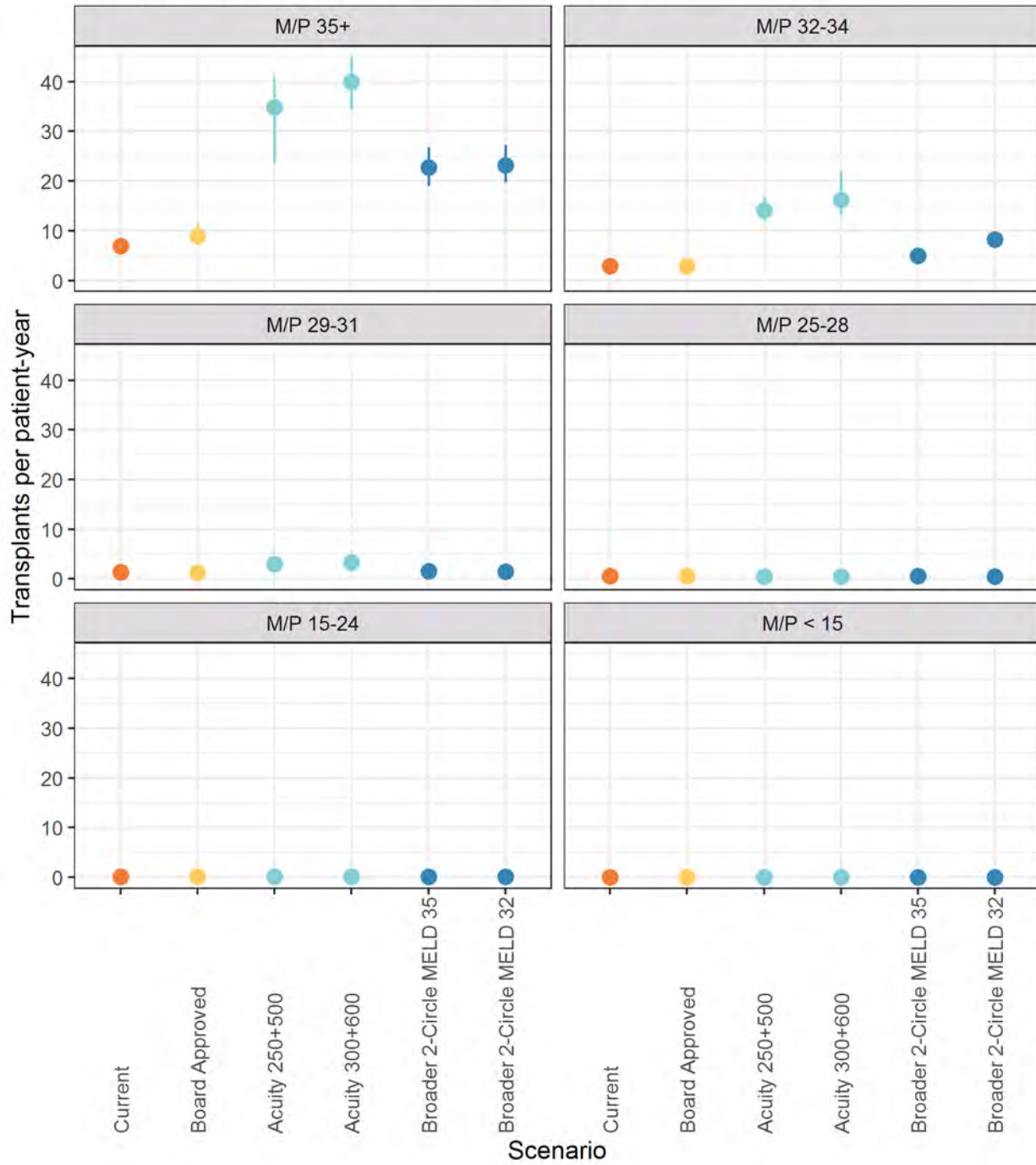


Figure 63 Transplant Rates by Allocation MELD/PELD - Region 1

Transplant Rates by Allocation MELD/PELD - Region 2

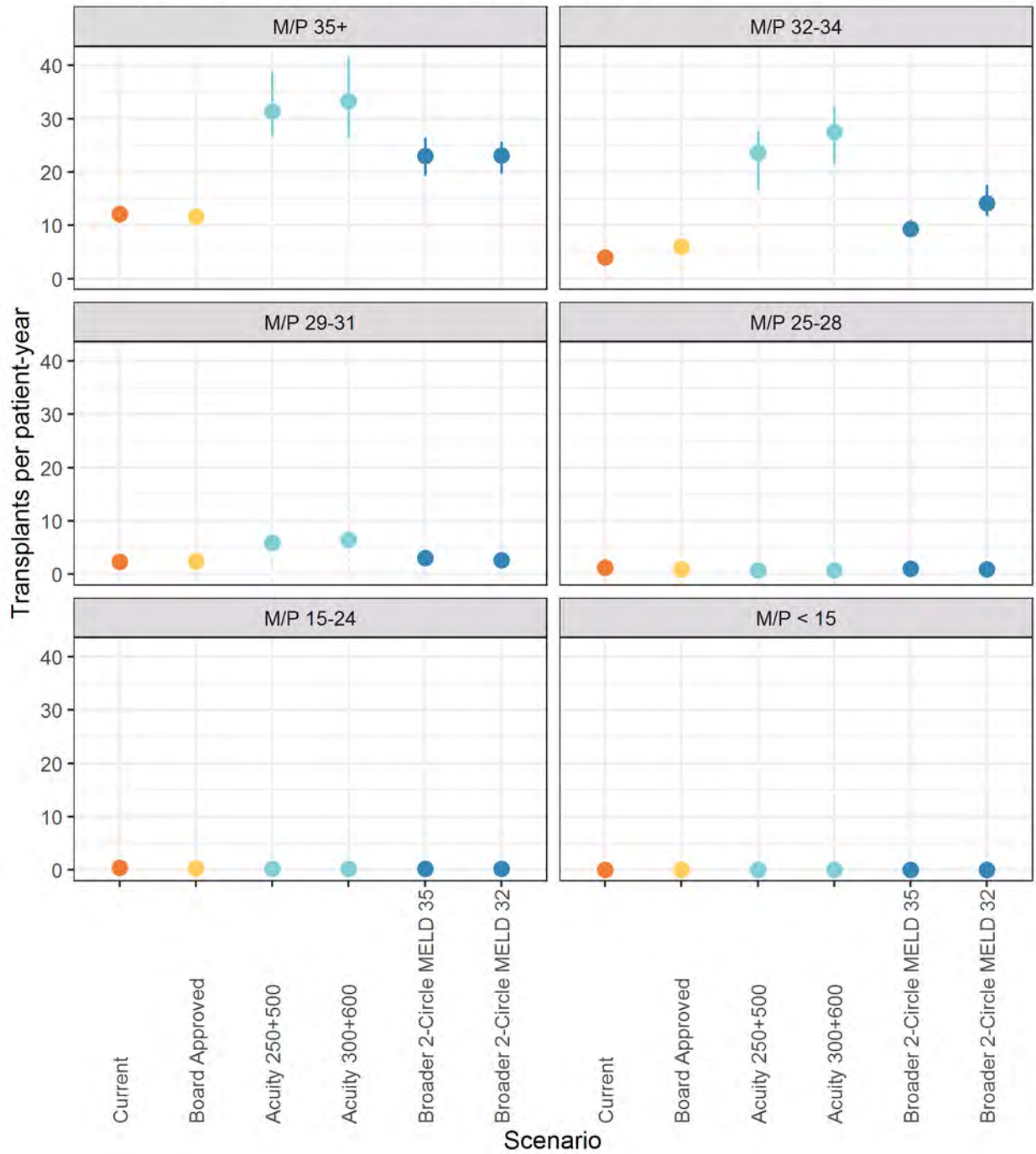


Figure 64 Transplant Rates by Allocation MELD/PELD - Region 2

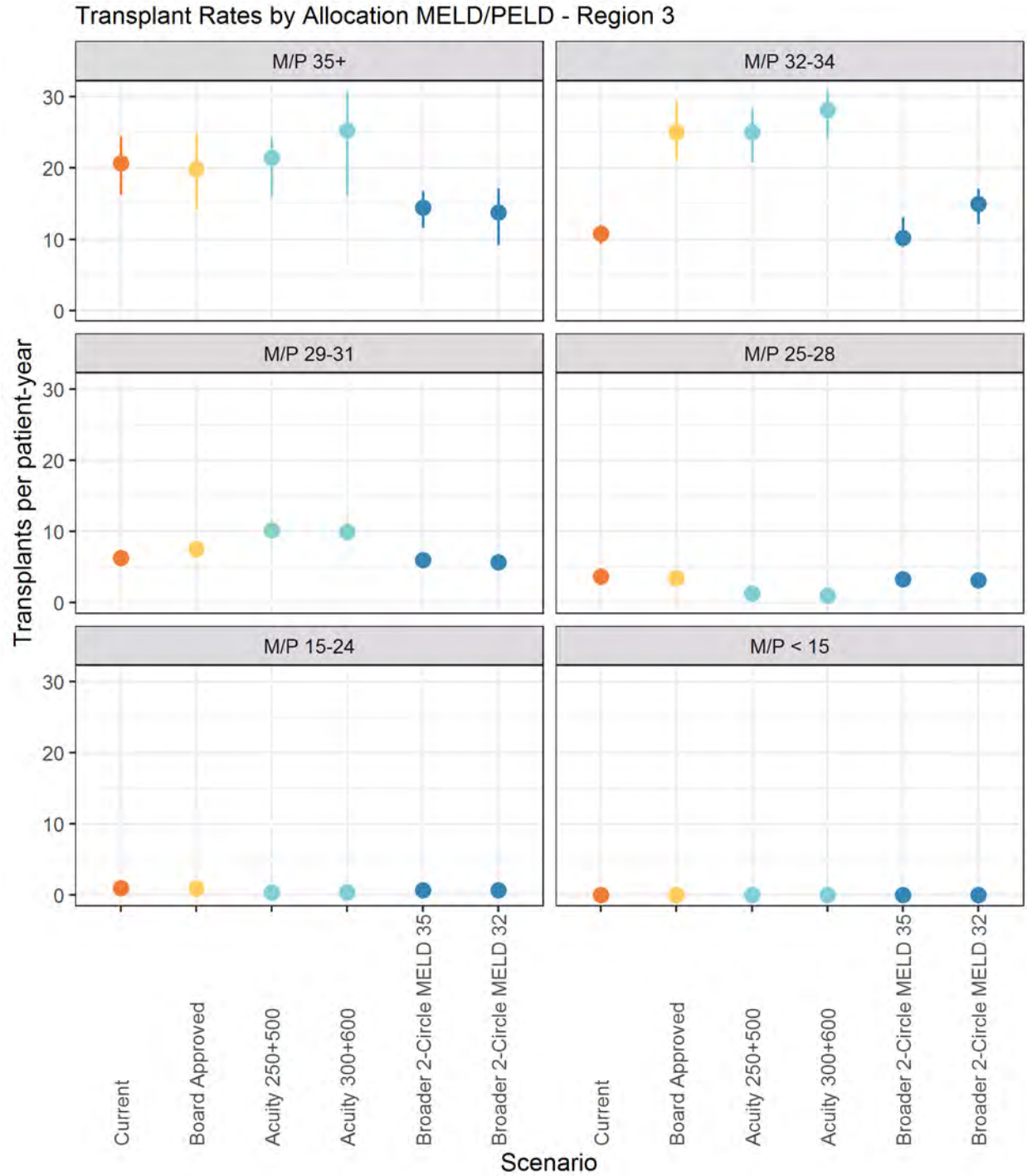


Figure 65 Transplant Rates by Allocation MELD/PELD - Region 3

Transplant Rates by Allocation MELD/PELD - Region 4

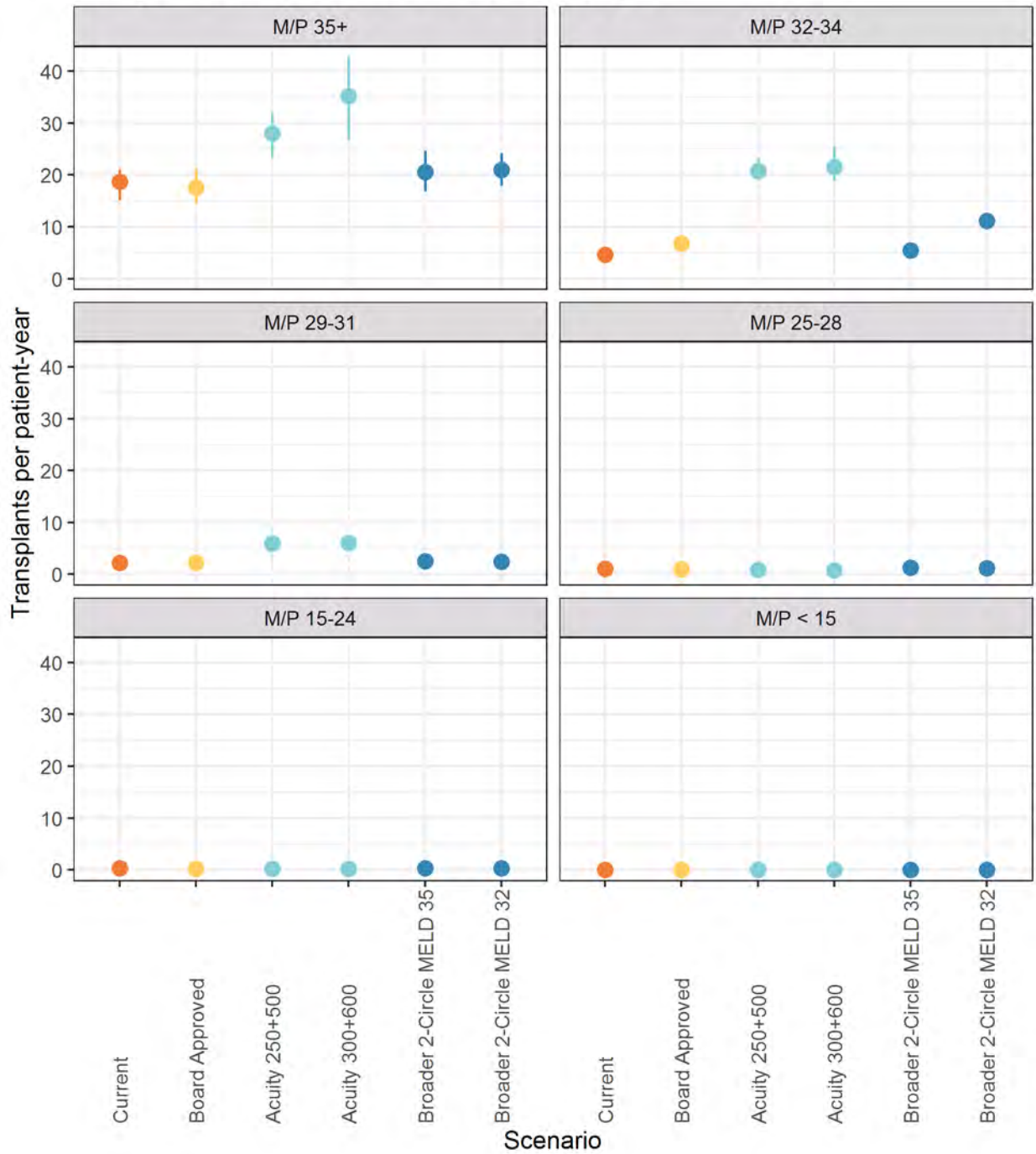


Figure 66 Transplant Rates by Allocation MELD/PELD - Region 4

Transplant Rates by Allocation MELD/PELD - Region 5

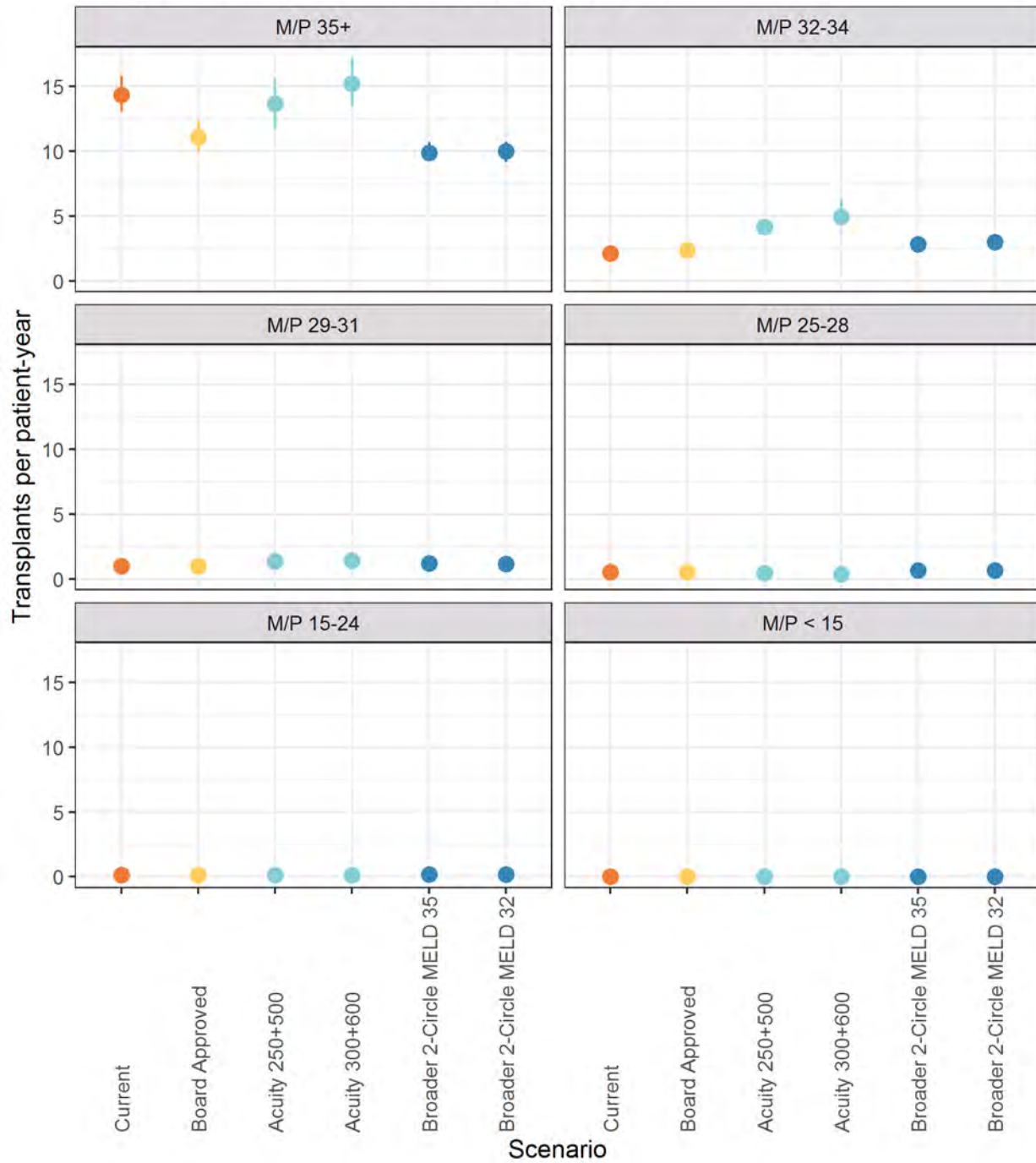


Figure 67 Transplant Rates by Allocation MELD/PELD - Region 5

Transplant Rates by Allocation MELD/PELD - Region 6

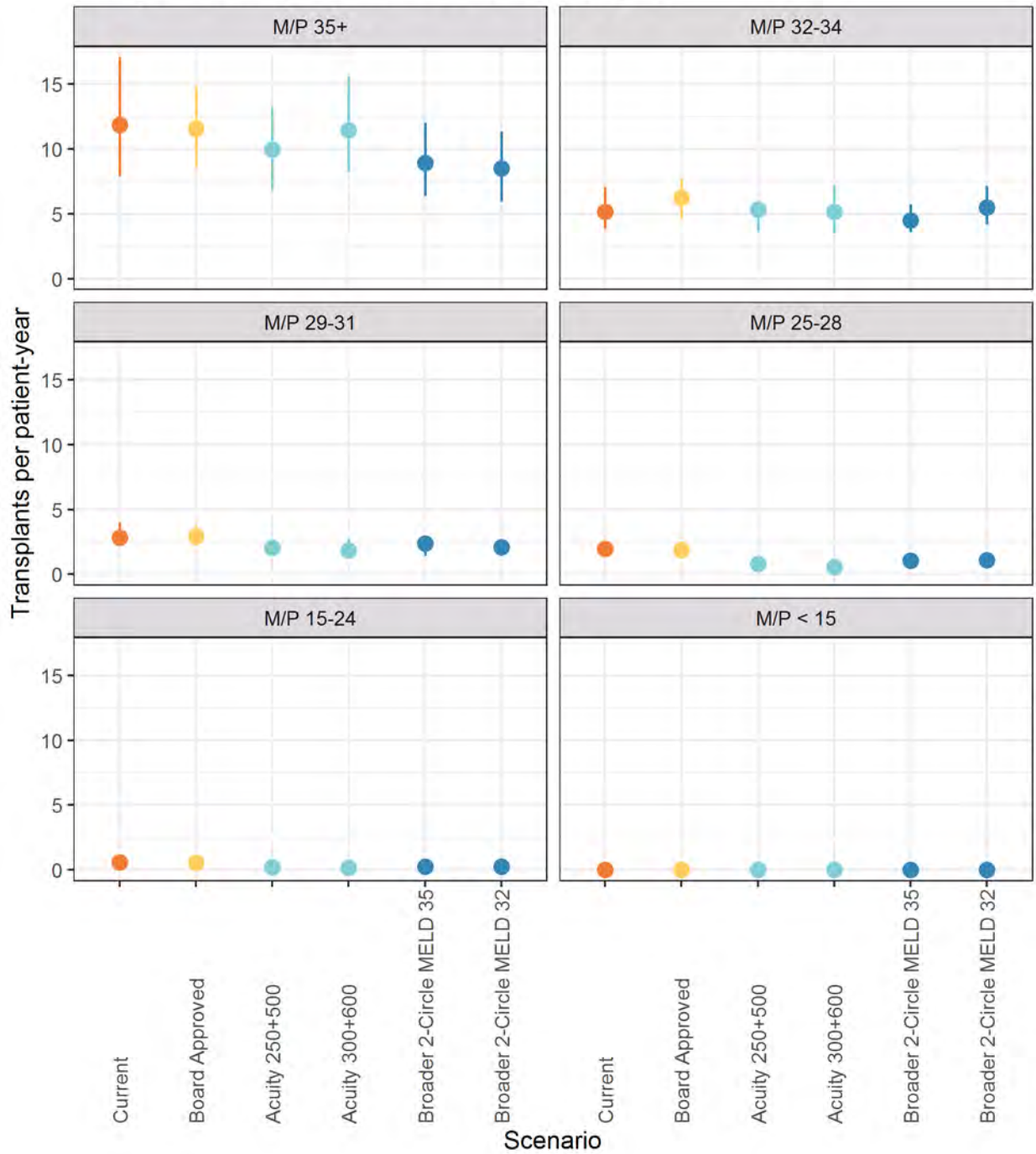


Figure 68 Transplant Rates by Allocation MELD/PELD - Region 6

Transplant Rates by Allocation MELD/PELD - Region 7

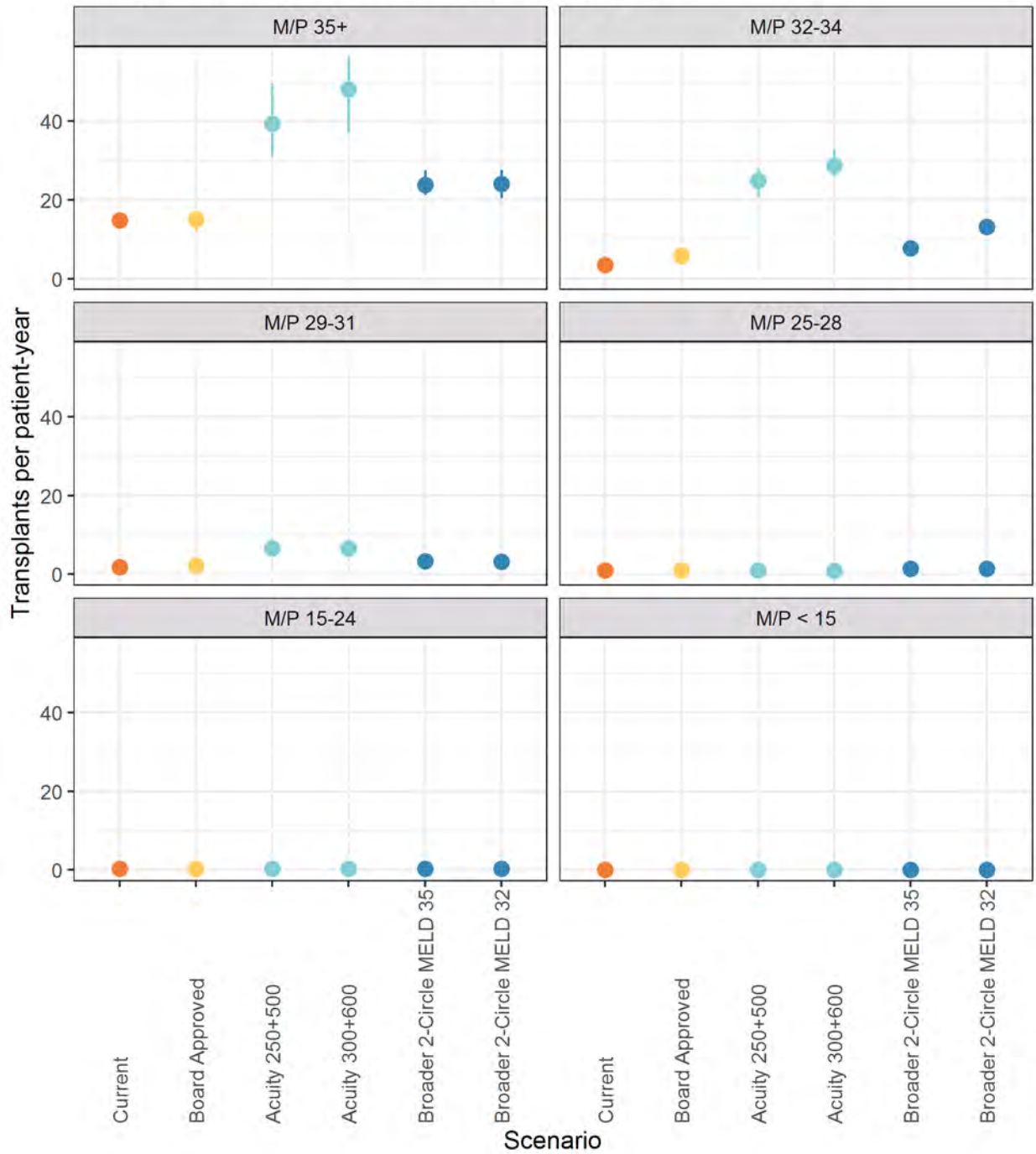


Figure 69 Transplant Rates by Allocation MELD/PELD - Region 7

Transplant Rates by Allocation MELD/PELD - Region 8

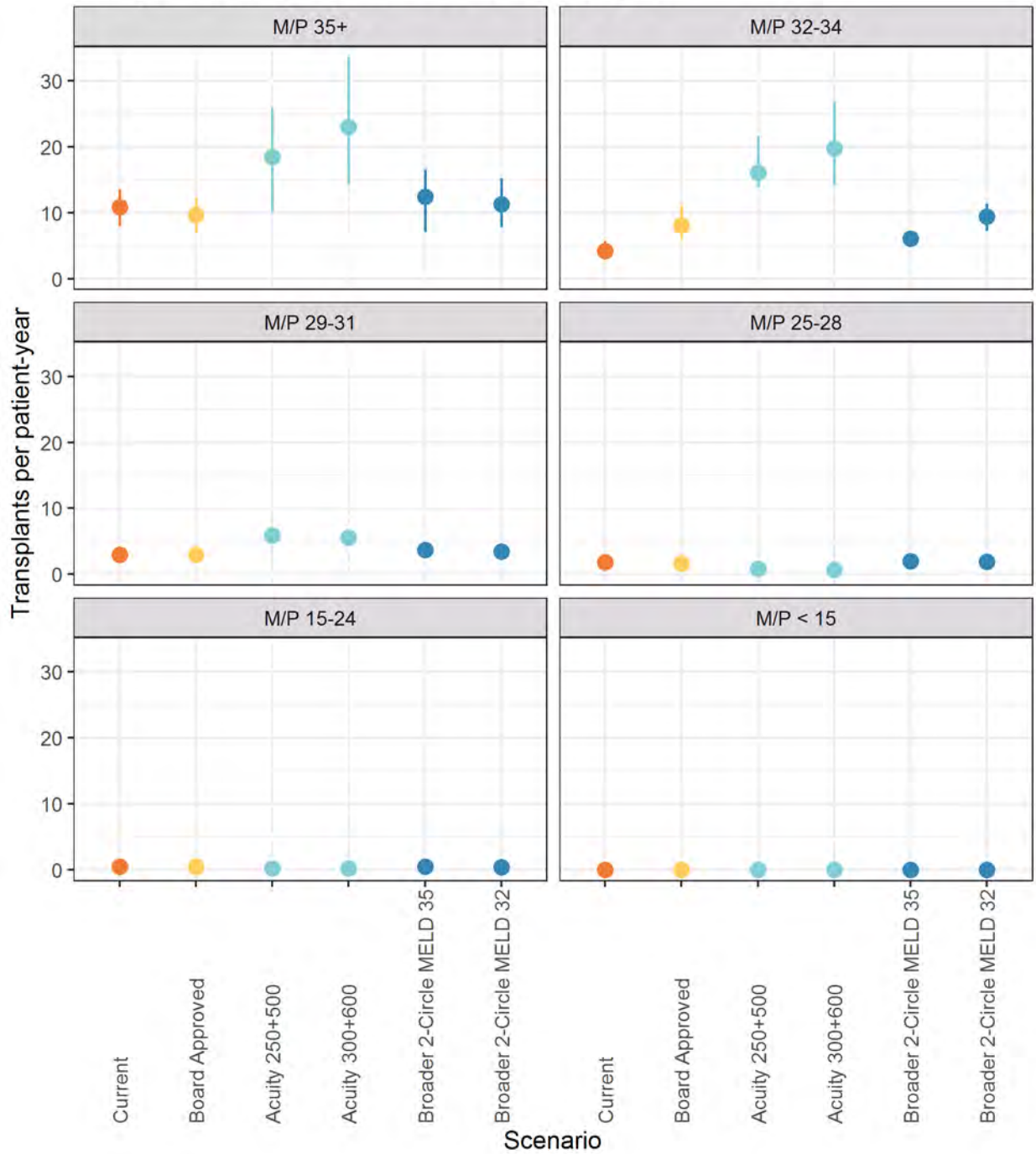


Figure 70 Transplant Rates by Allocation MELD/PELD - Region 8

Transplant Rates by Allocation MELD/PELD - Region 9

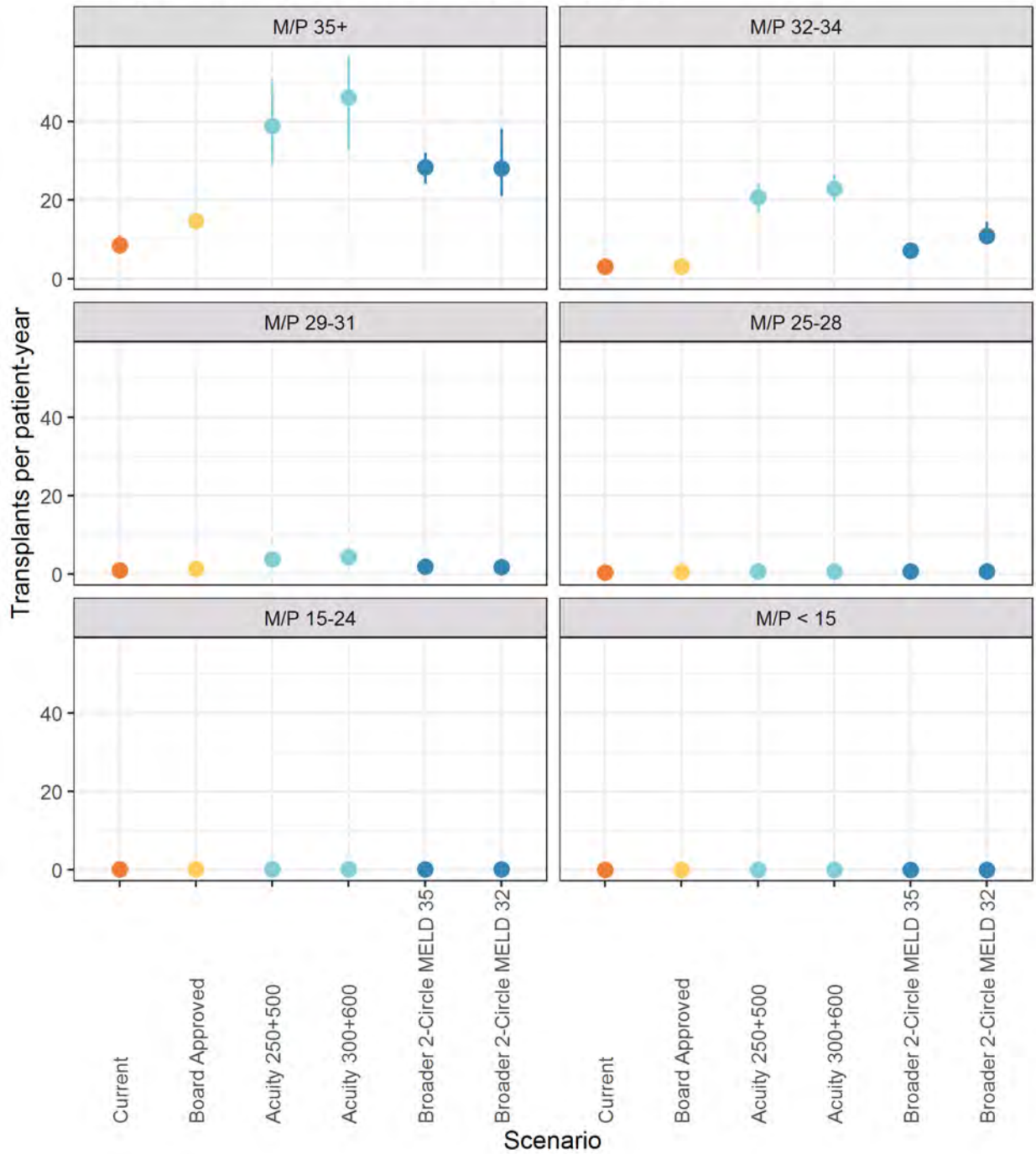


Figure 71 Transplant Rates by Allocation MELD/PELD - Region 9

Transplant Rates by Allocation MELD/PELD - Region 10

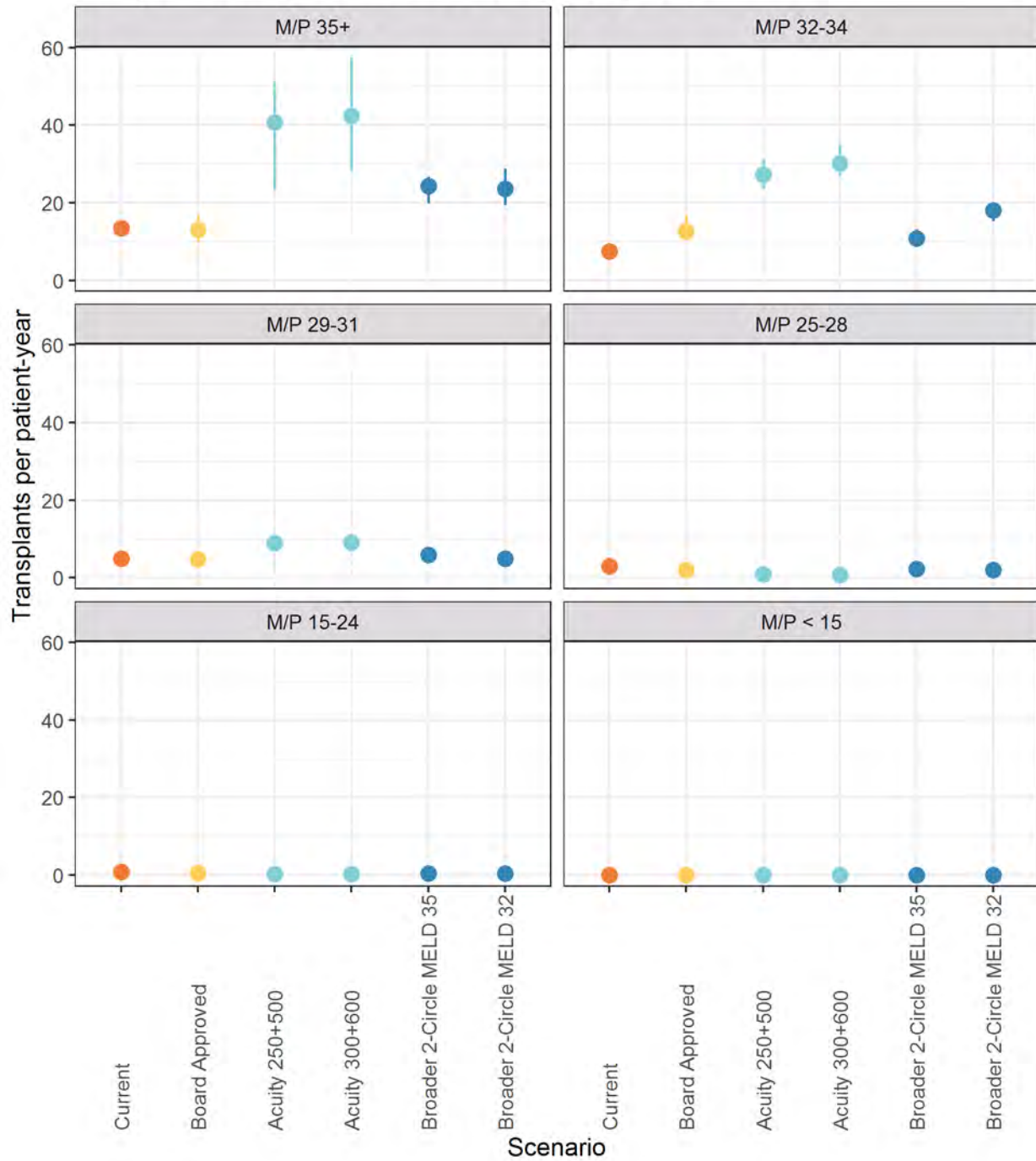


Figure 72 Transplant Rates by Allocation MELD/PELD - Region 10

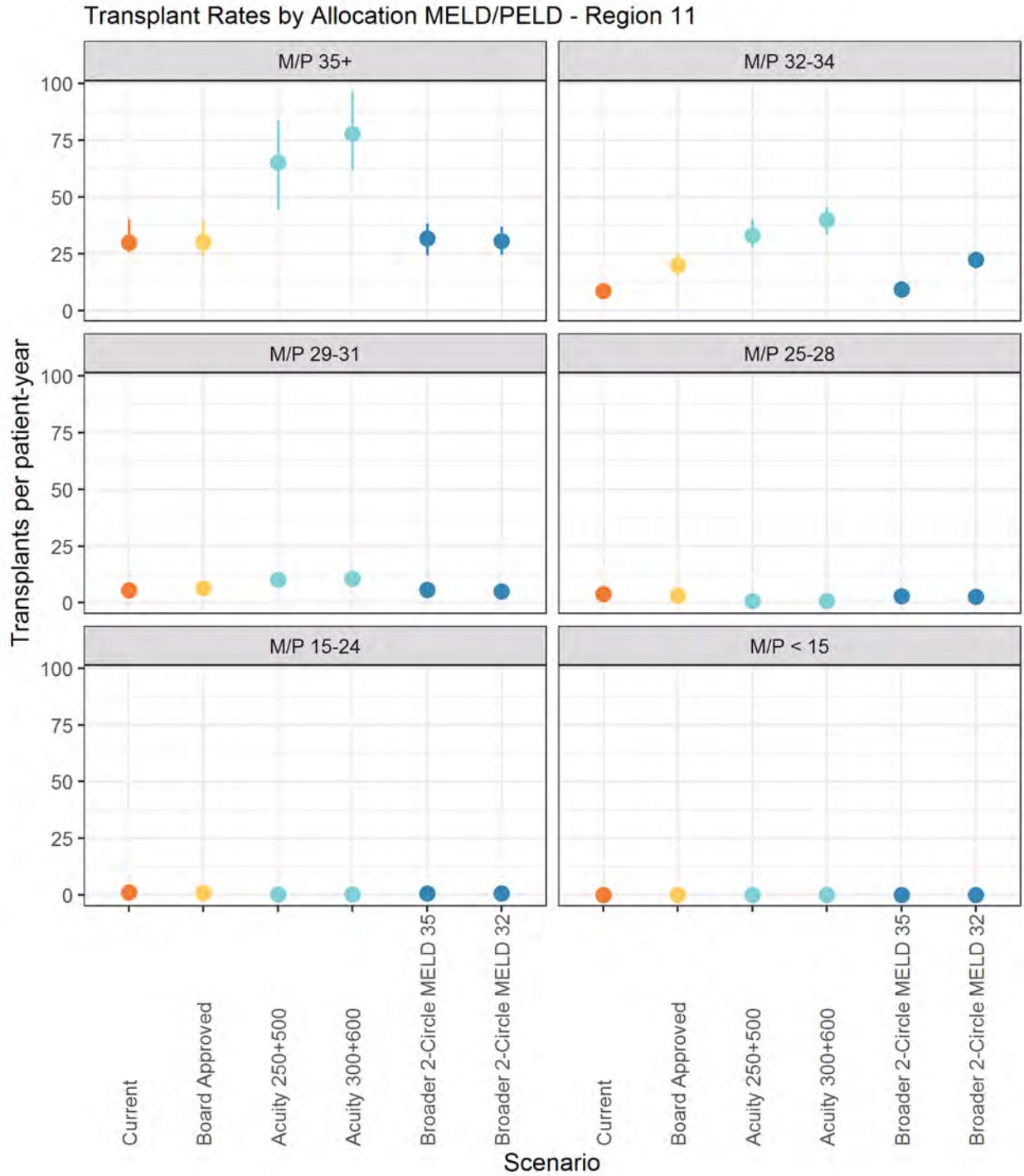


Figure 73 Transplant Rates by Allocation MELD/PELD - Region 11

Transplant Counts by Allocation MELD/PELD

Transplant Counts by Allocation MELD/PELD - Region 1

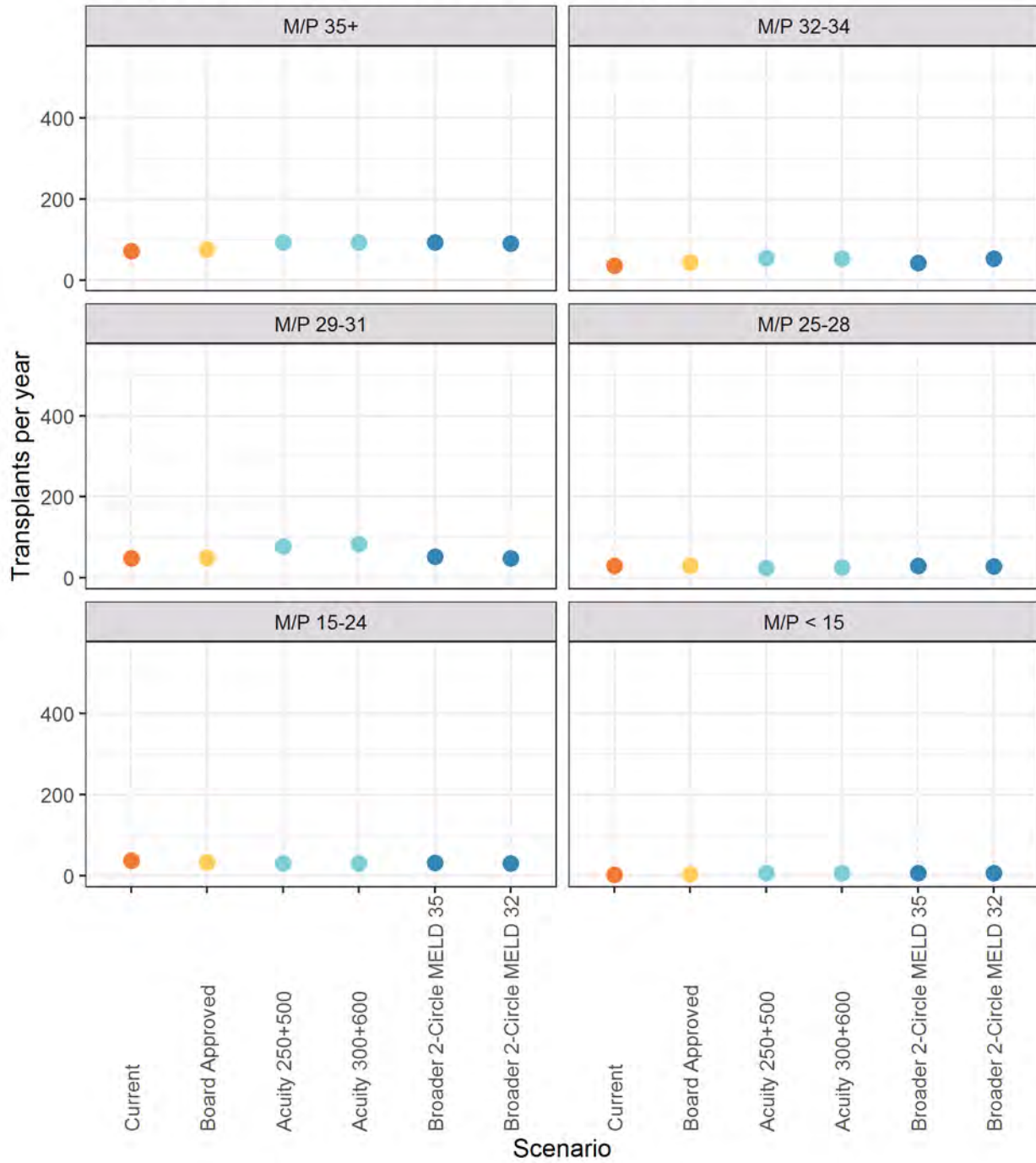


Figure 74 Transplant Counts by Allocation MELD/PELD - Region 1

Transplant Counts by Allocation MELD/PELD - Region 2

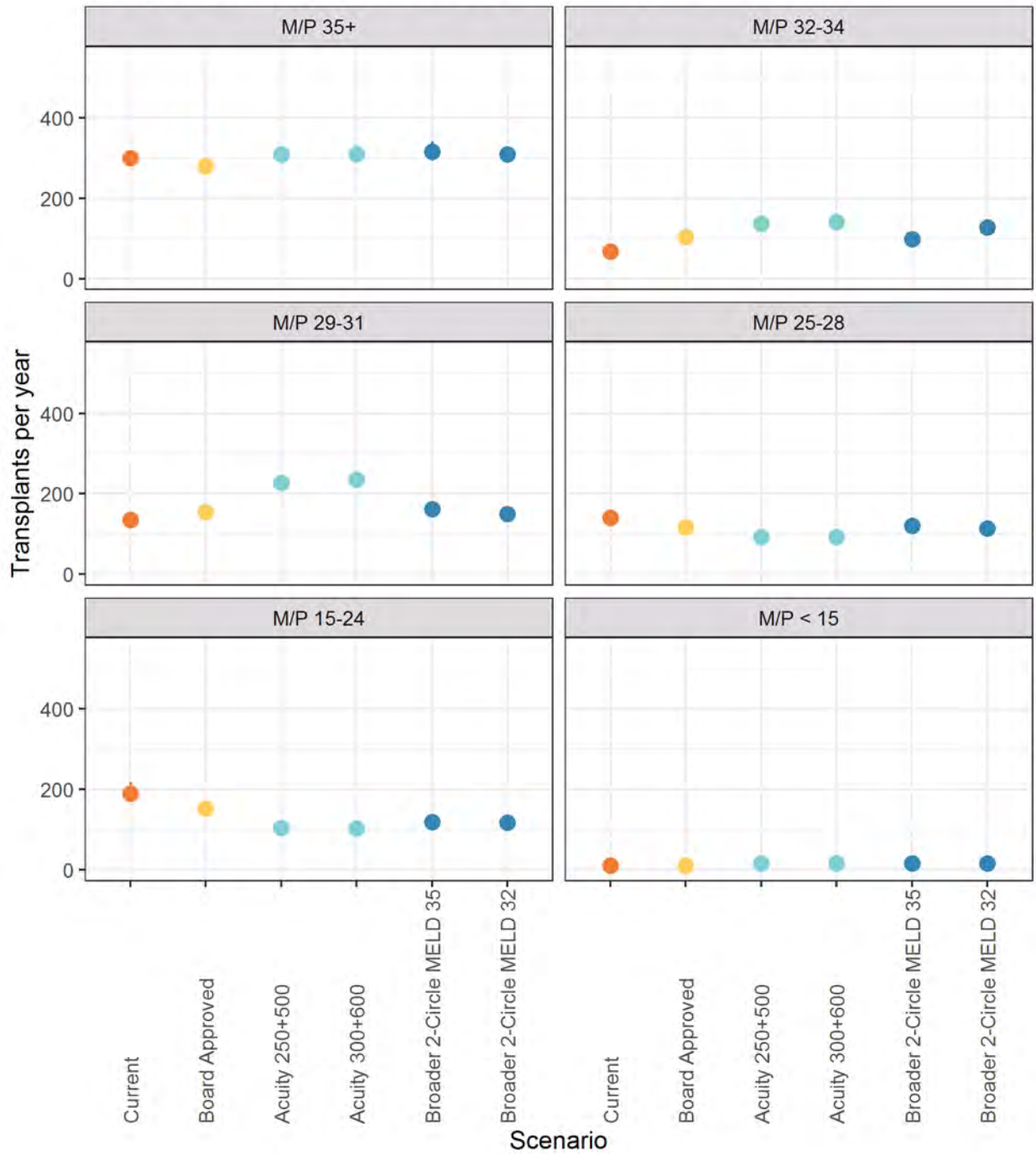


Figure 75 Transplant Counts by Allocation MELD/PELD - Region 2

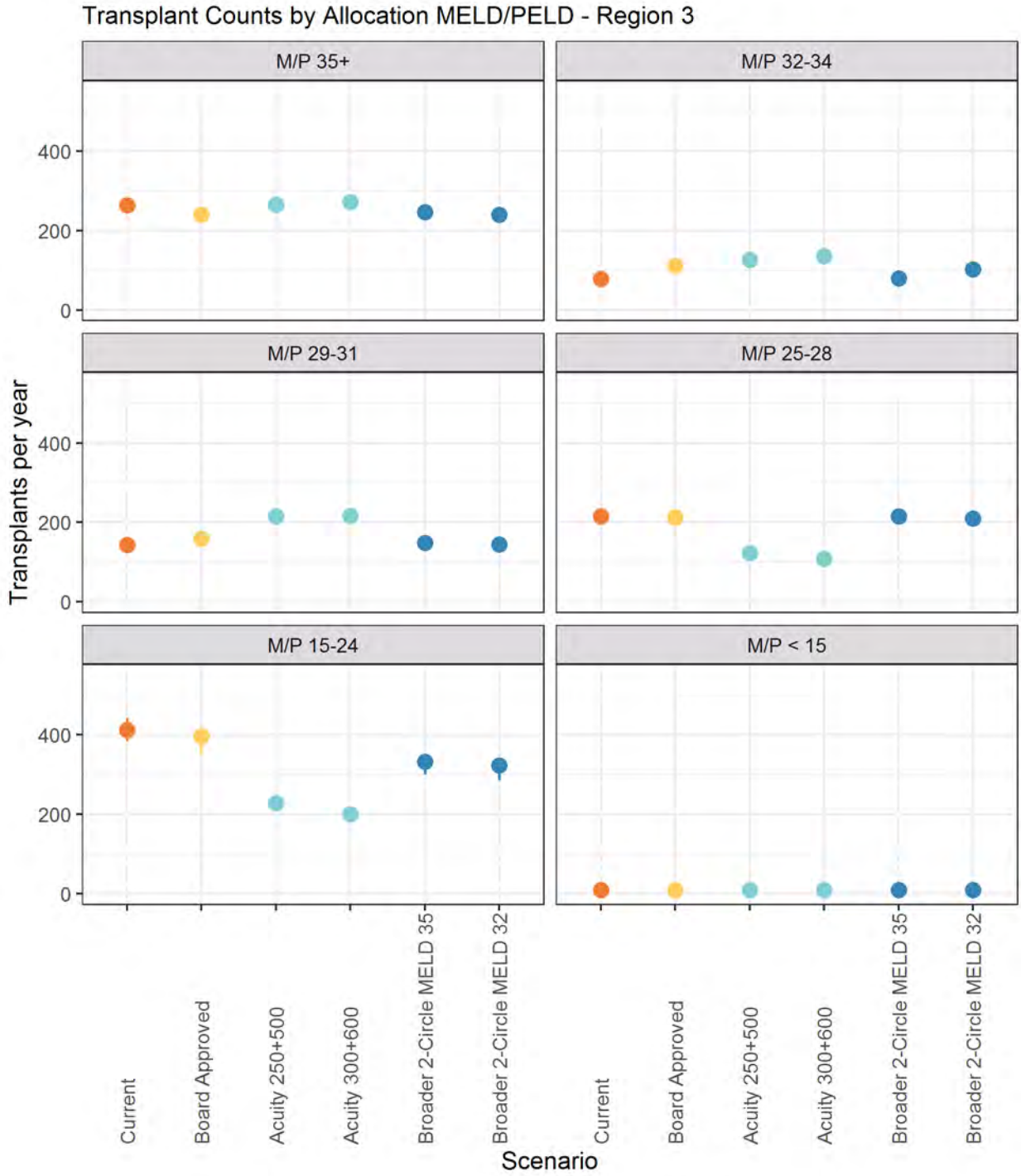


Figure 76 Transplant Counts by Allocation MELD/PELD - Region 3

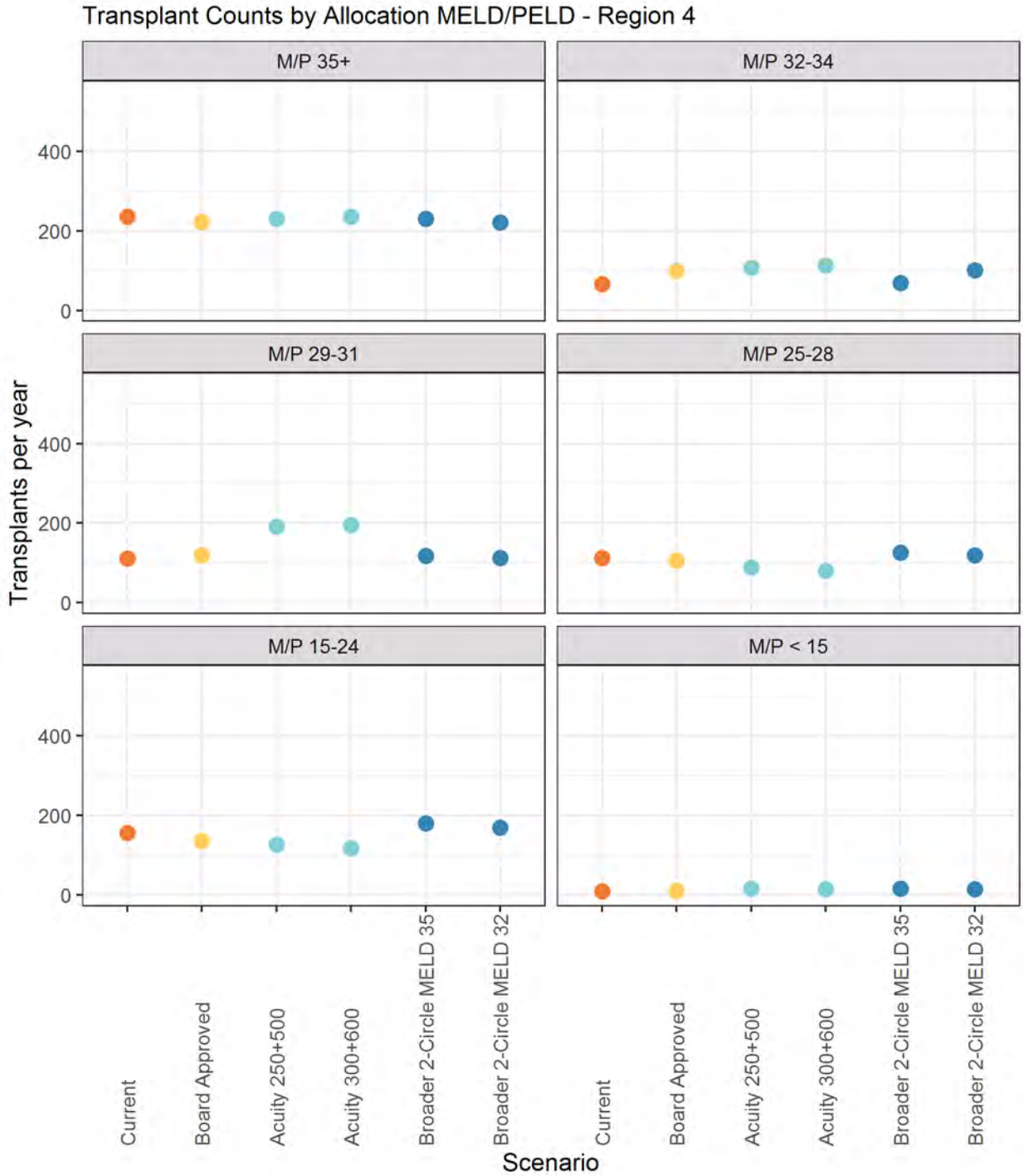


Figure 77 Transplant Counts by Allocation MELD/PELD - Region 4

Transplant Counts by Allocation MELD/PELD - Region 5

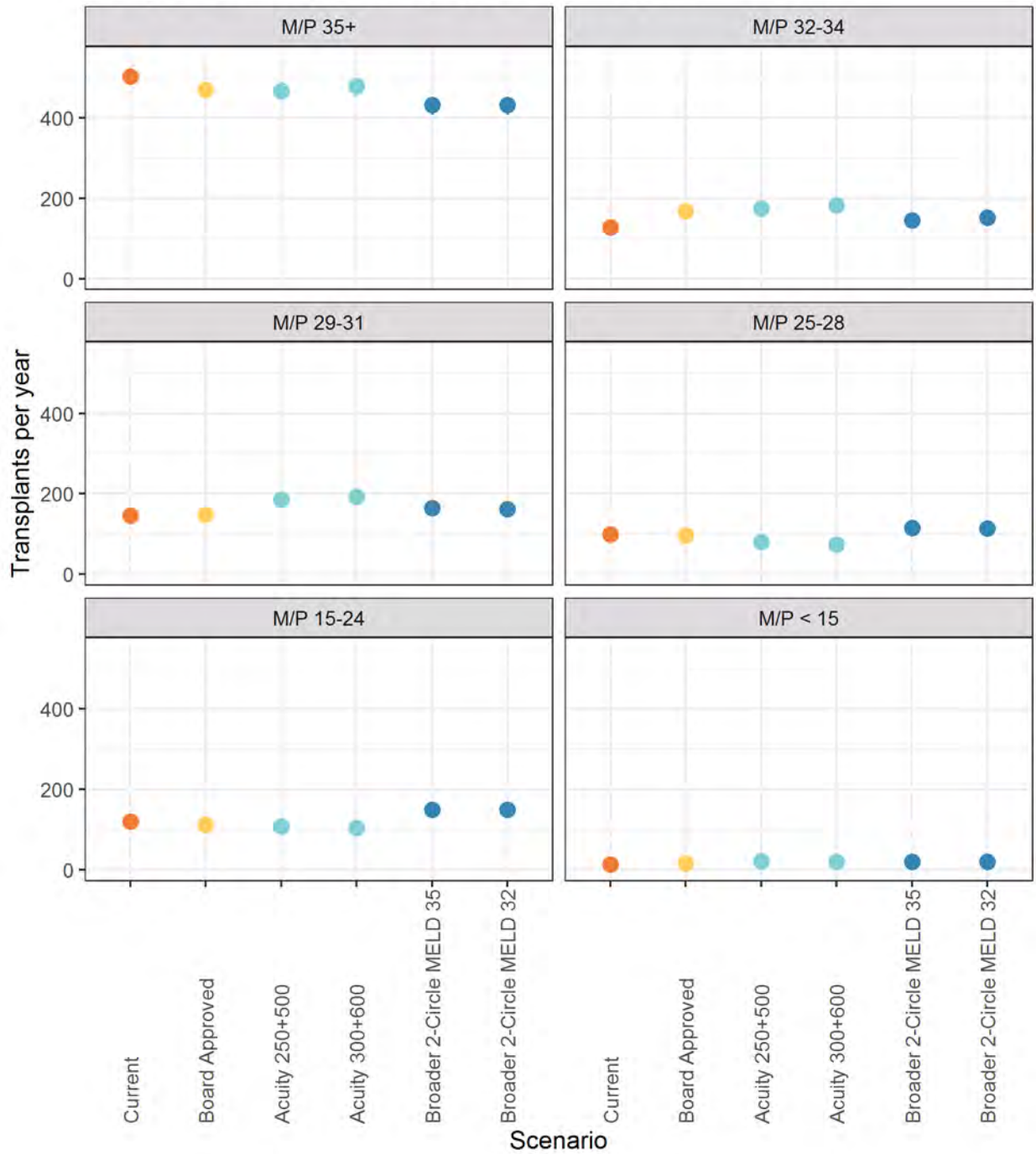


Figure 78 Transplant Counts by Allocation MELD/PELD - Region 5

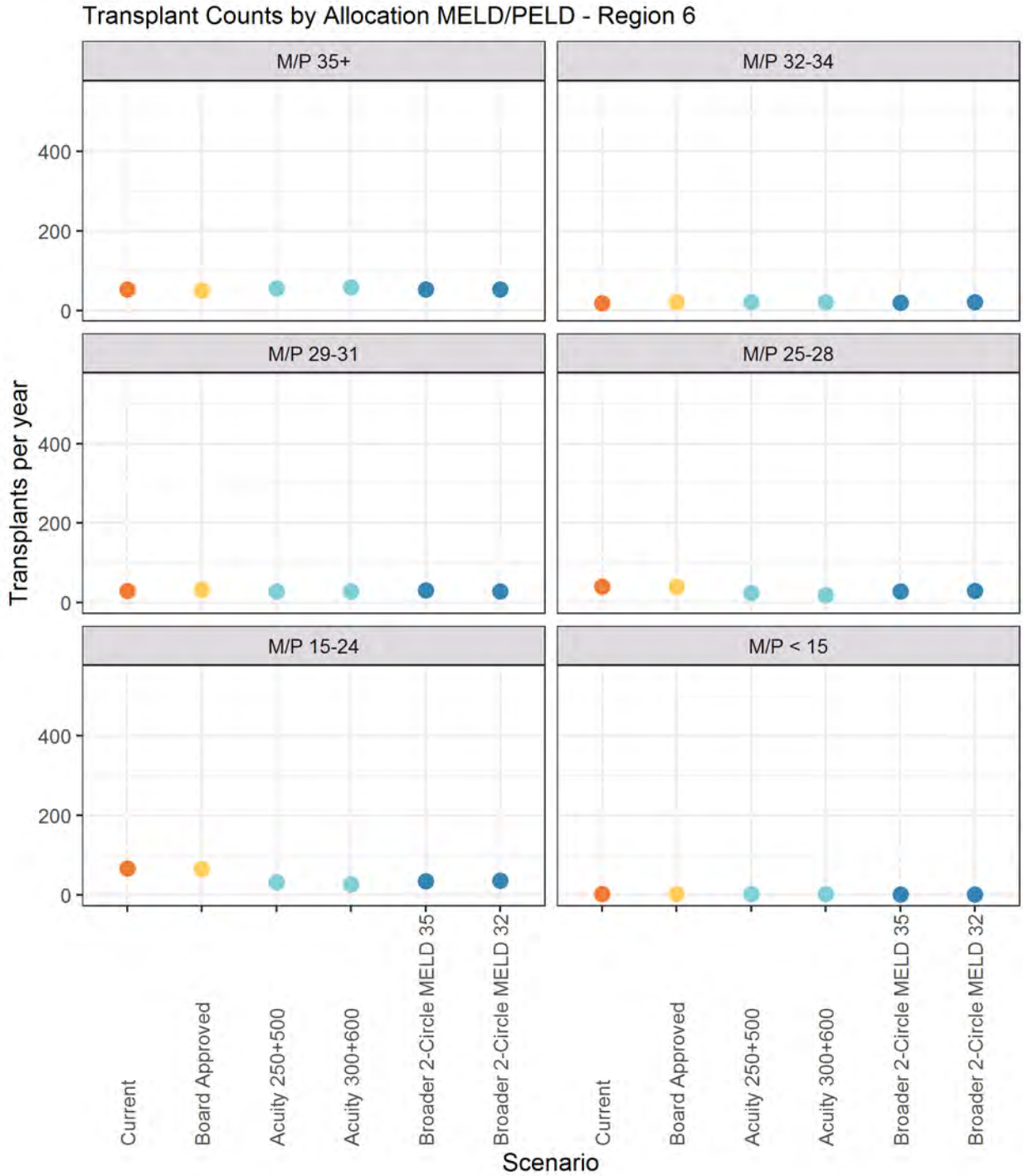


Figure 79 Transplant Counts by Allocation MELD/PELD - Region 6

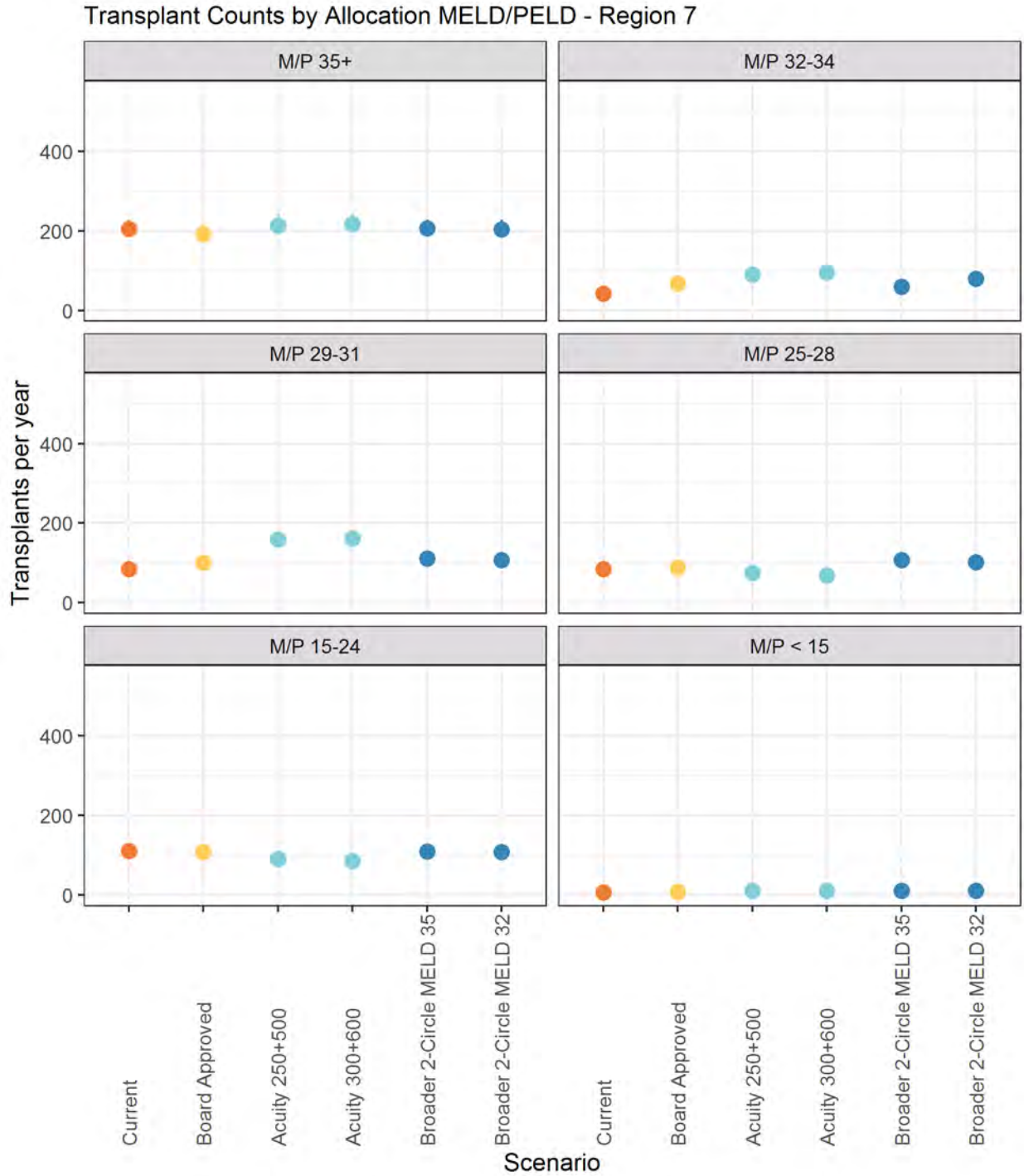


Figure 80 Transplant Counts by Allocation MELD/PELD - Region 7

Transplant Counts by Allocation MELD/PELD - Region 8

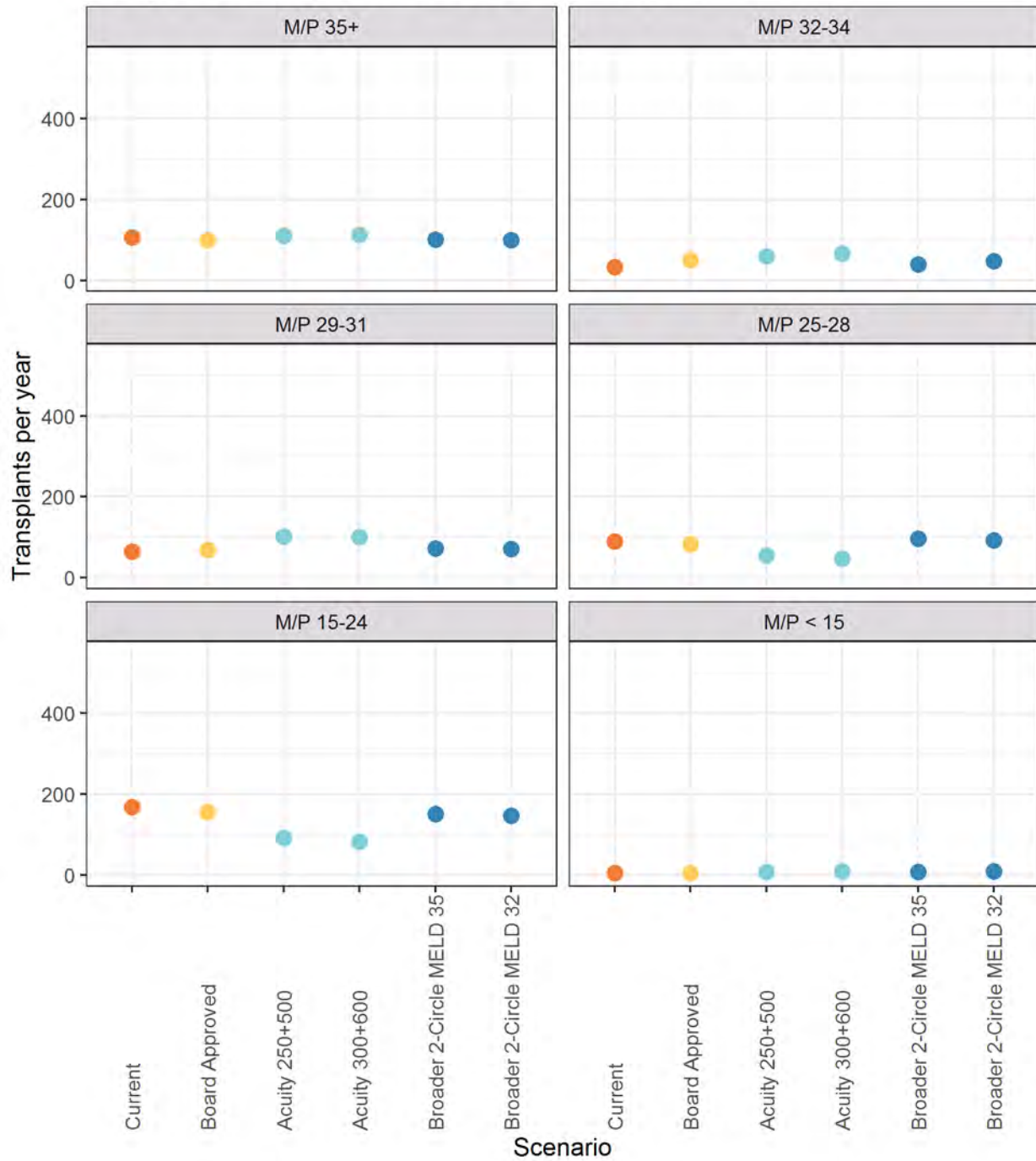


Figure 81 Transplant Counts by Allocation MELD/PELD - Region 8

Transplant Counts by Allocation MELD/PELD - Region 9

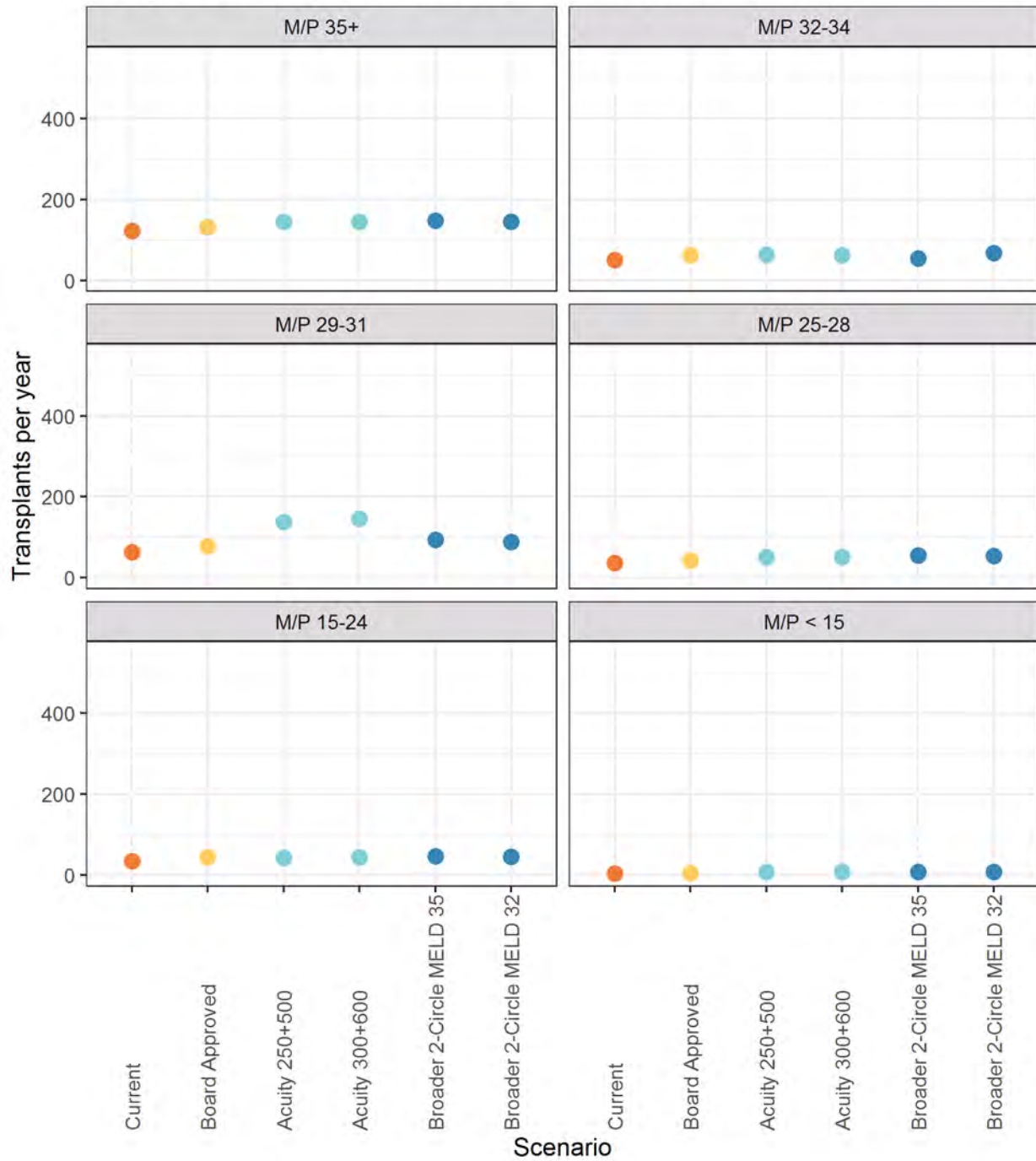


Figure 82 Transplant Counts by Allocation MELD/PELD - Region 9

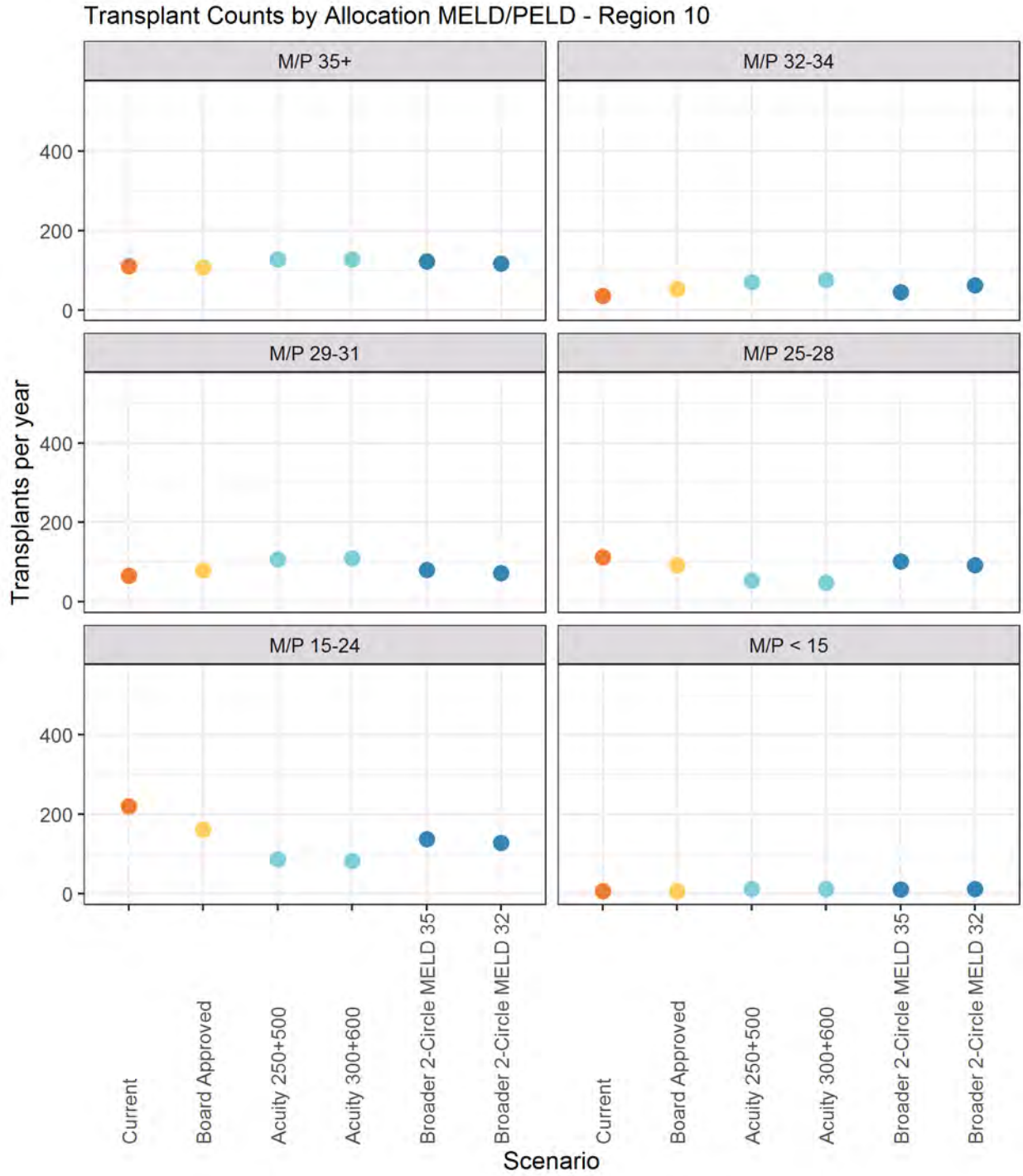


Figure 83 Transplant Counts by Allocation MELD/PELD - Region 10

Transplant Counts by Allocation MELD/PELD - Region 11

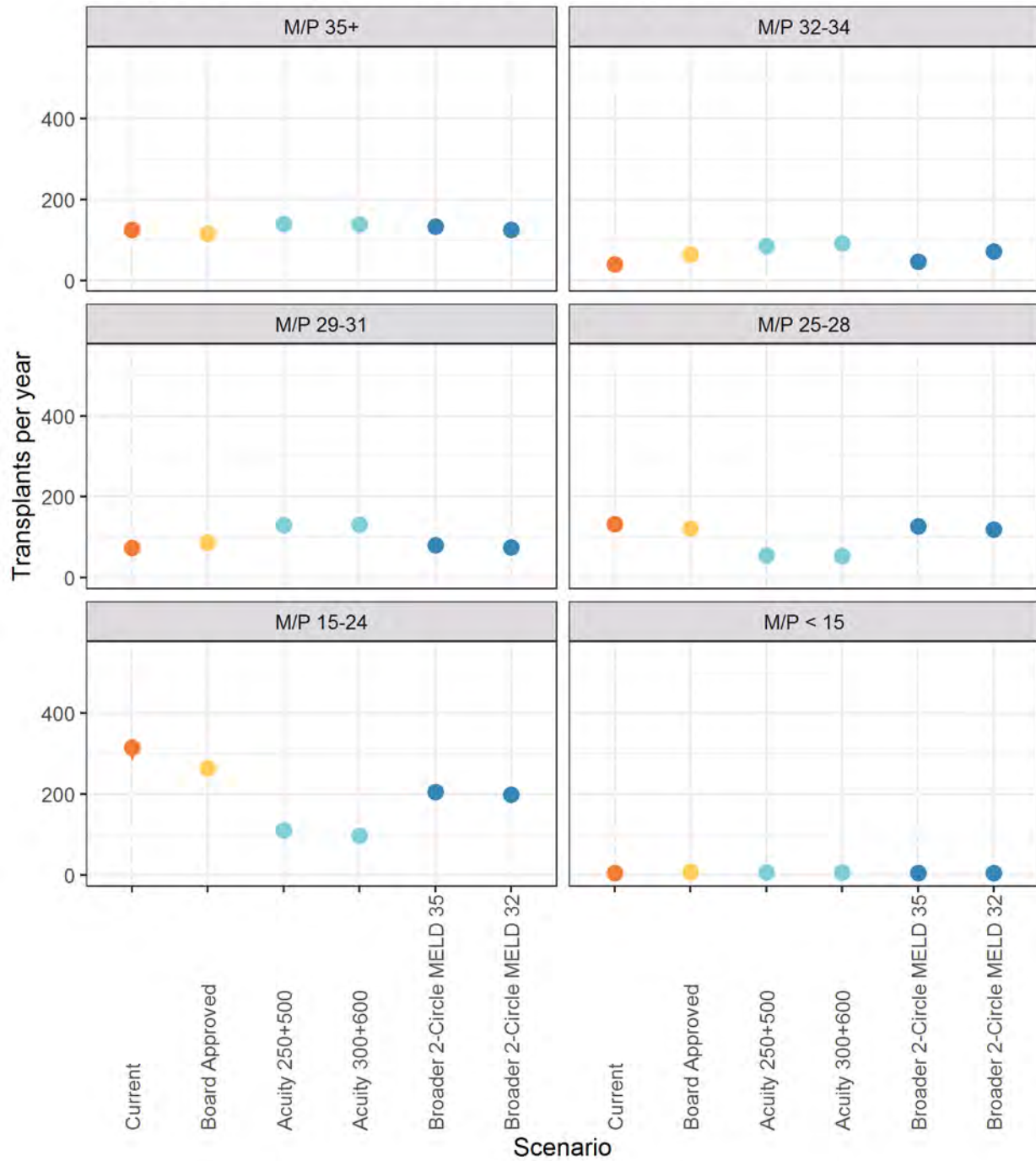


Figure 84 Transplant Counts by Allocation MELD/PELD - Region 11

Waitlist Mortality

Waitlist Mortality Rates by Exception Status

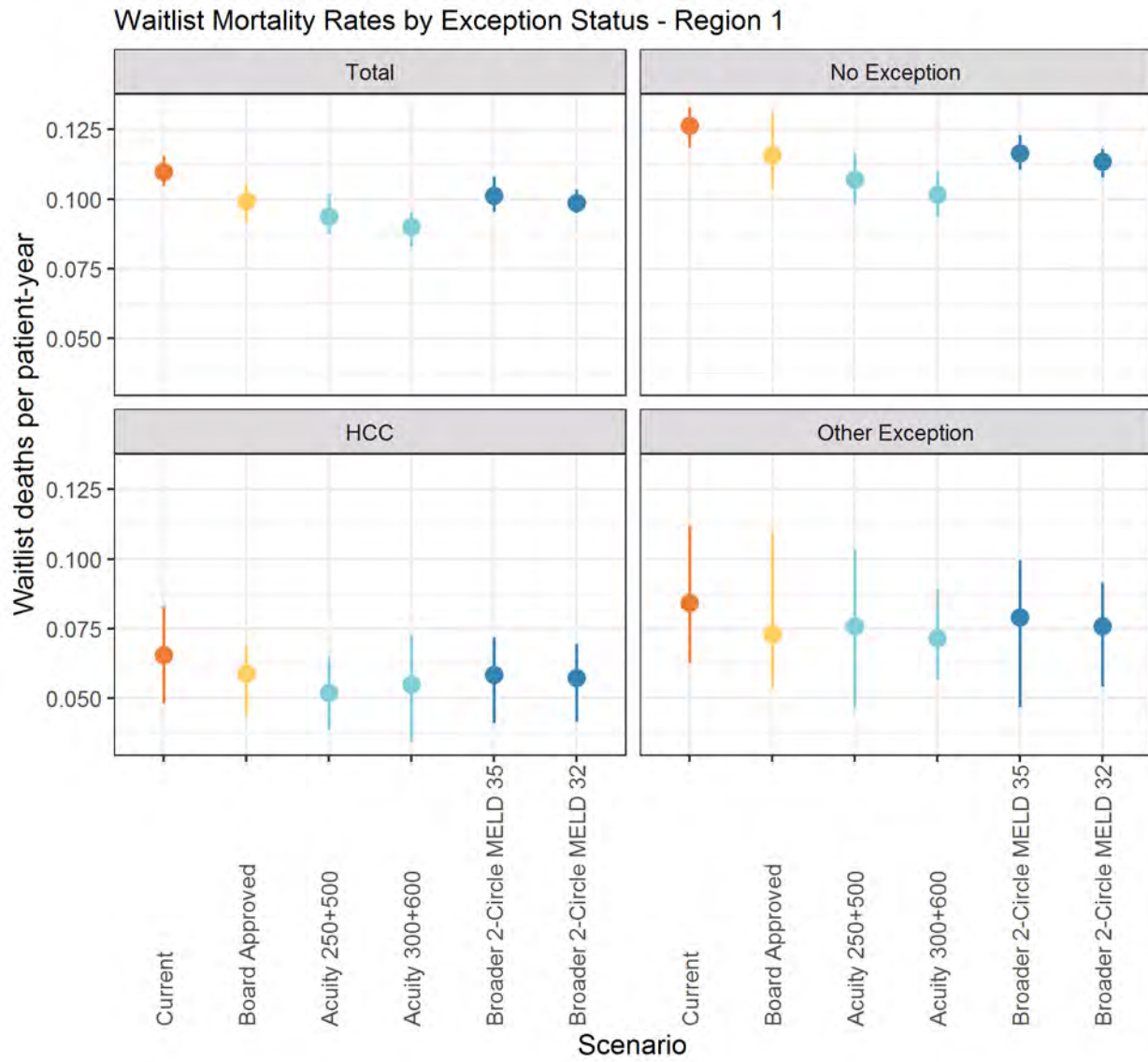


Figure 85 Waitlist Mortality Rates by Exception Status - Region 1

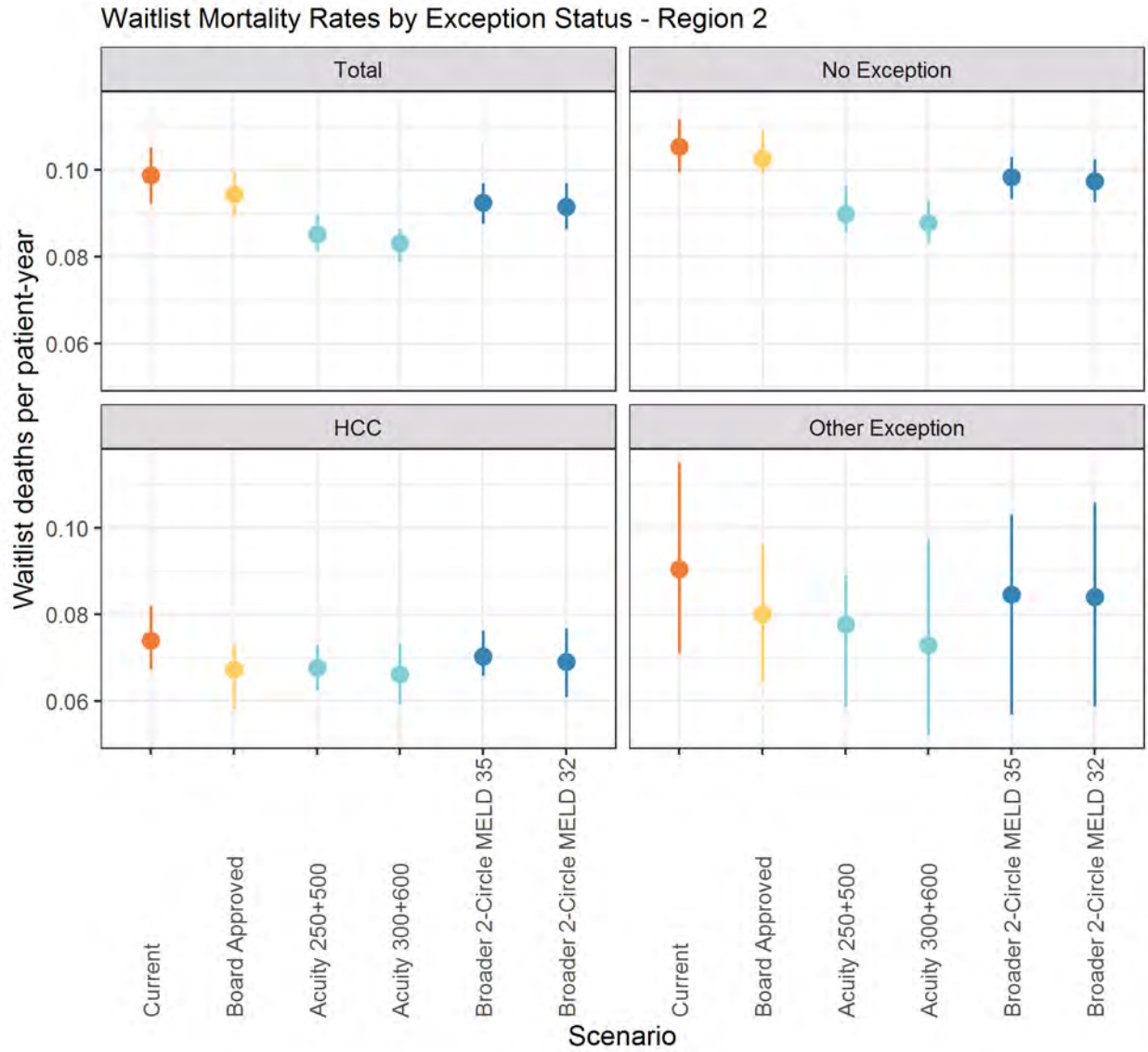


Figure 86 Waitlist Mortality Rates by Exception Status - Region 2

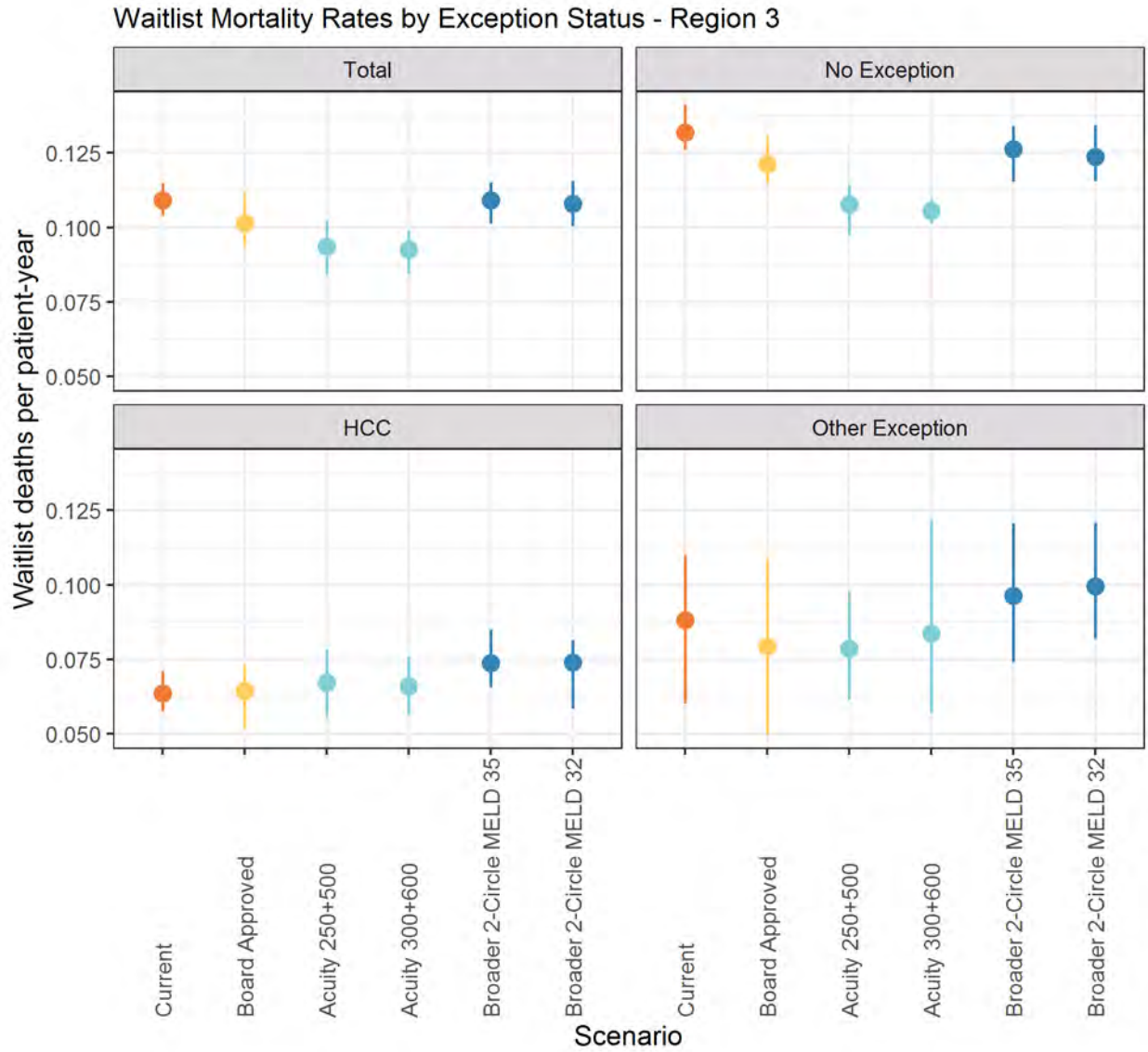


Figure 87 Waitlist Mortality Rates by Exception Status - Region 3

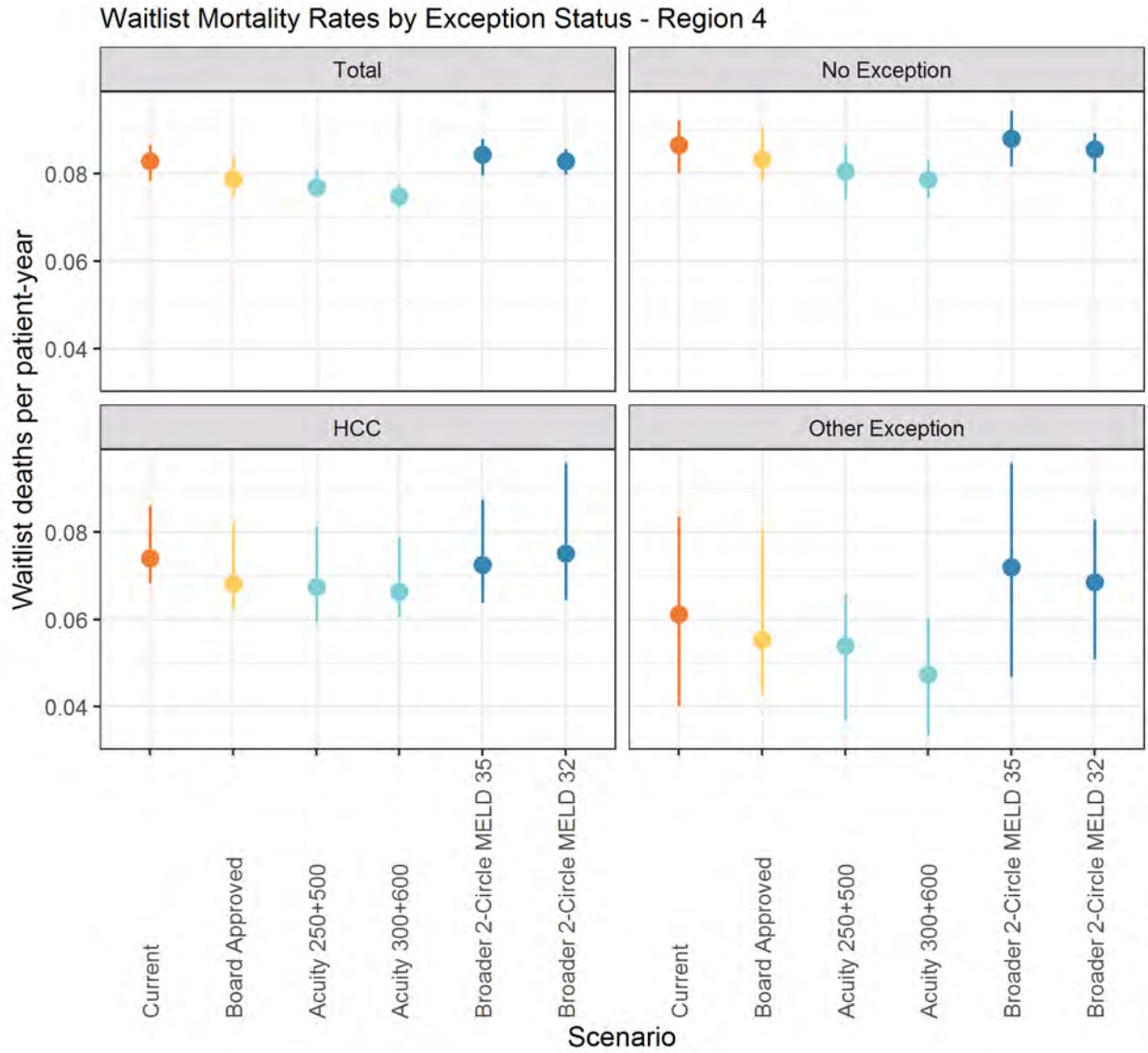


Figure 88 Waitlist Mortality Rates by Exception Status - Region 4

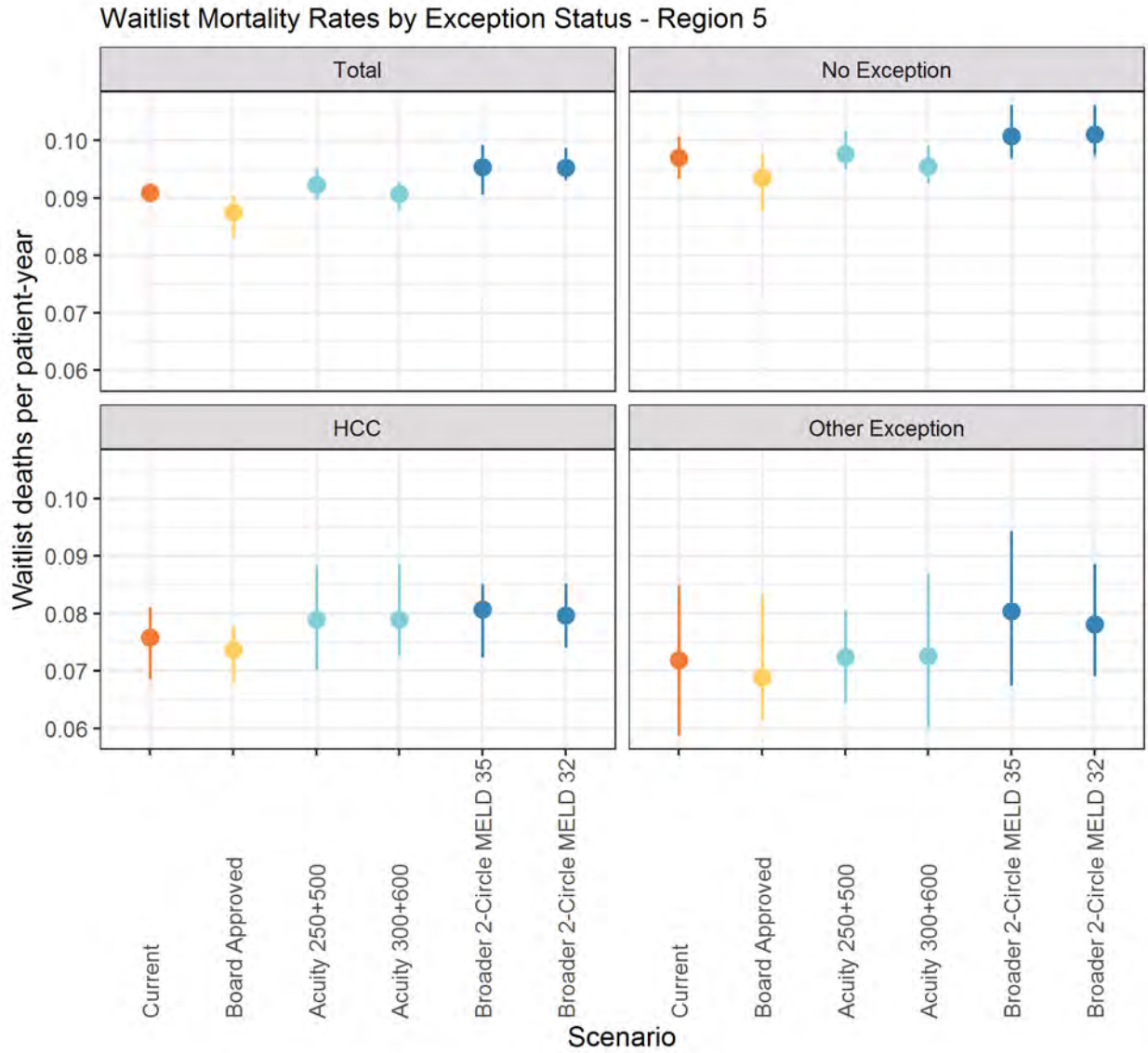


Figure 89 Waitlist Mortality Rates by Exception Status - Region 5

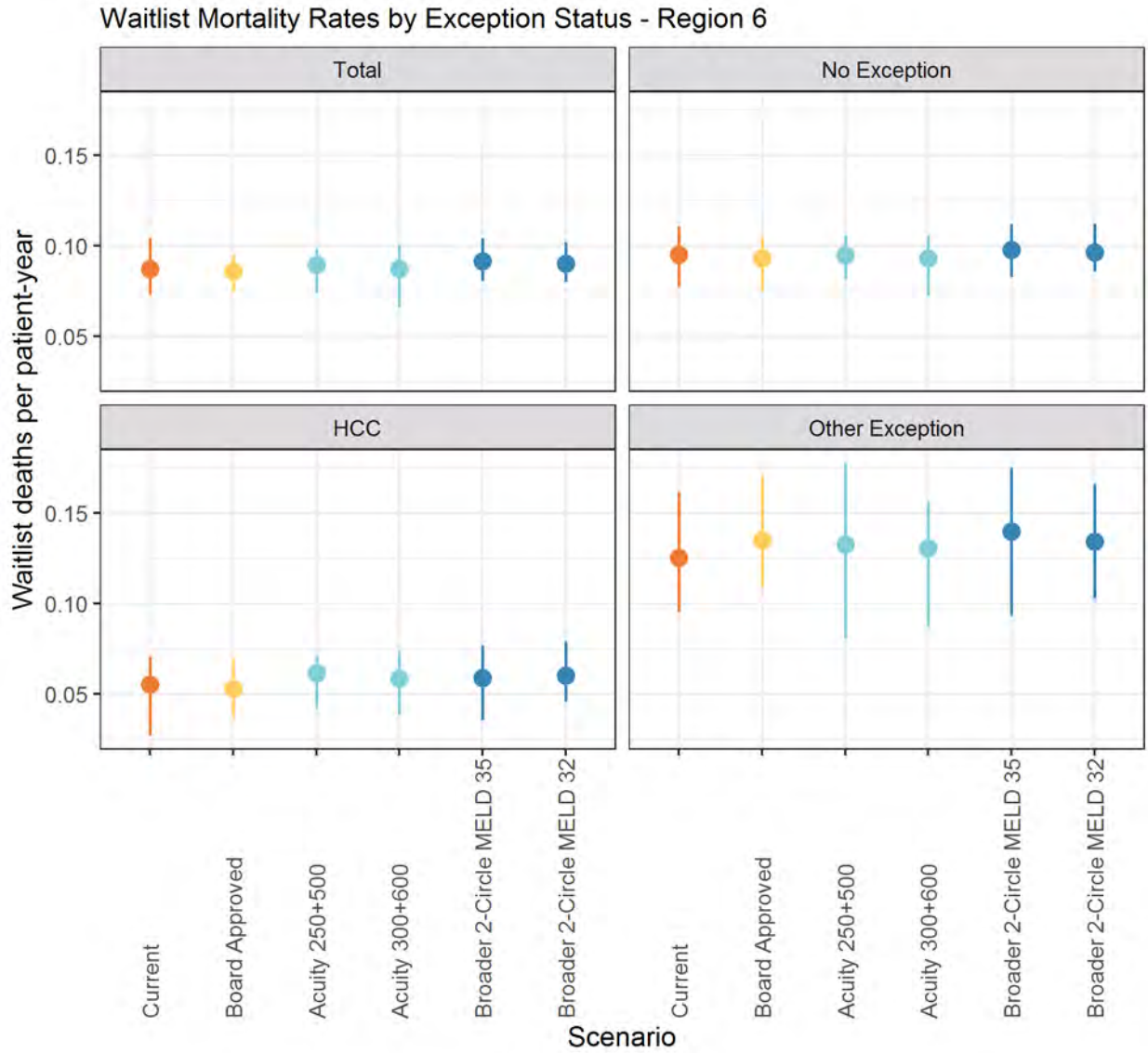


Figure 90 Waitlist Mortality Rates by Exception Status - Region 6

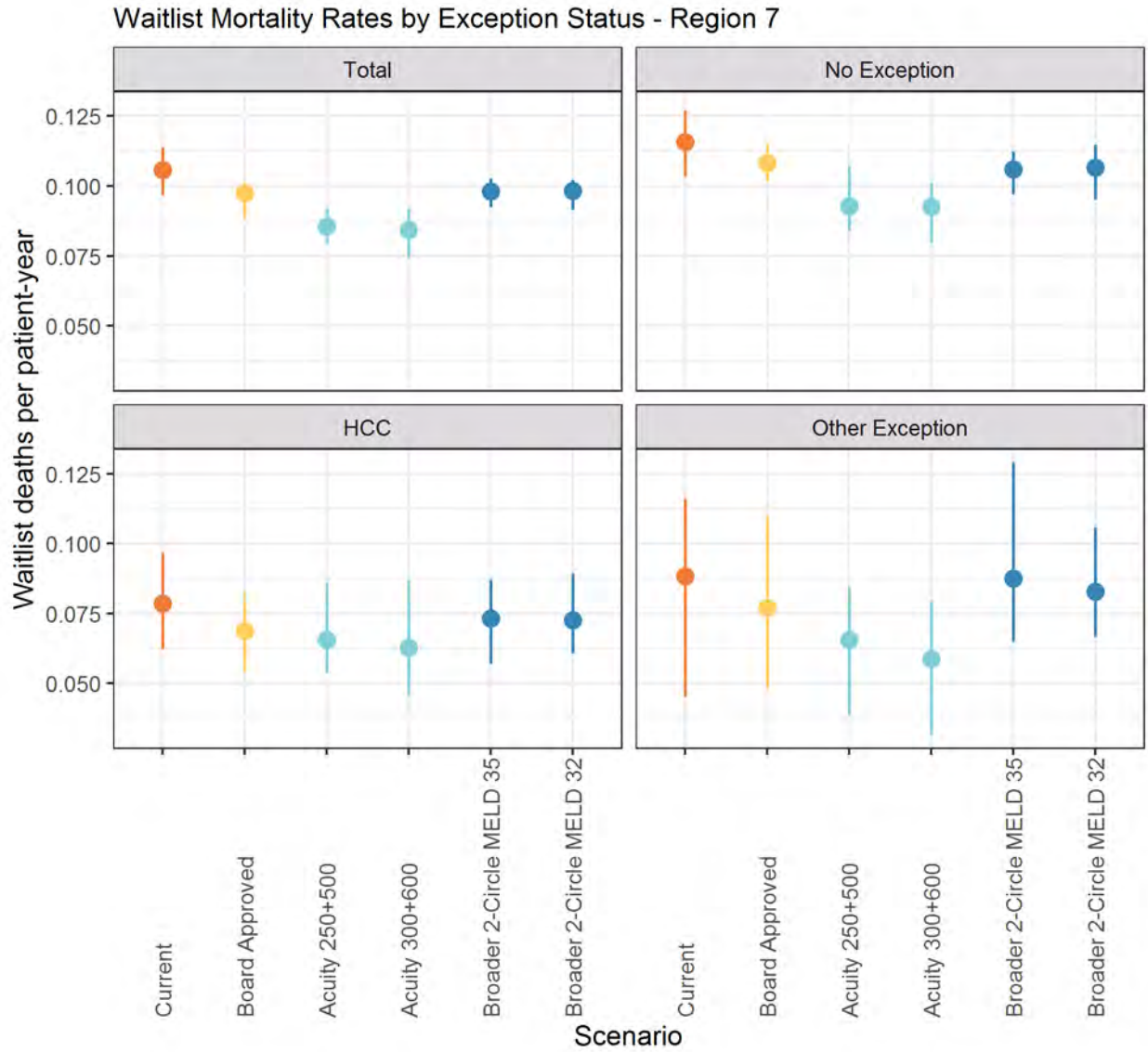


Figure 91 Waitlist Mortality Rates by Exception Status - Region 7

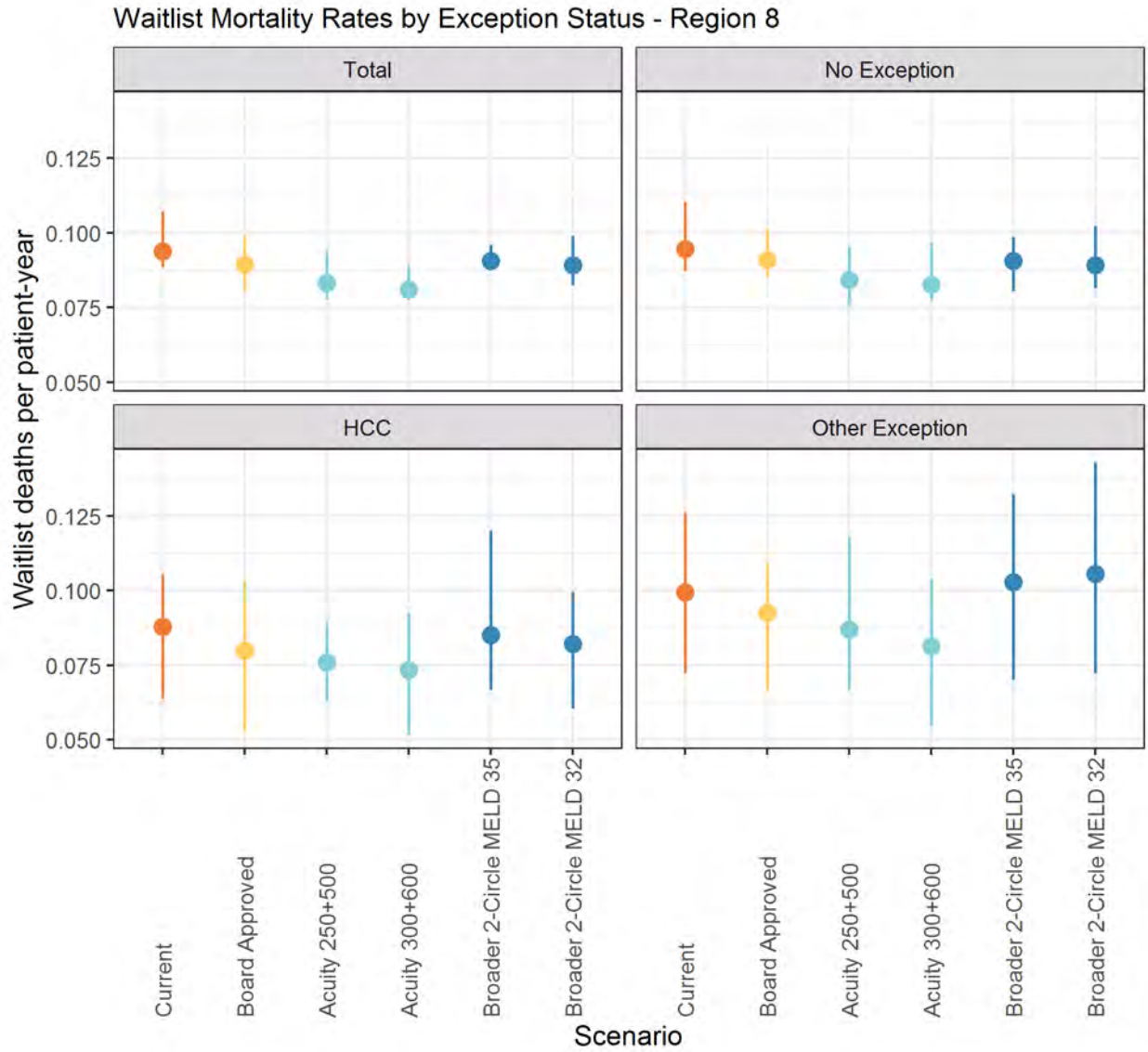


Figure 92 Waitlist Mortality Rates by Exception Status - Region 8

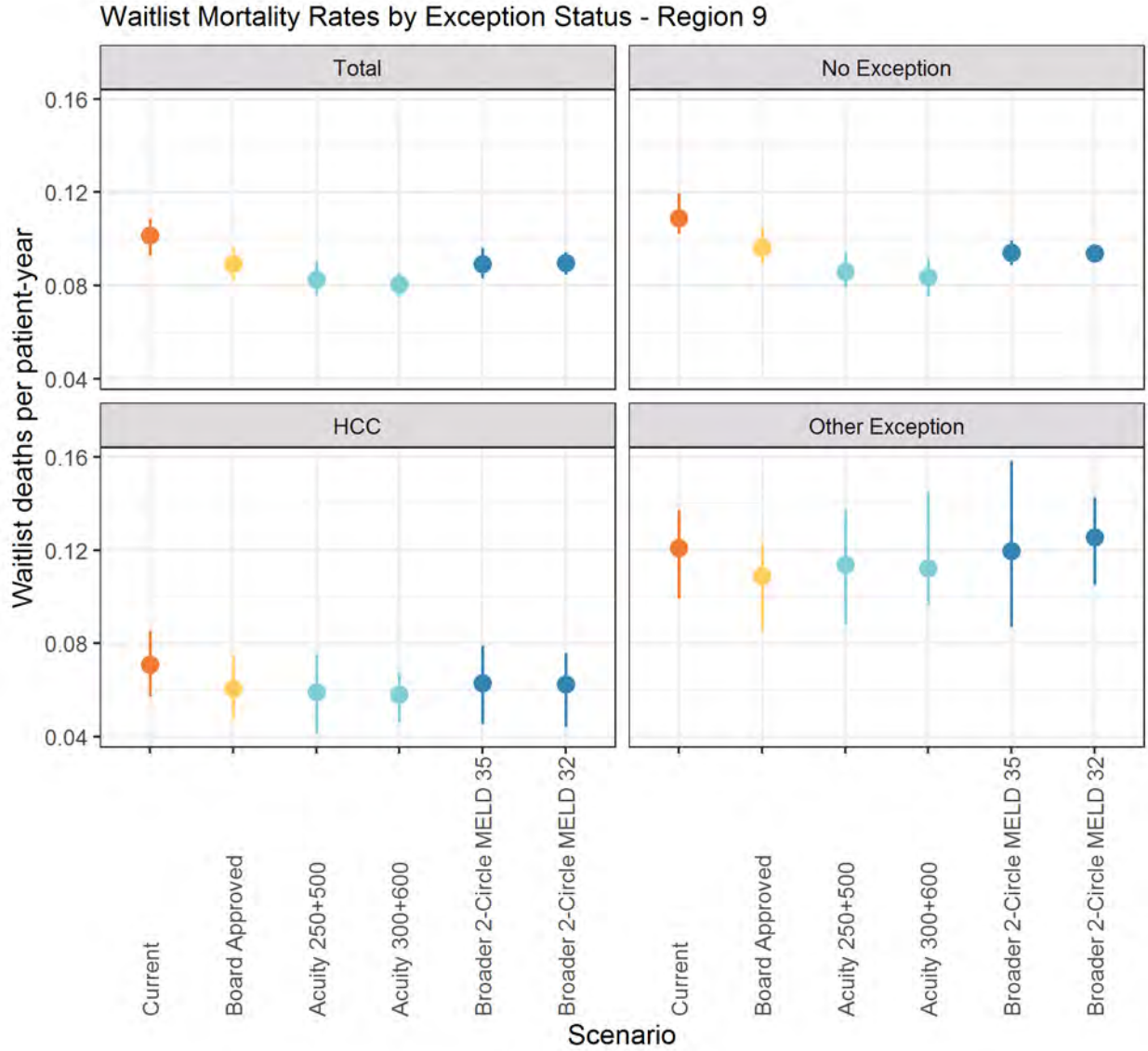


Figure 93 Waitlist Mortality Rates by Exception Status - Region 9

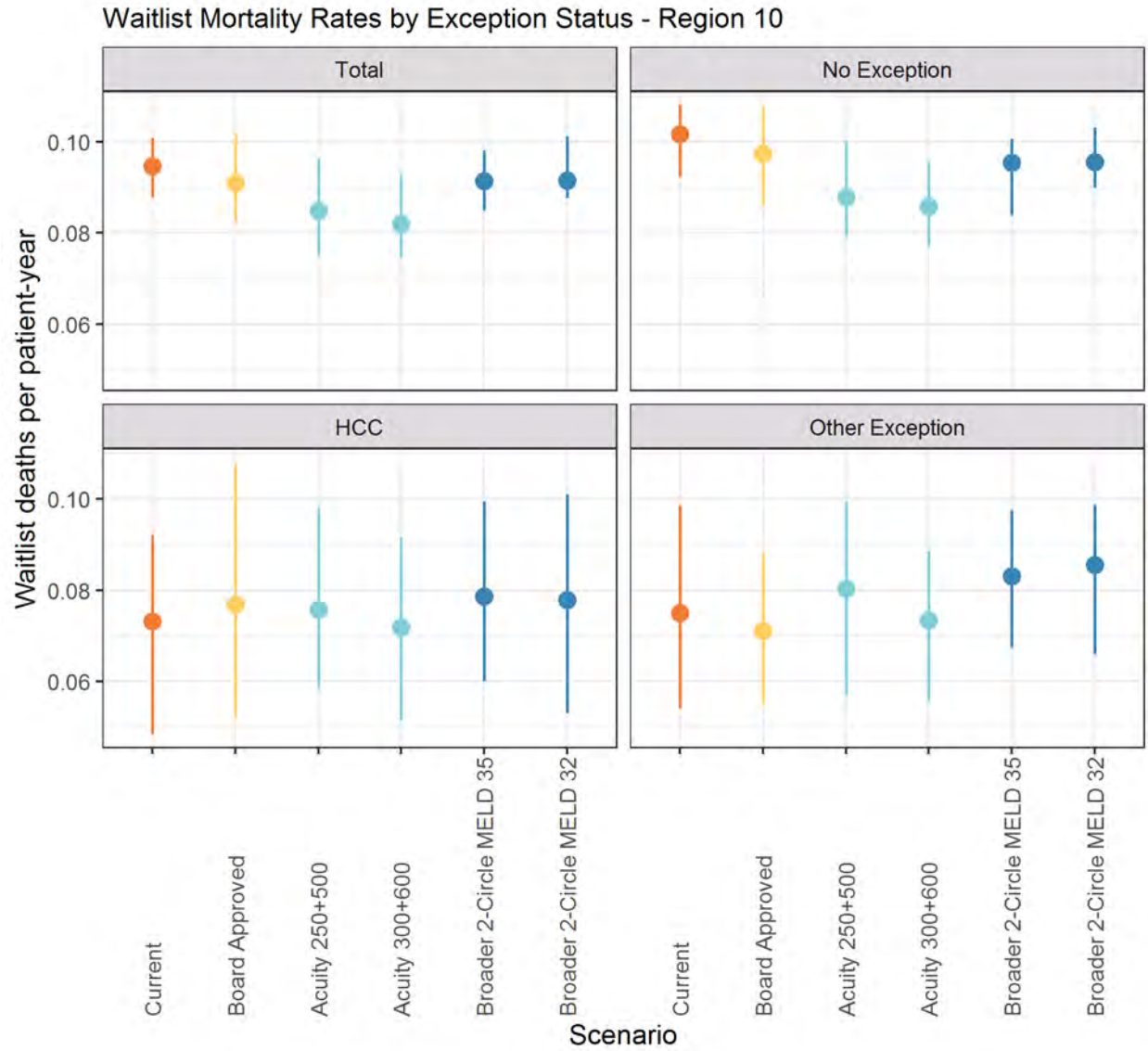


Figure 94 Waitlist Mortality Rates by Exception Status - Region 10

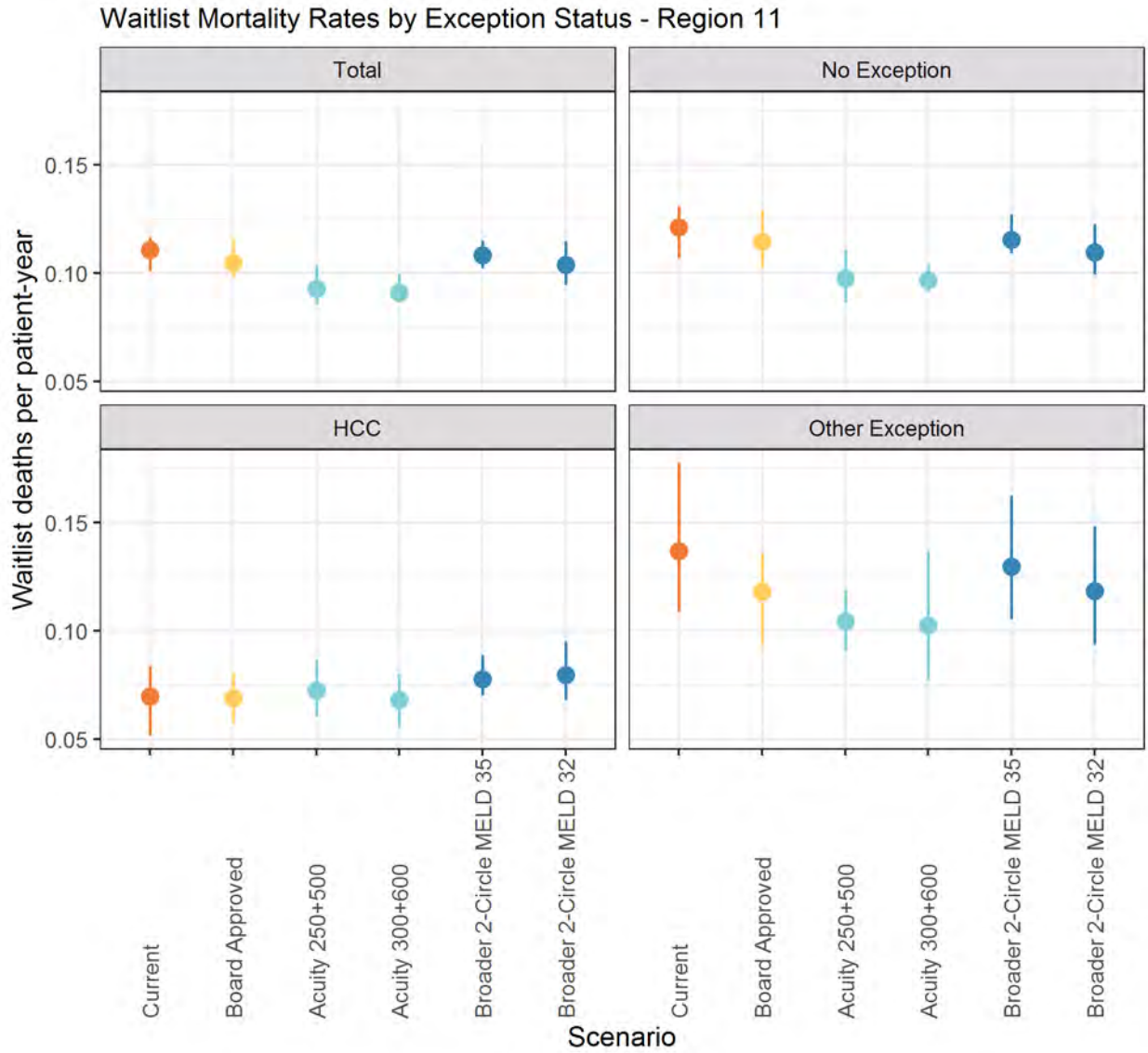


Figure 95 Waitlist Mortality Rates by Exception Status - Region 11

Waitlist Mortality Counts by Exception Status

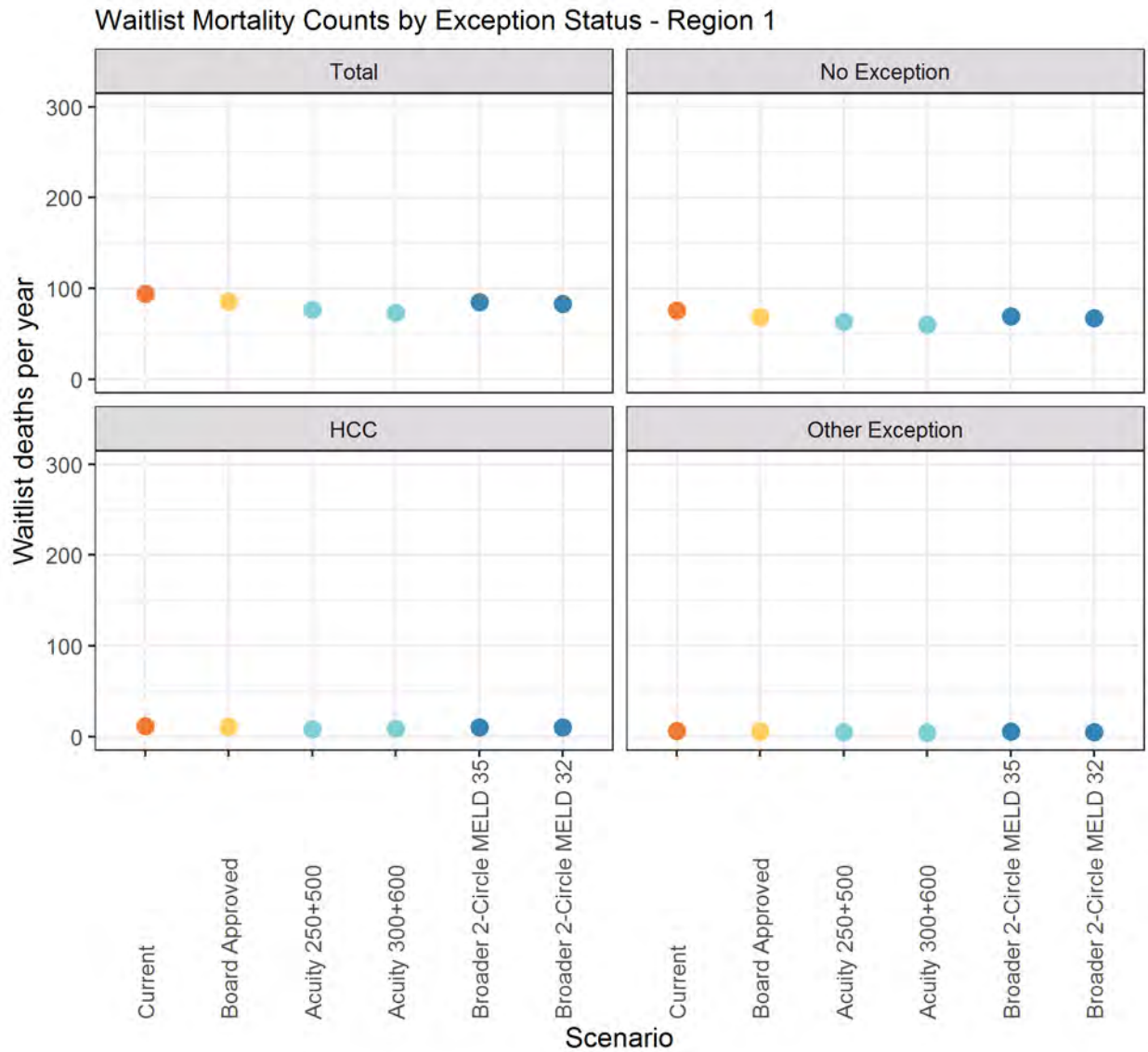


Figure 96 Waitlist Mortality Counts by Exception Status - Region 1

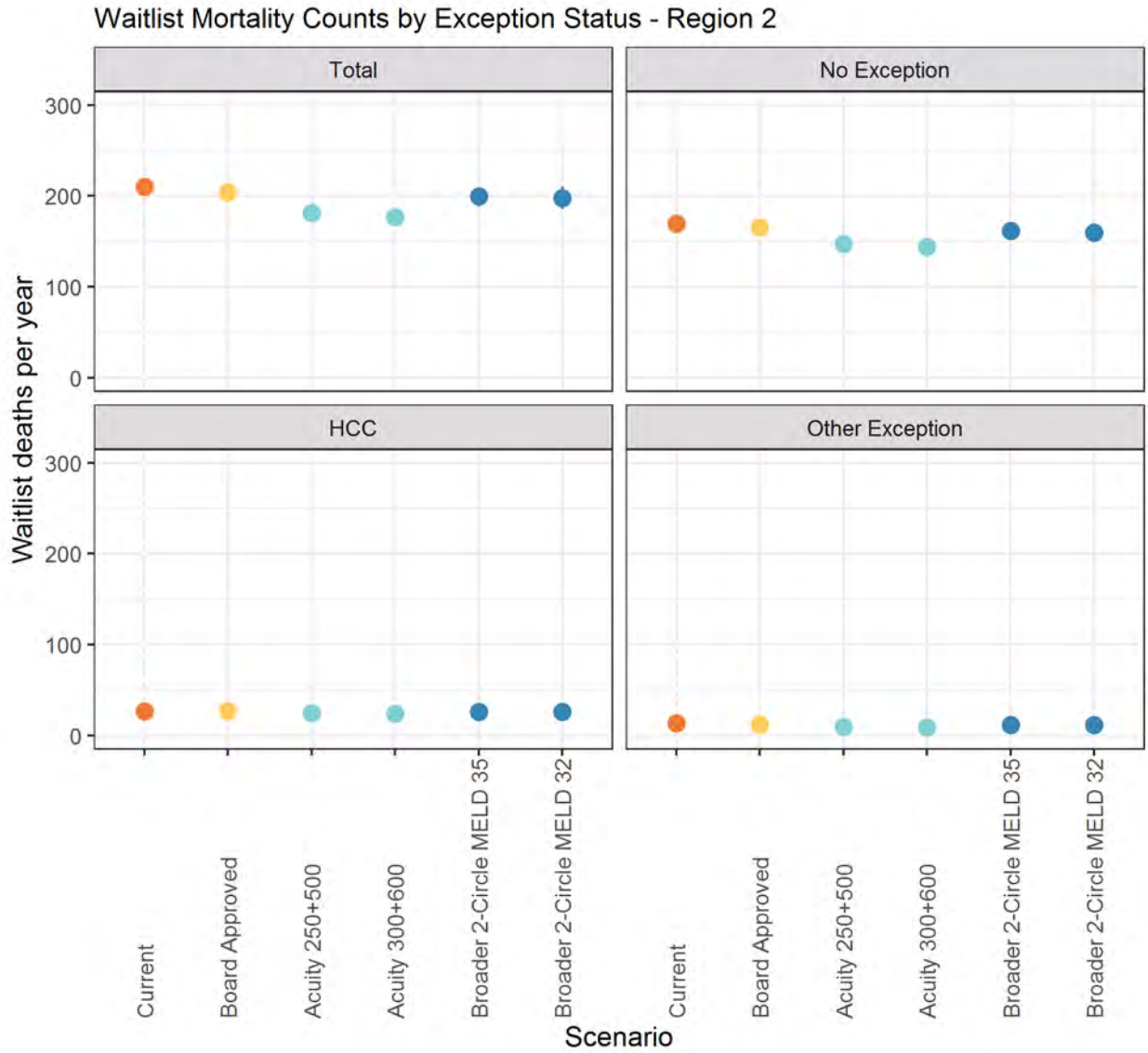


Figure 97 Waitlist Mortality Counts by Exception Status - Region 2

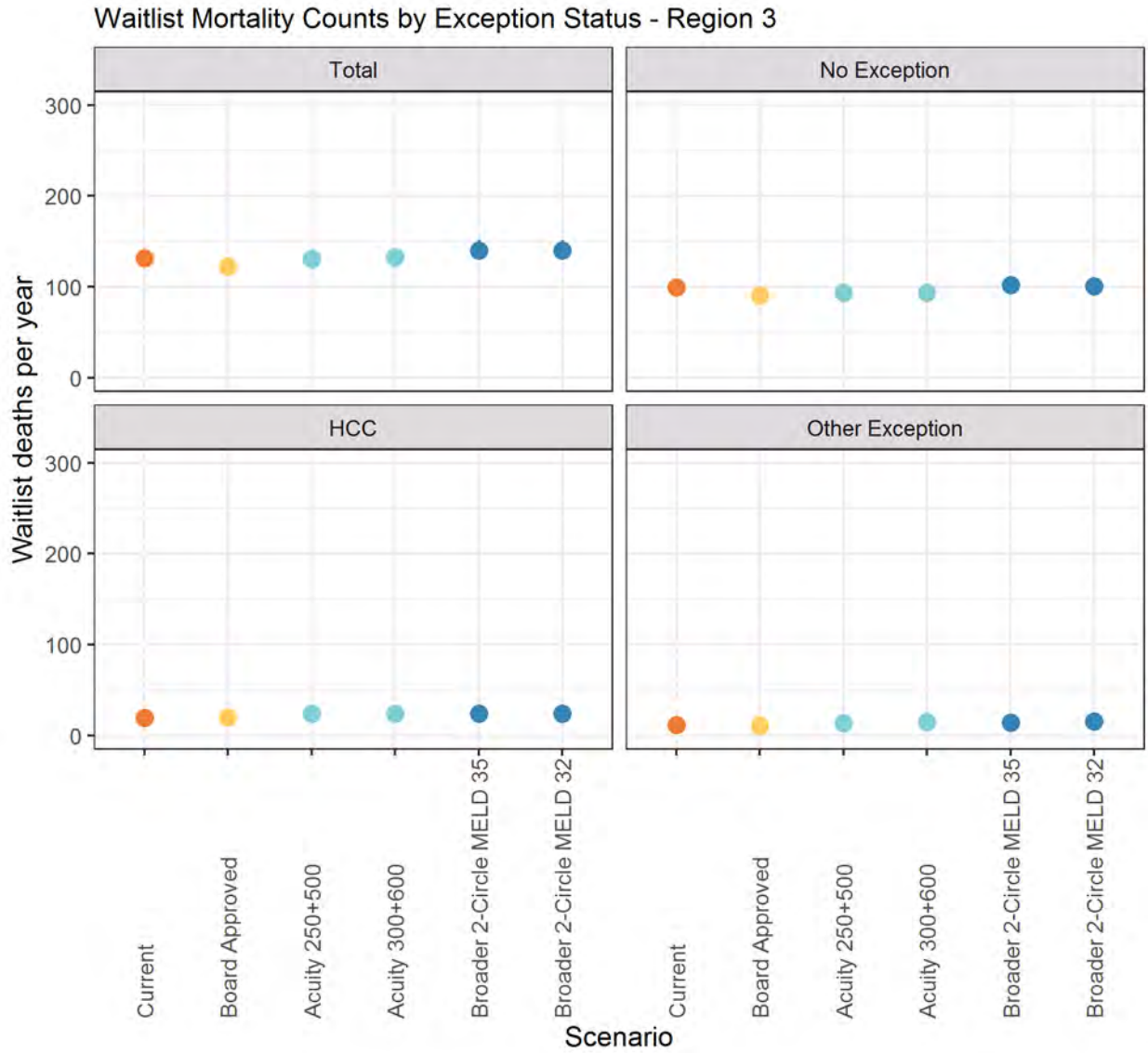


Figure 98 Waitlist Mortality Counts by Exception Status - Region 3

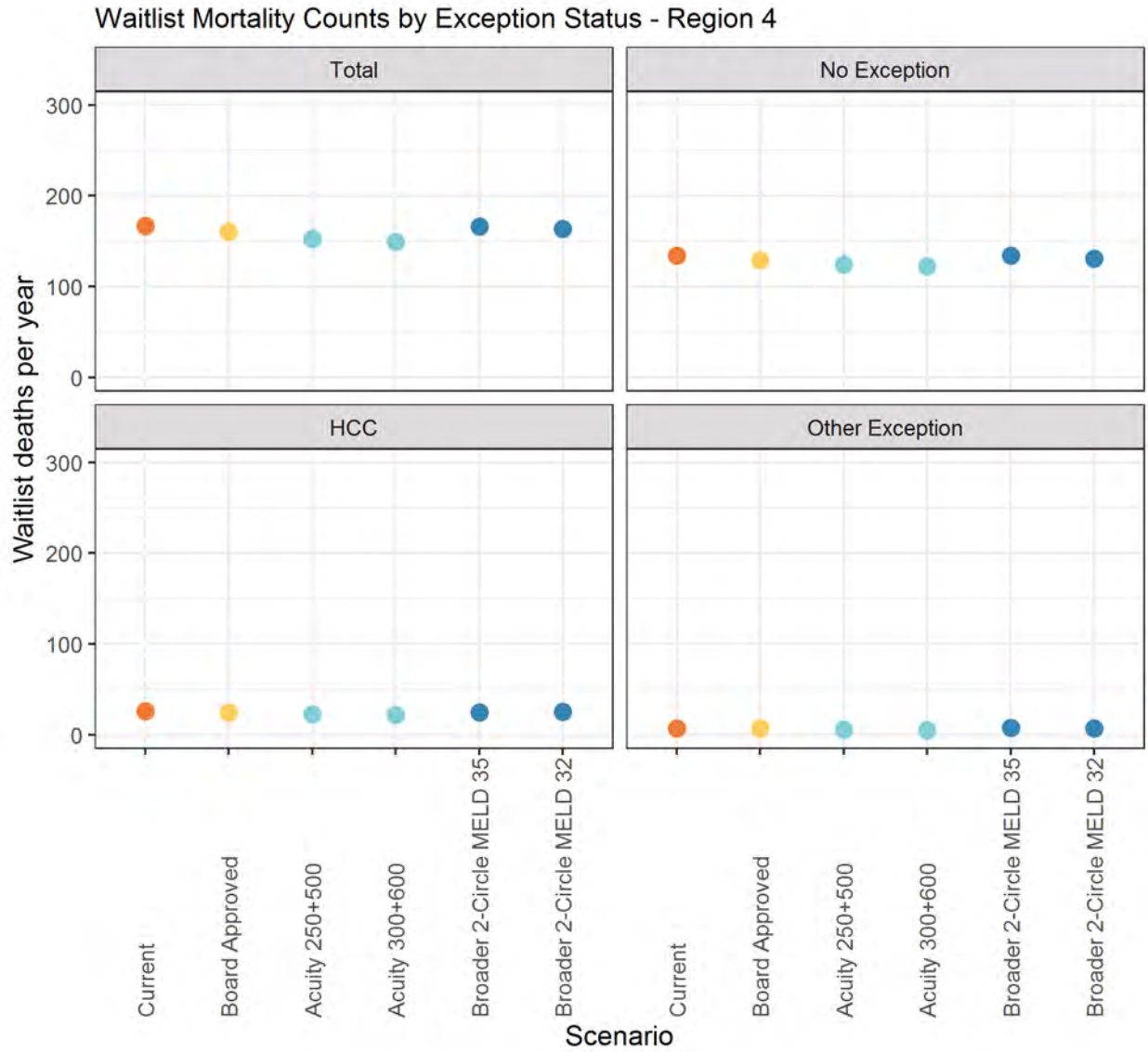


Figure 99 Waitlist Mortality Counts by Exception Status - Region 4

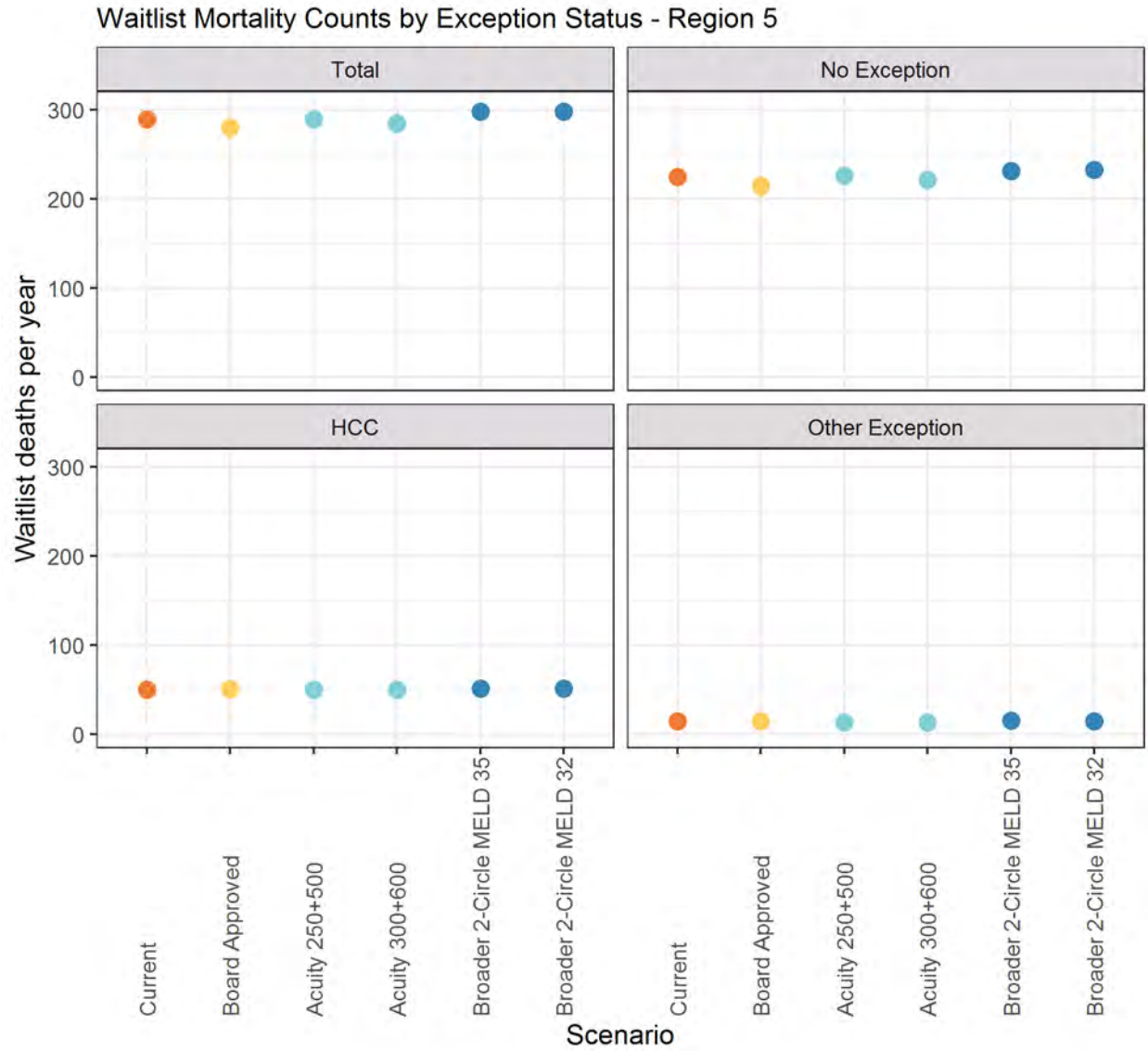


Figure 100 Waitlist Mortality Counts by Exception Status - Region 5

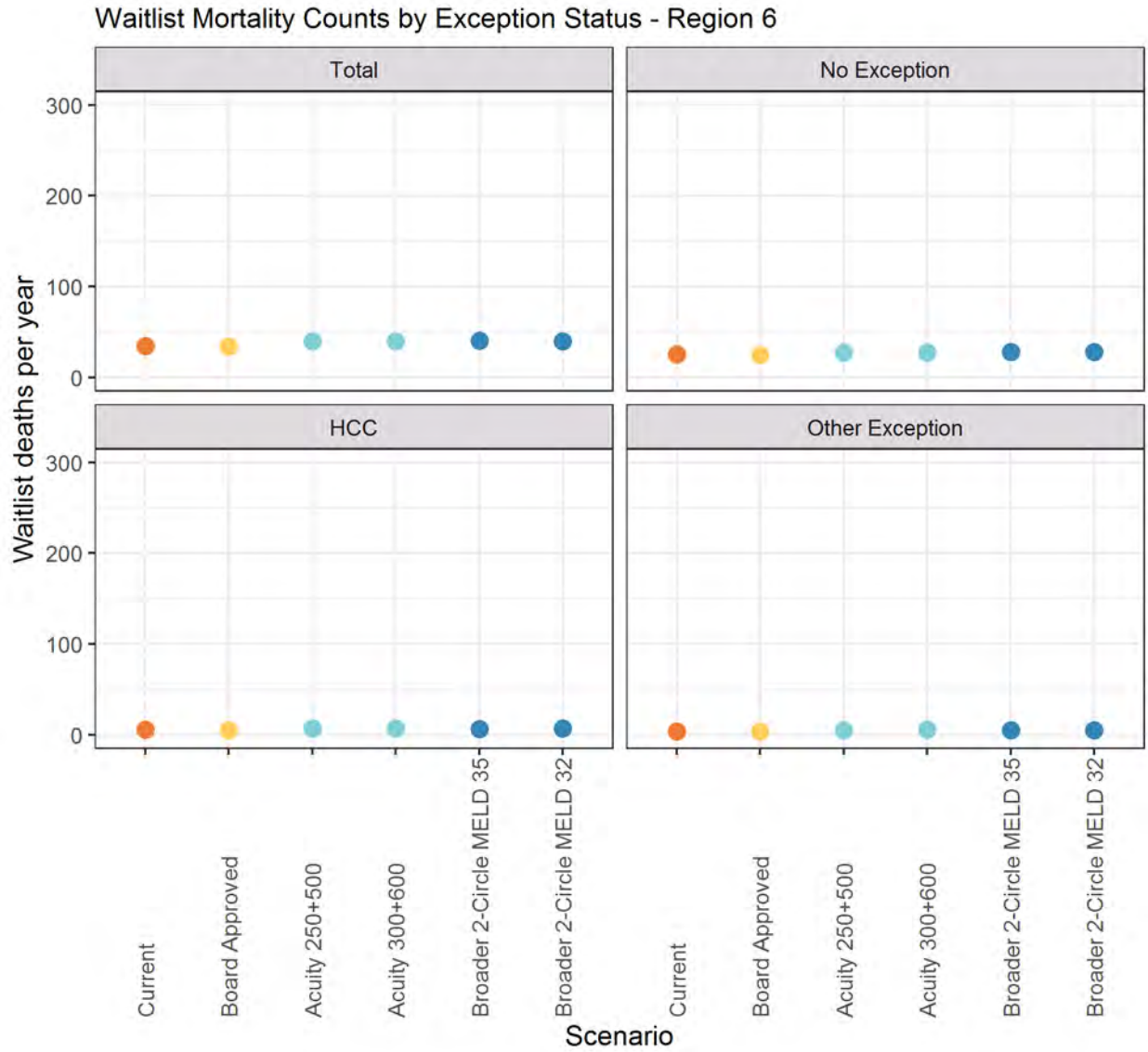


Figure 101 Waitlist Mortality Counts by Exception Status - Region 6

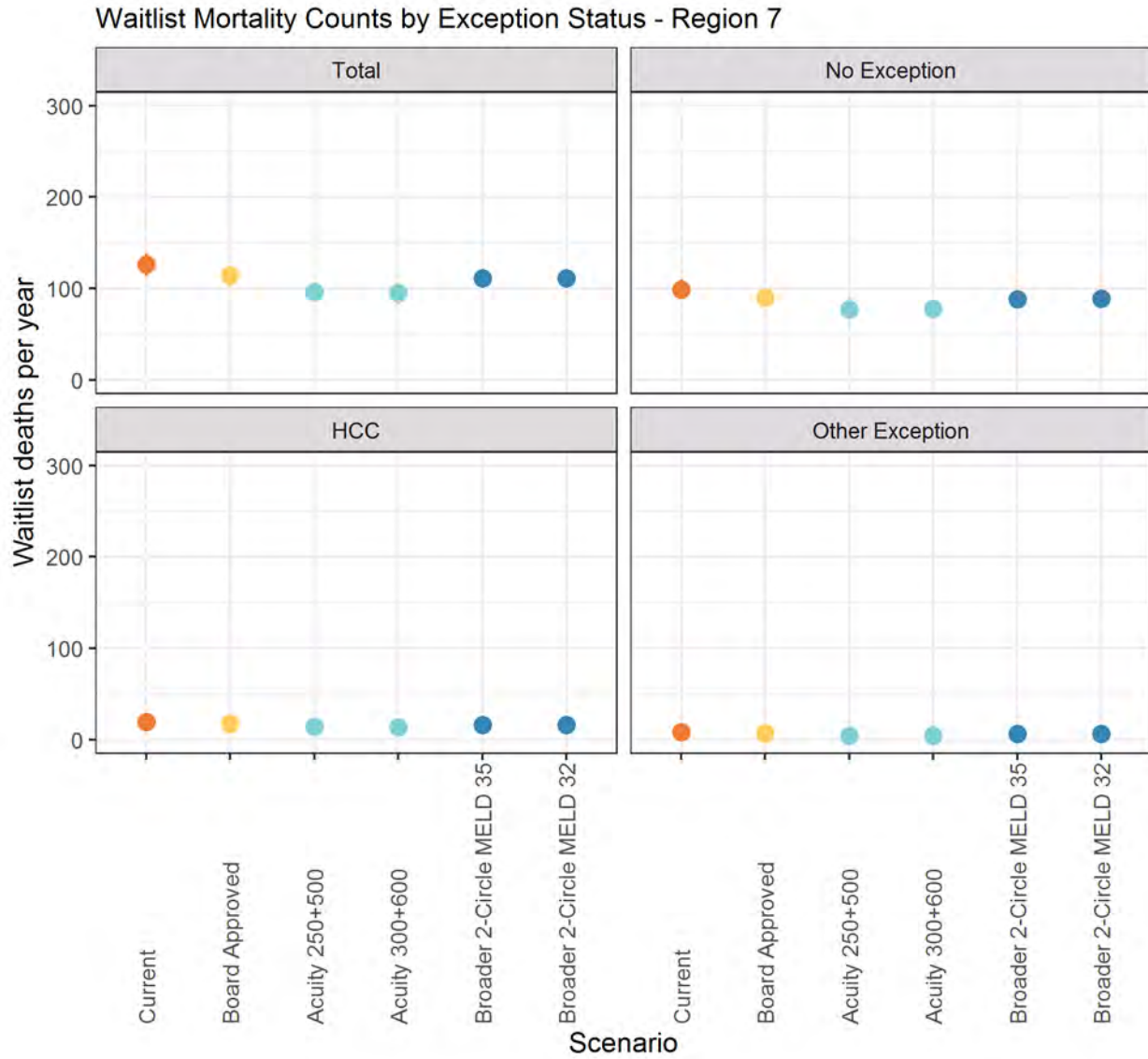


Figure 102 Waitlist Mortality Counts by Exception Status - Region 7

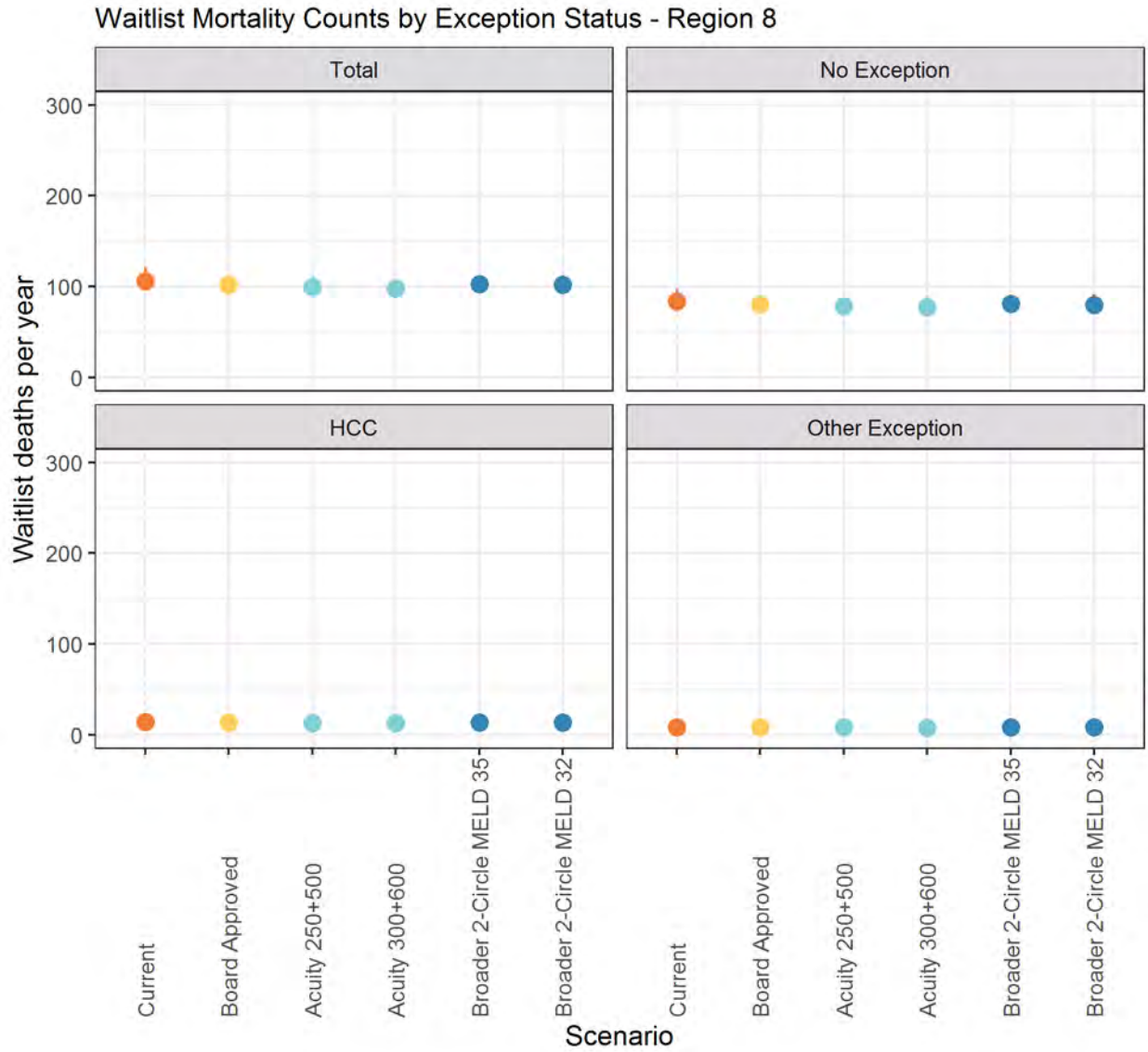


Figure 103 Waitlist Mortality Counts by Exception Status - Region 8

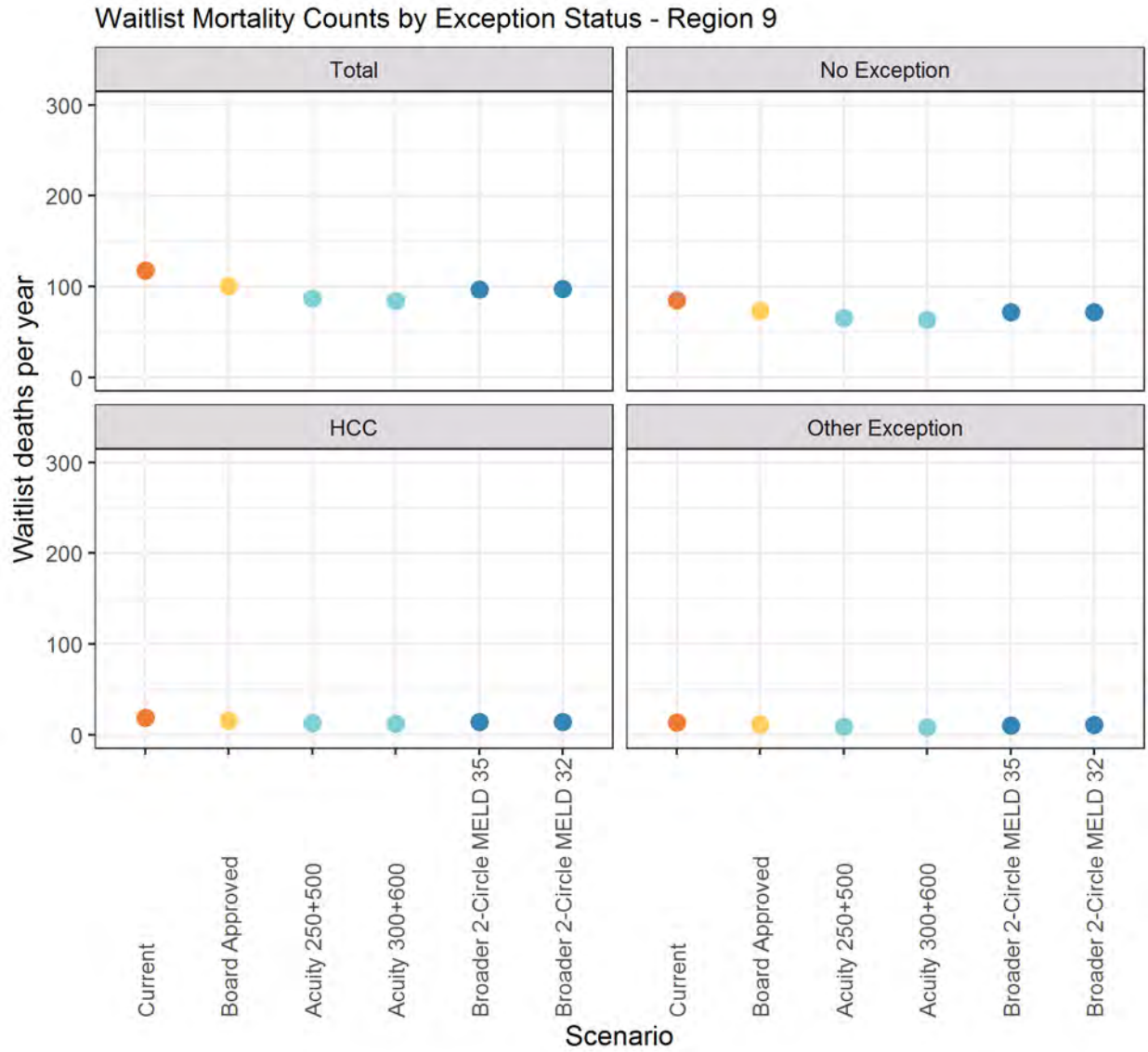


Figure 104 Waitlist Mortality Counts by Exception Status - Region 9

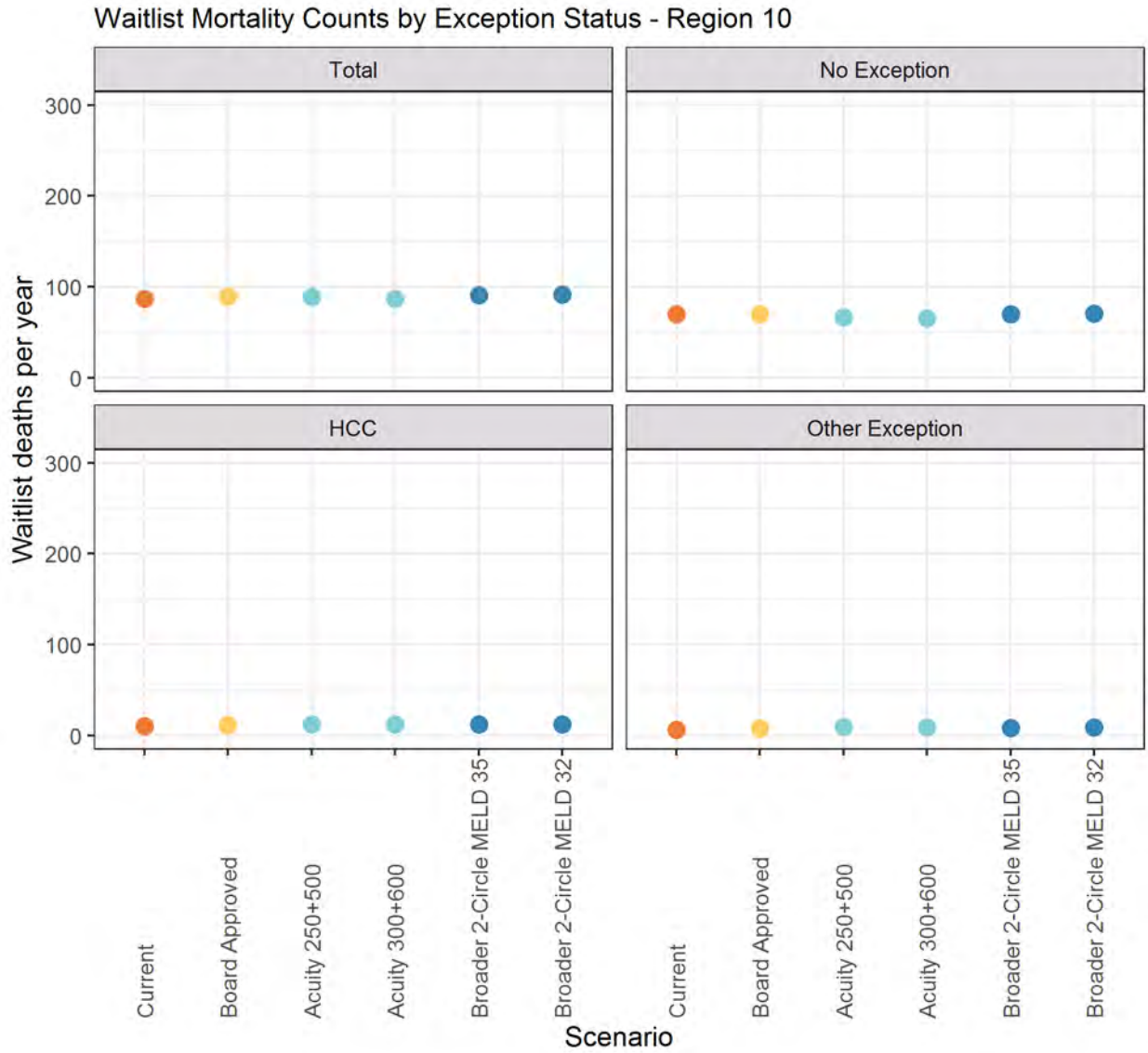


Figure 105 Waitlist Mortality Counts by Exception Status - Region 10

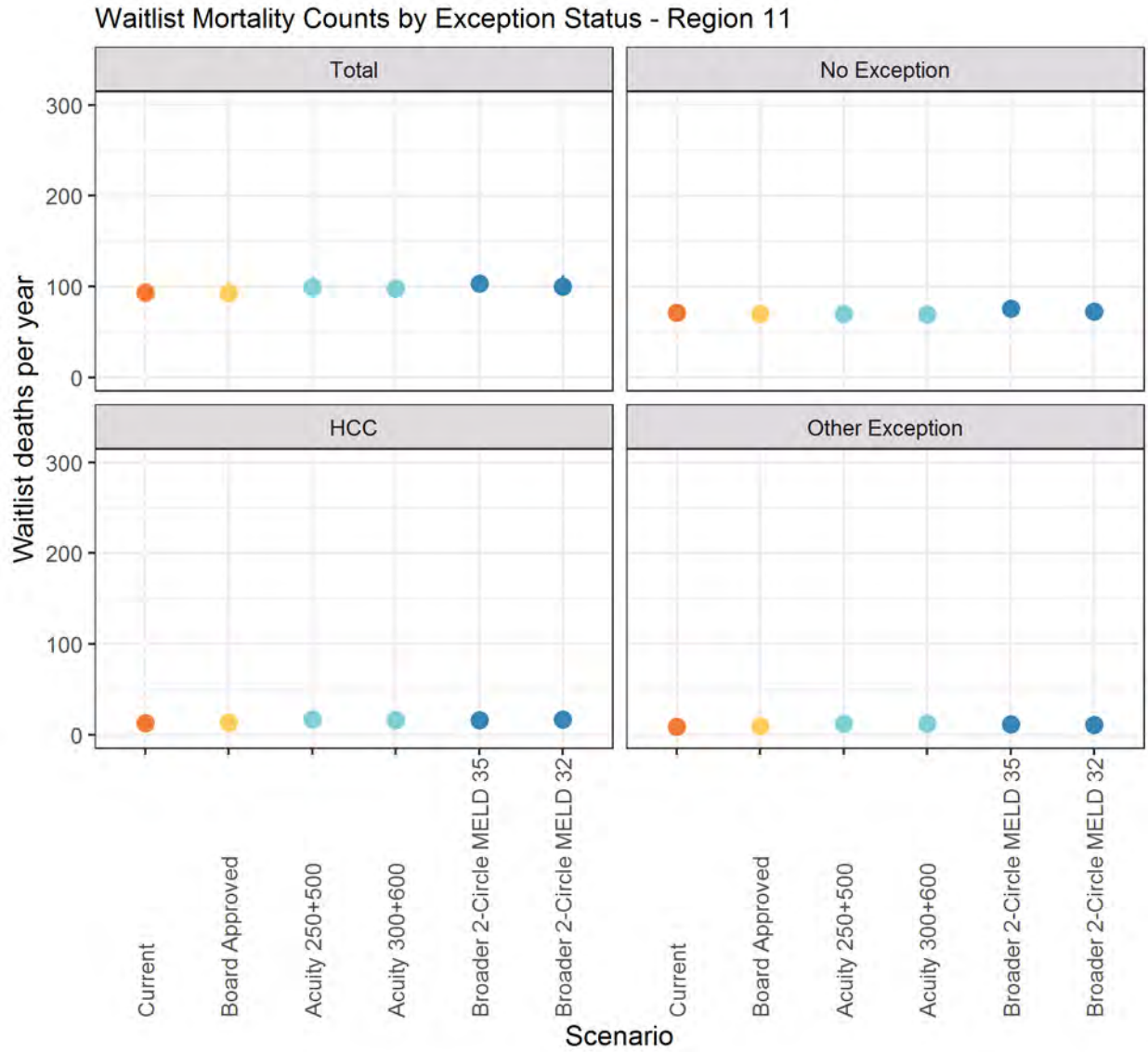


Figure 106 Waitlist Mortality Counts by Exception Status - Region 11

Waitlist Mortality Rates by Allocation MELD/PELD

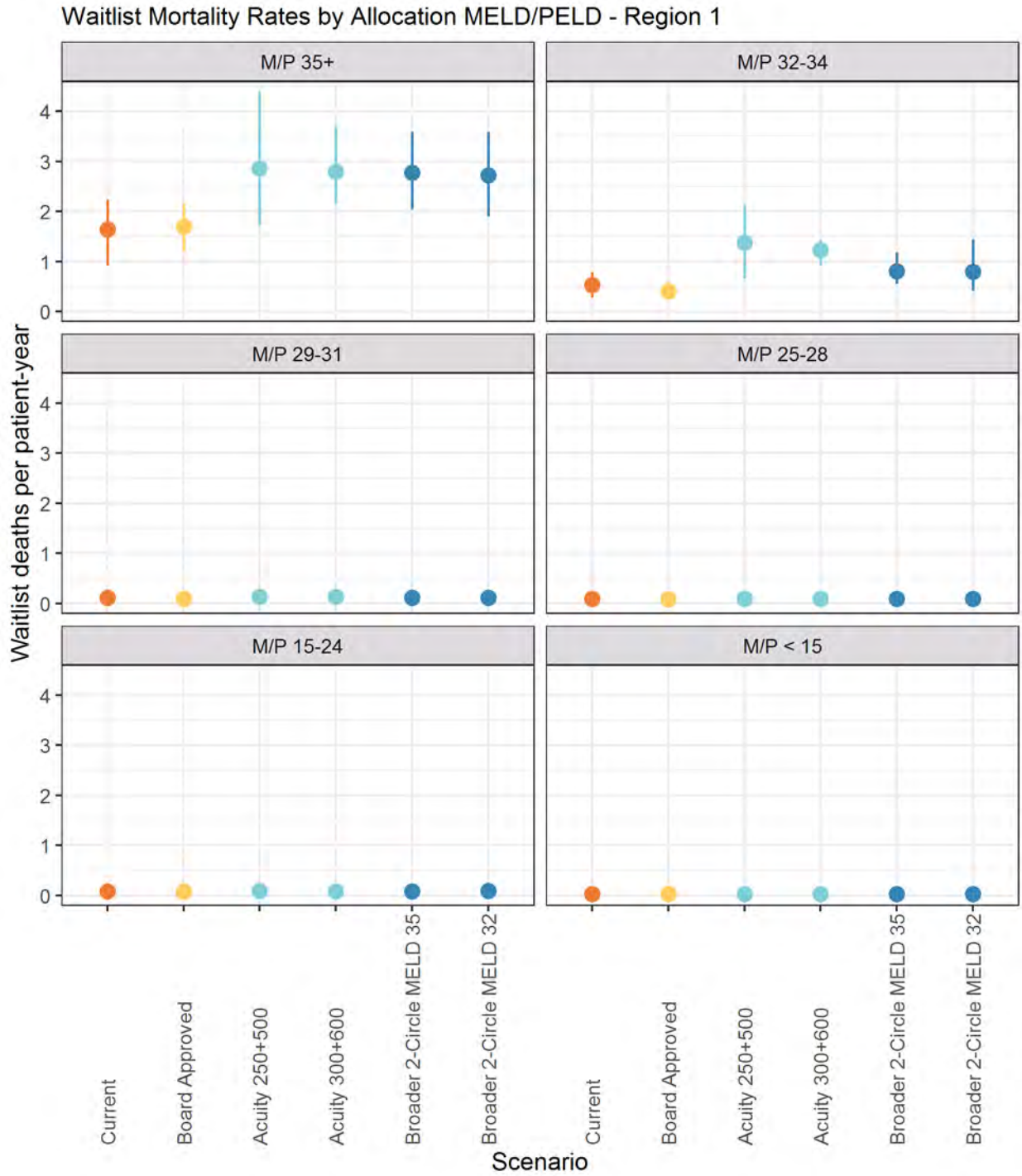


Figure 107 Waitlist Mortality Rates by Allocation MELD/PELD - Region 1

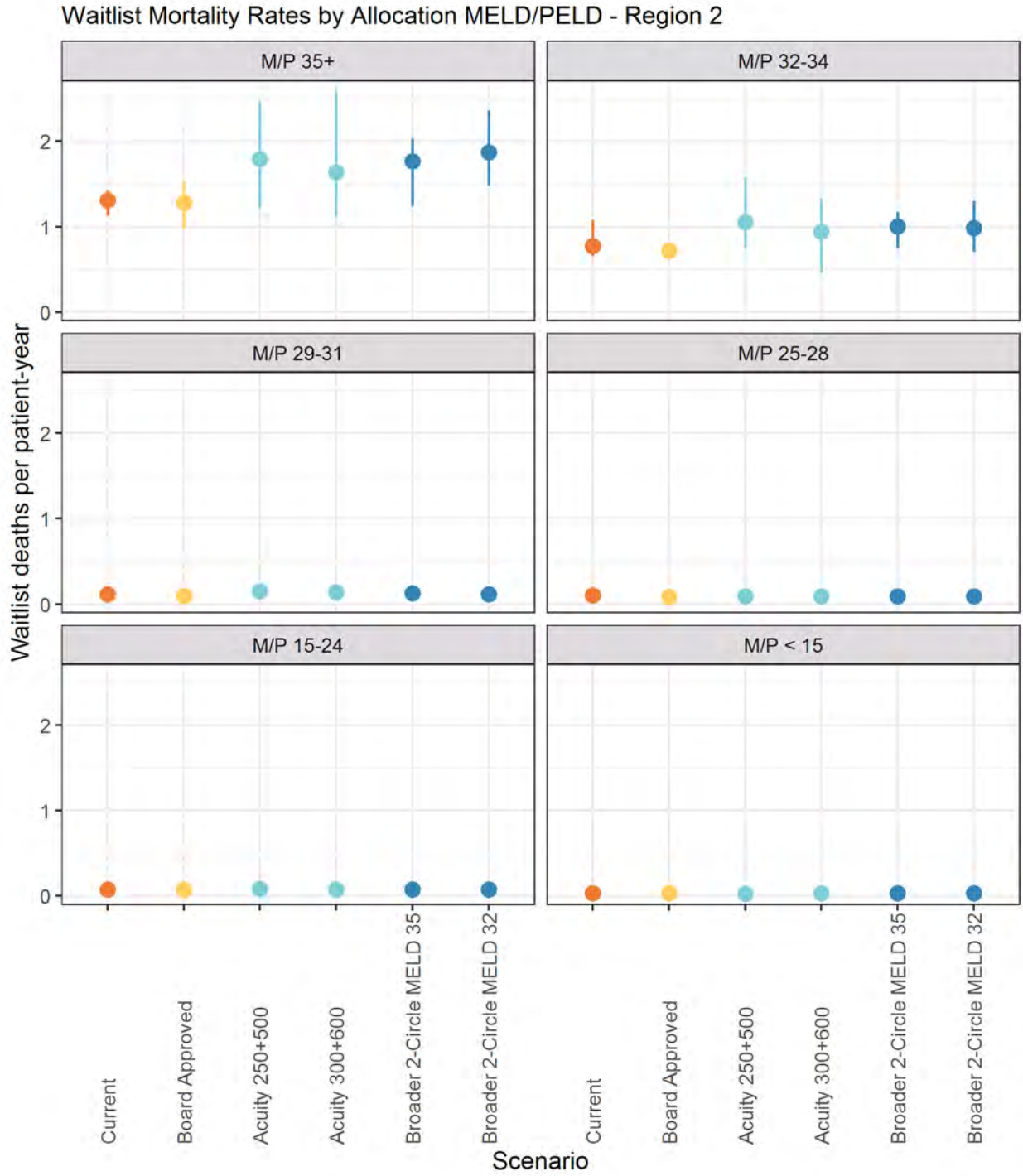


Figure 108 Waitlist Mortality Rates by Allocation MELD/PELD - Region 2

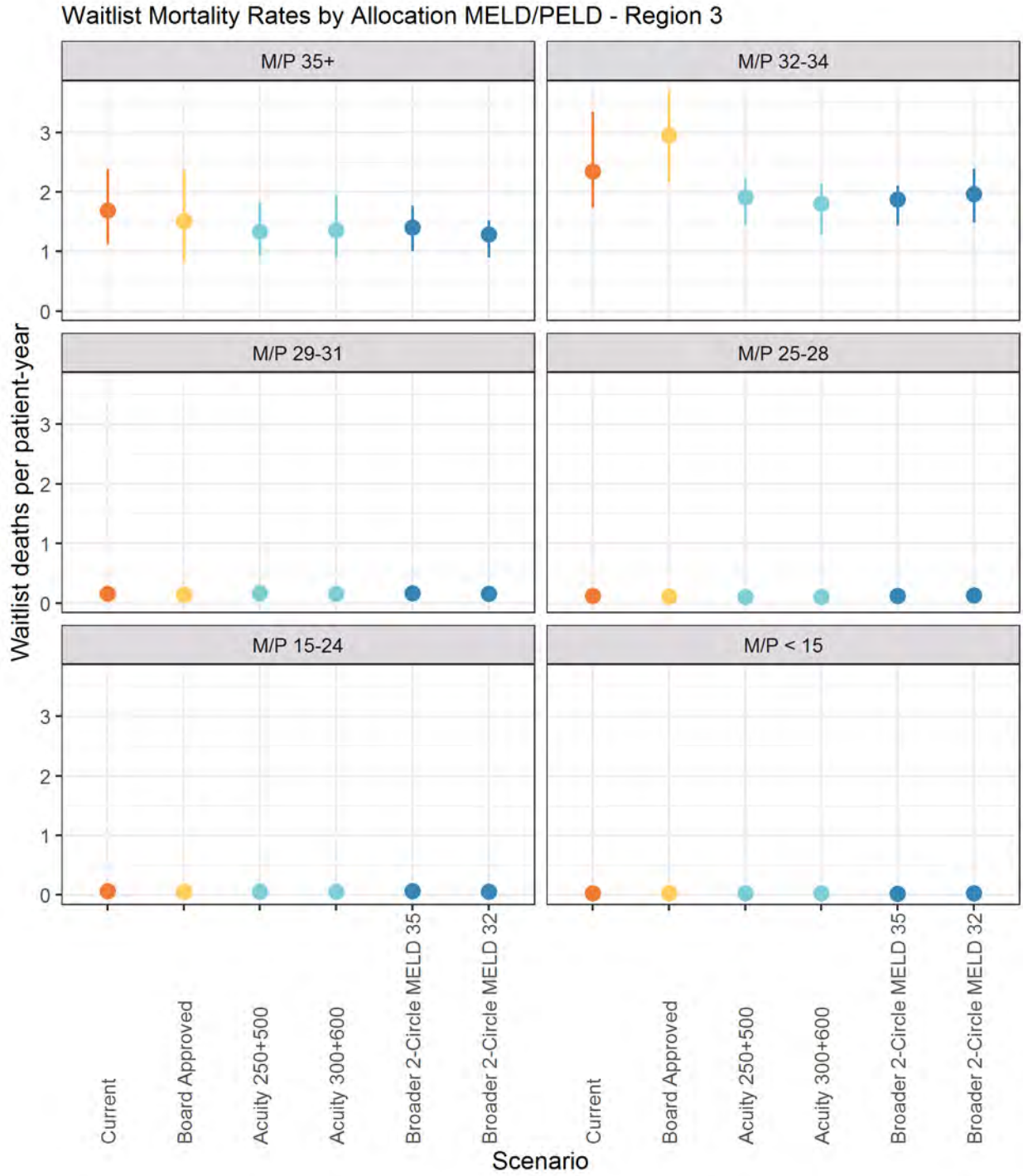


Figure 109 Waitlist Mortality Rates by Allocation MELD/PELD - Region 3

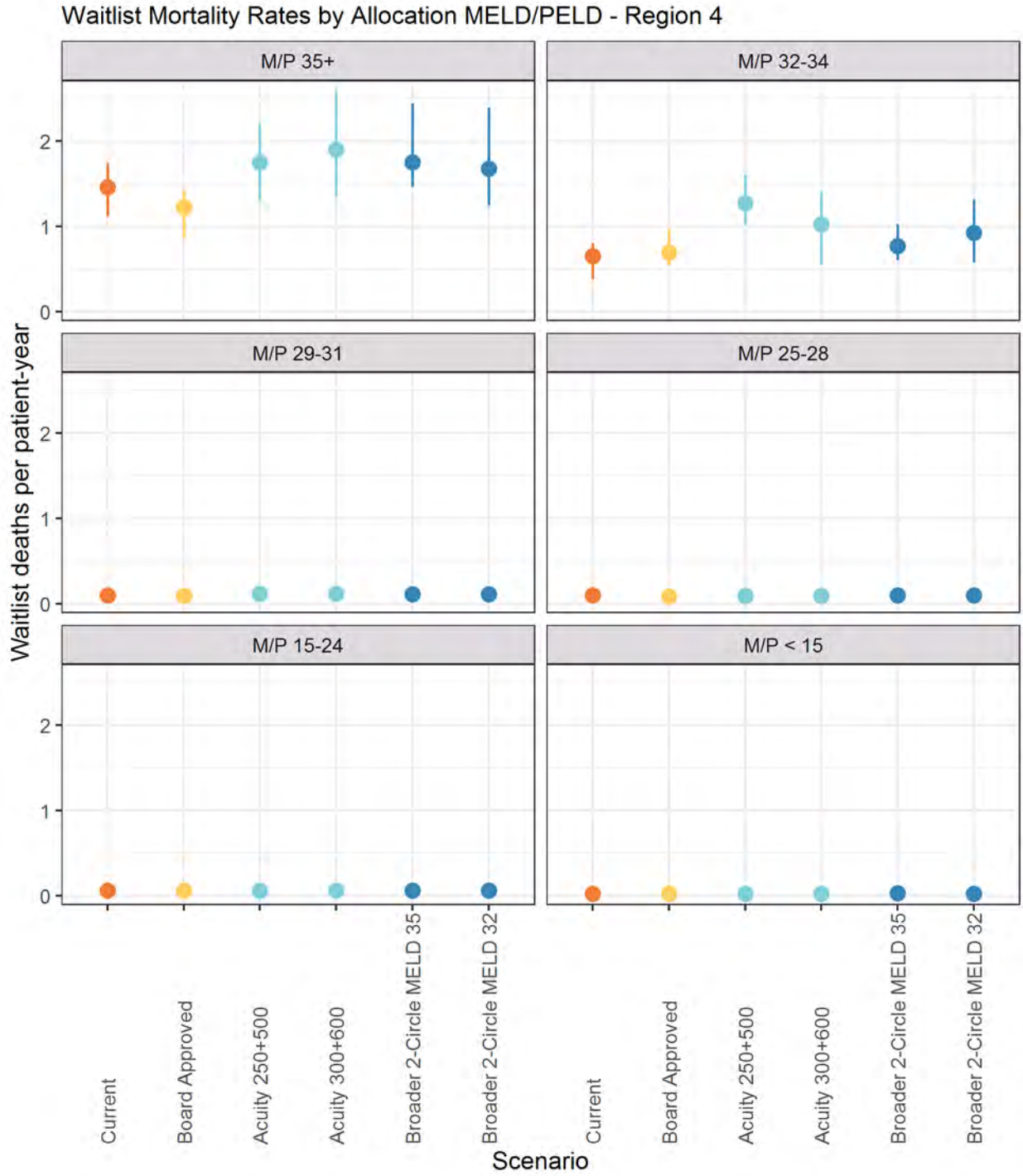


Figure 110 Waitlist Mortality Rates by Allocation MELD/PELD - Region 4

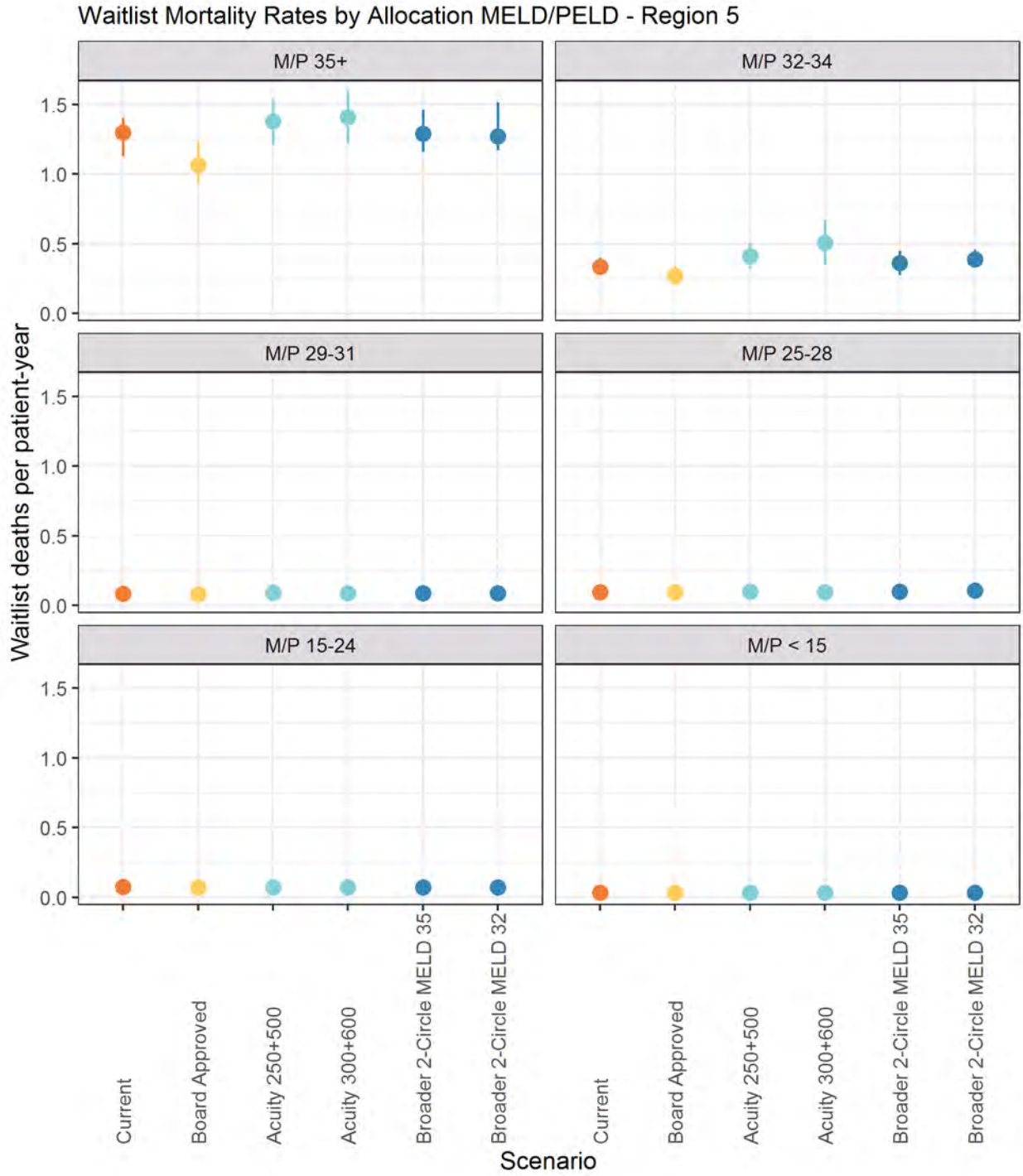


Figure 111 Waitlist Mortality Rates by Allocation MELD/PELD - Region 5

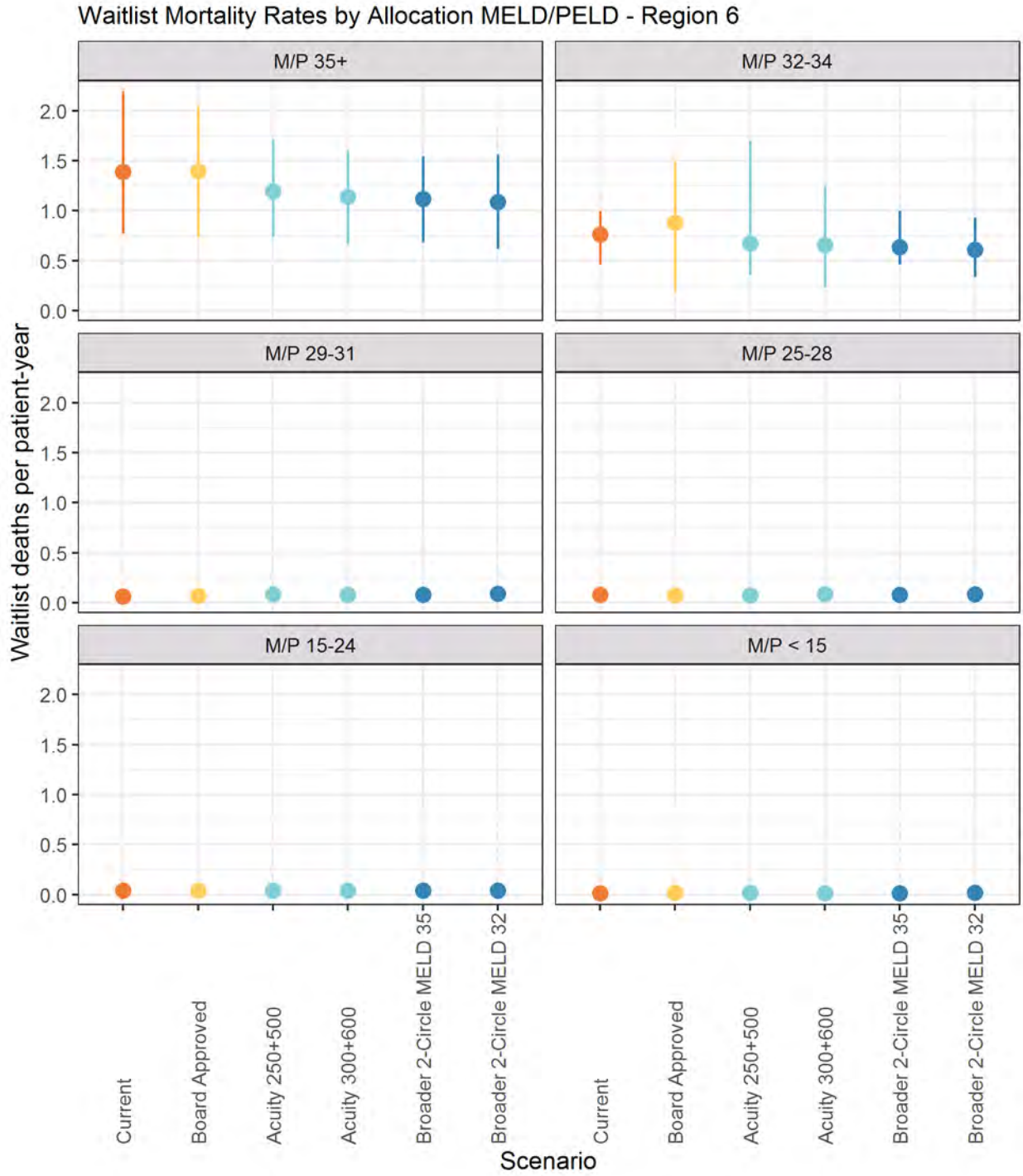


Figure 112 Waitlist Mortality Rates by Allocation MELD/PELD - Region 6

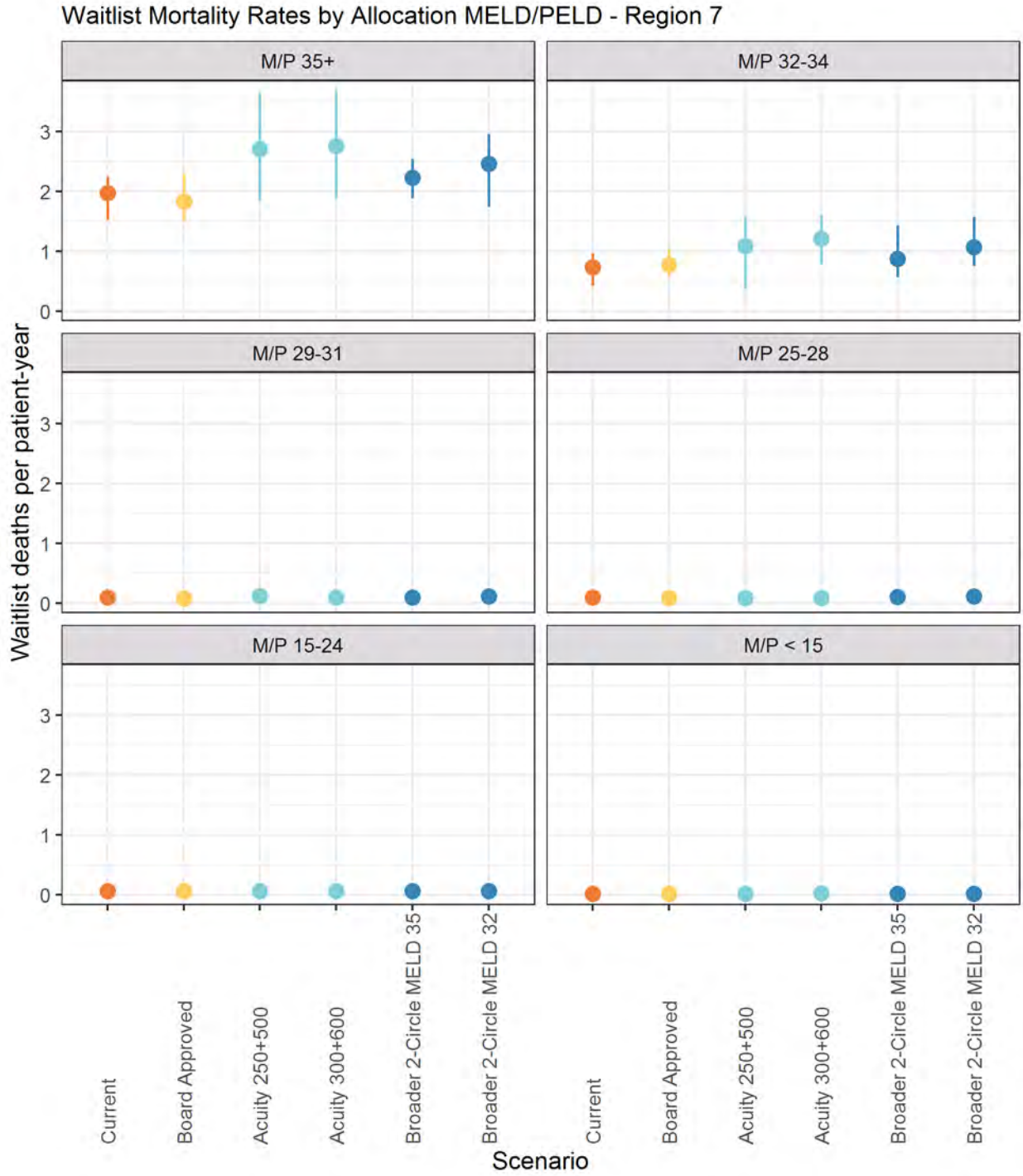


Figure 113 Waitlist Mortality Rates by Allocation MELD/PELD - Region 7

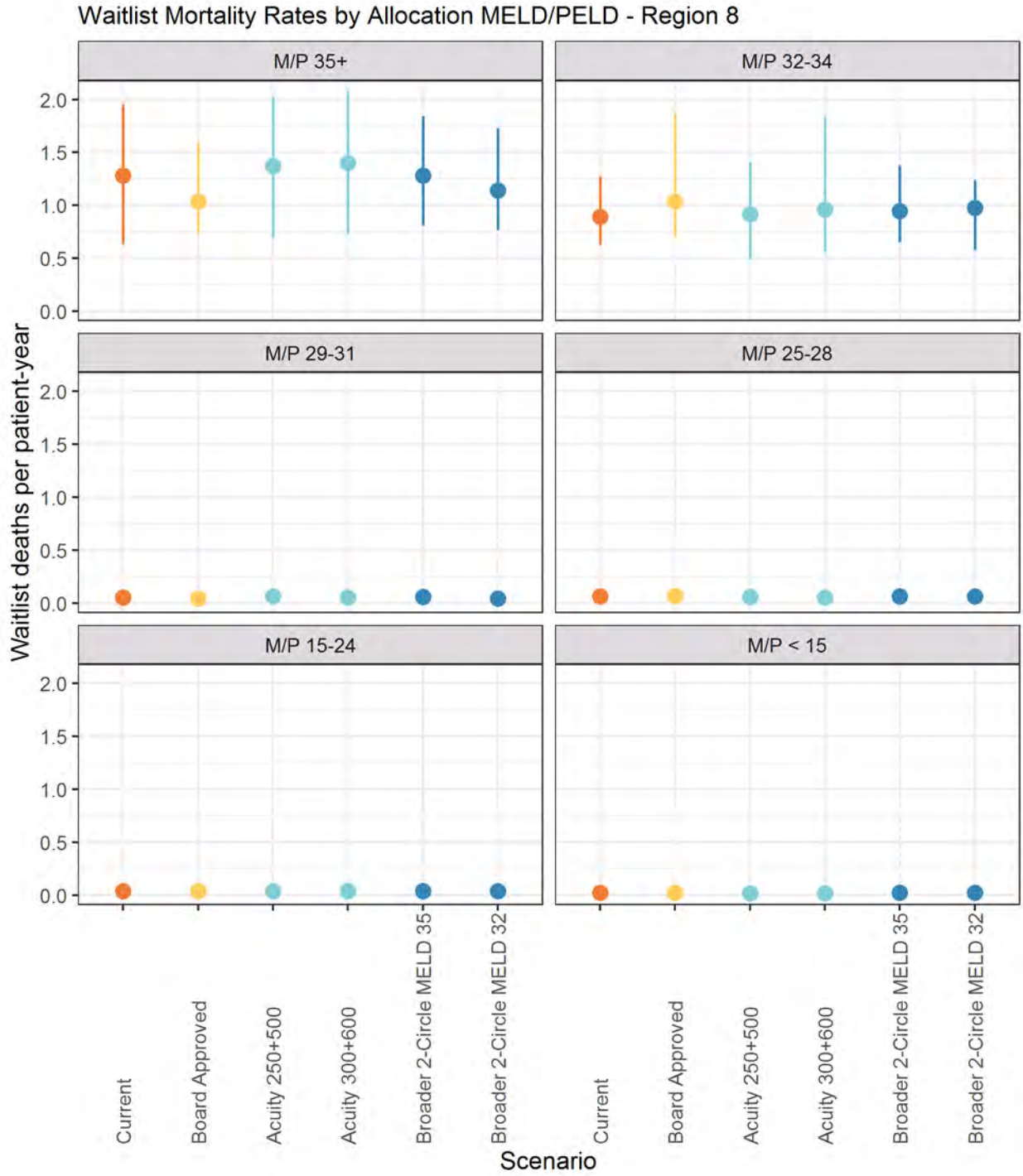


Figure 114 Waitlist Mortality Rates by Allocation MELD/PELD - Region 8

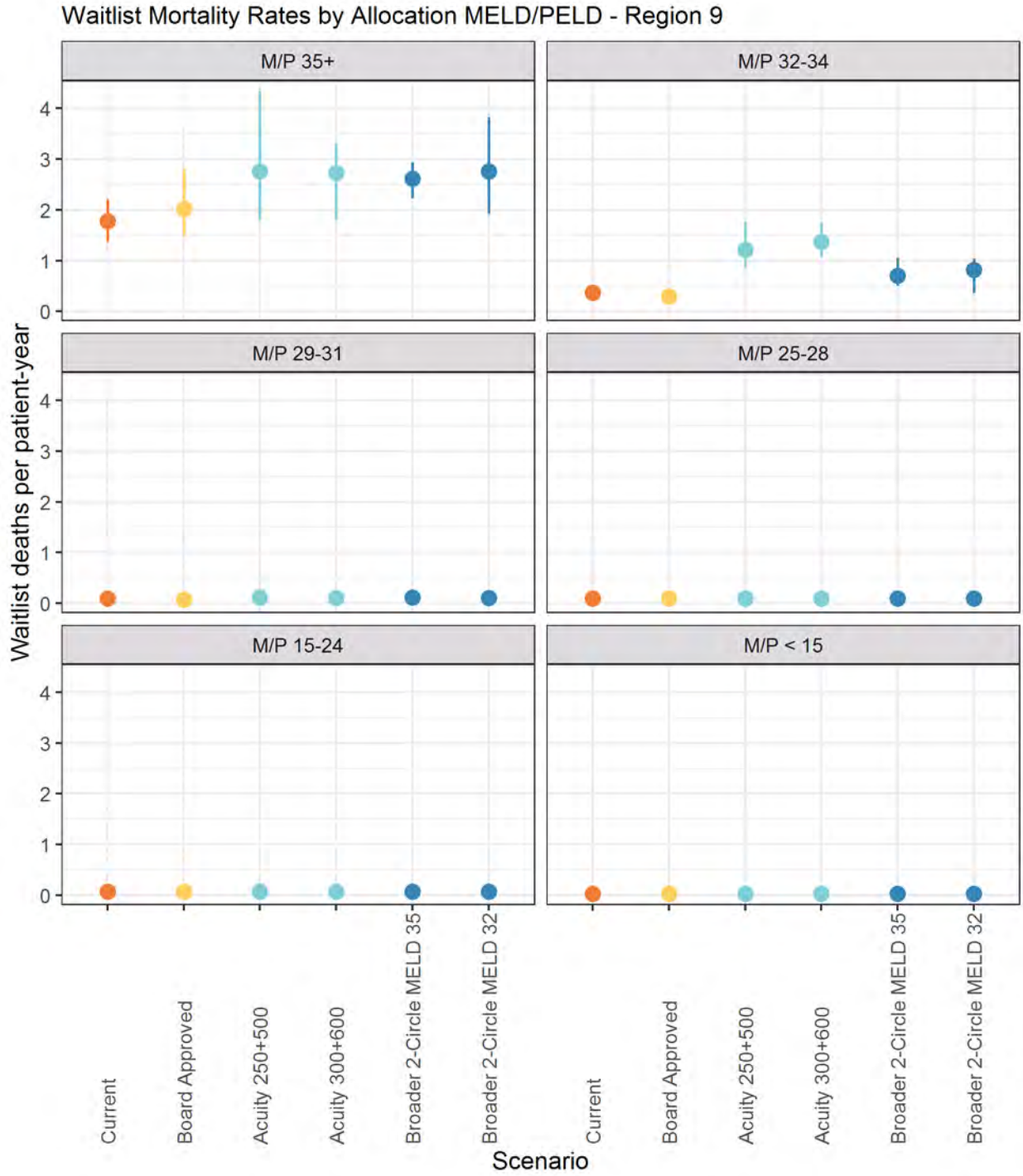


Figure 115 Waitlist Mortality Rates by Allocation MELD/PELD - Region 9

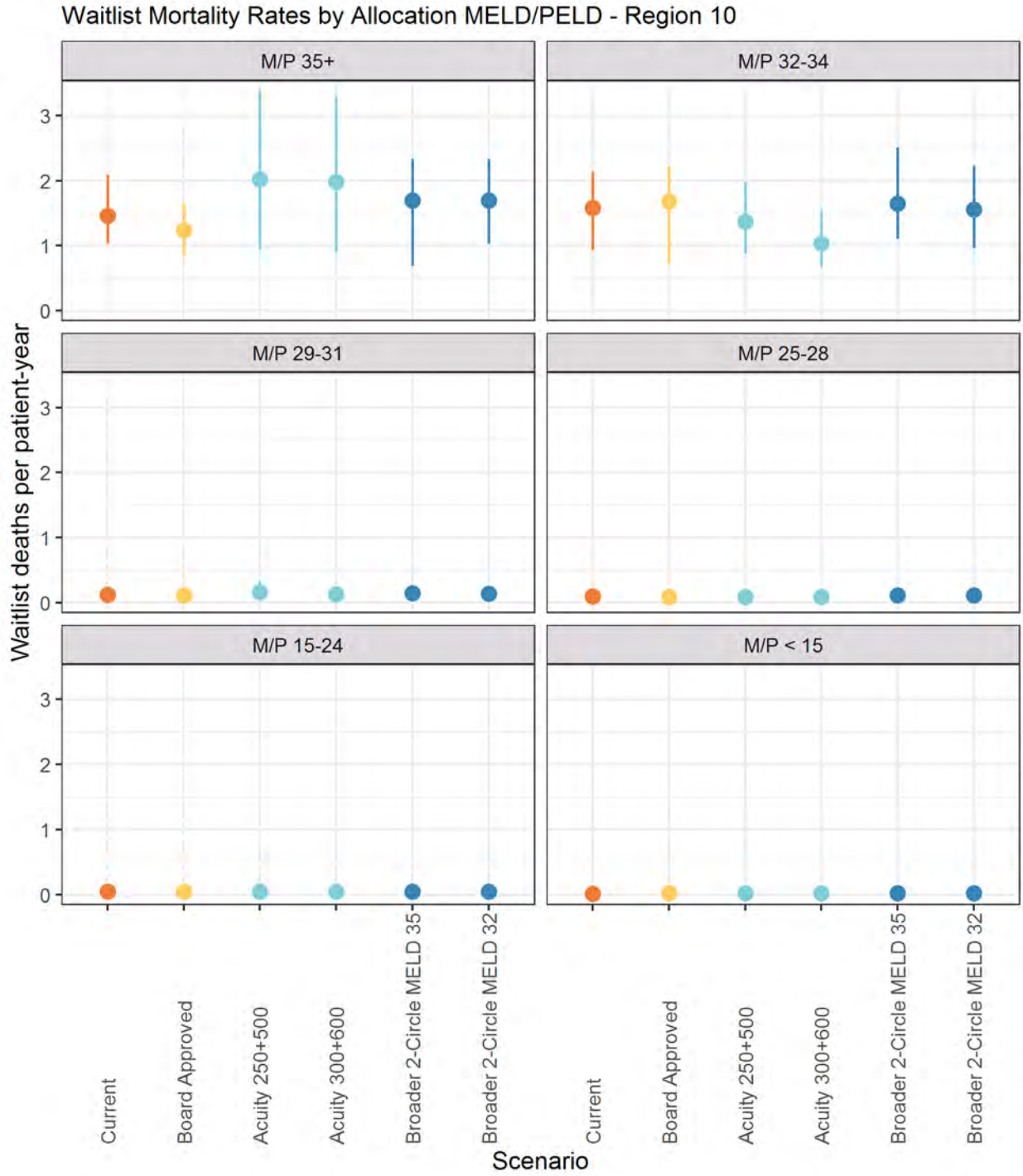


Figure 116 Waitlist Mortality Rates by Allocation MELD/PELD - Region 10

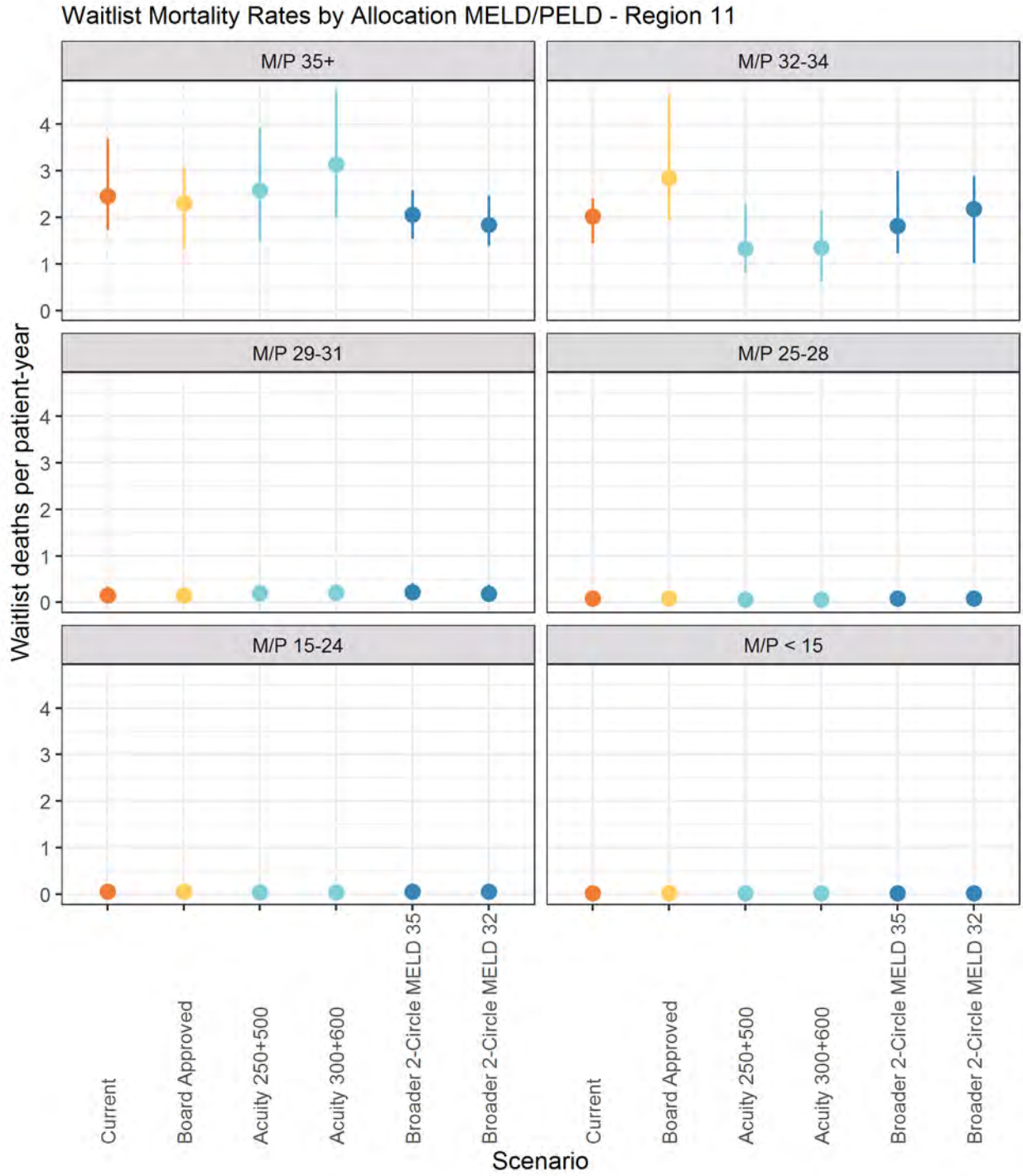


Figure 117 Waitlist Mortality Rates by Allocation MELD/PELD - Region 11

Waitlist Mortality Counts by Allocation MELD/PELD

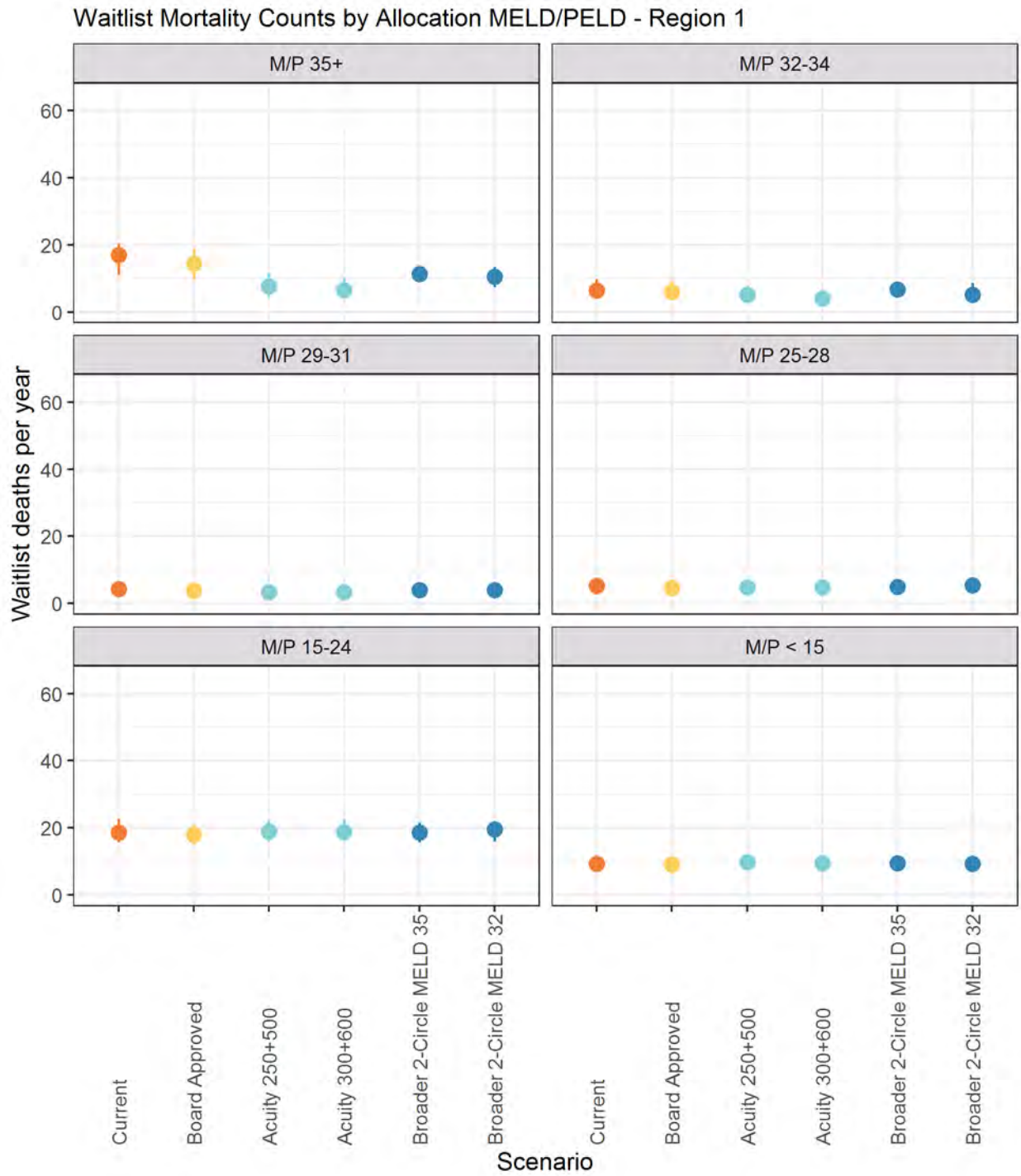


Figure 118 Waitlist Mortality Counts by Allocation MELD/PELD - Region 1

Waitlist Mortality Counts by Allocation MELD/PELD - Region 2

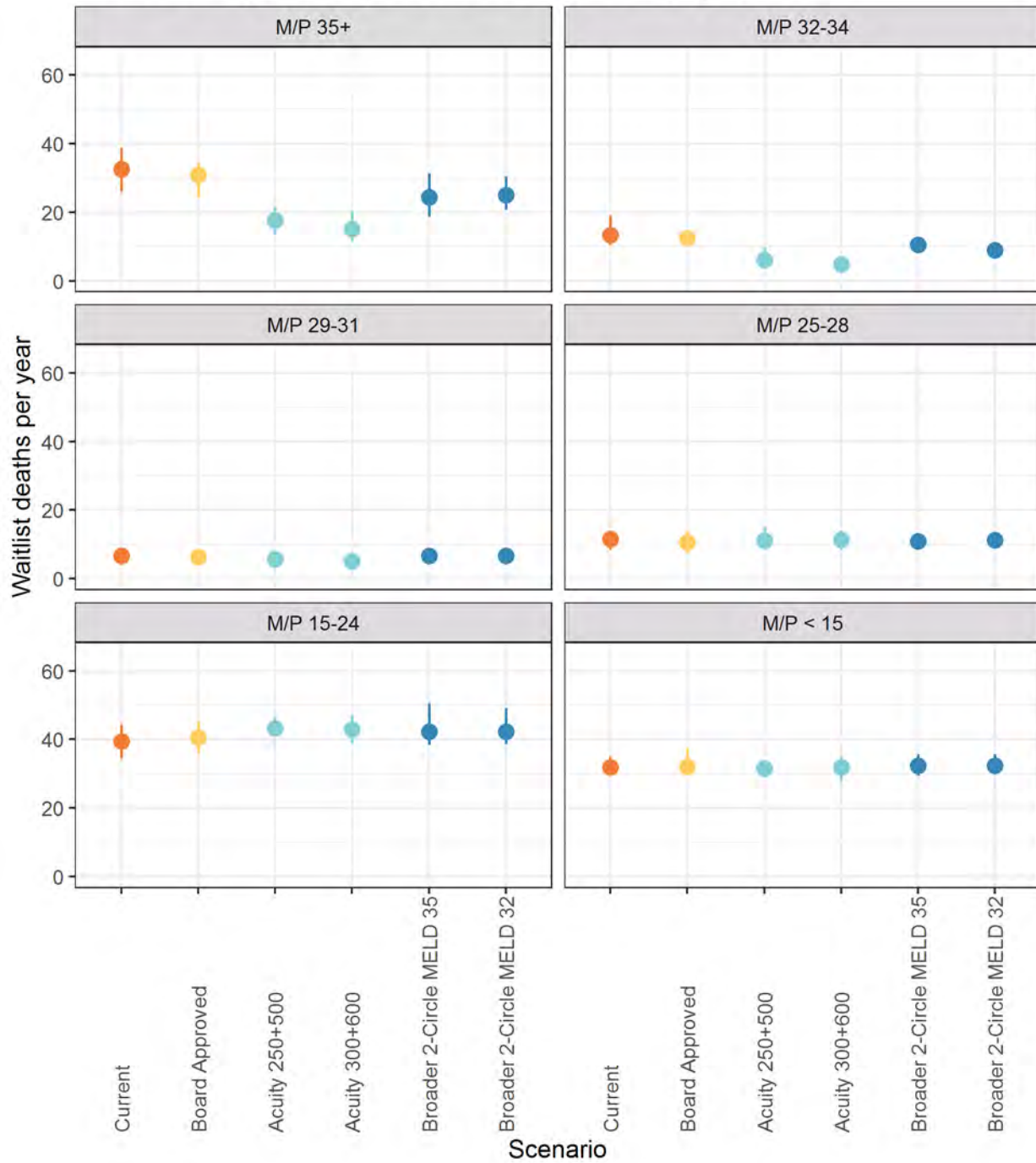


Figure 119 Waitlist Mortality Counts by Allocation MELD/PELD - Region 2

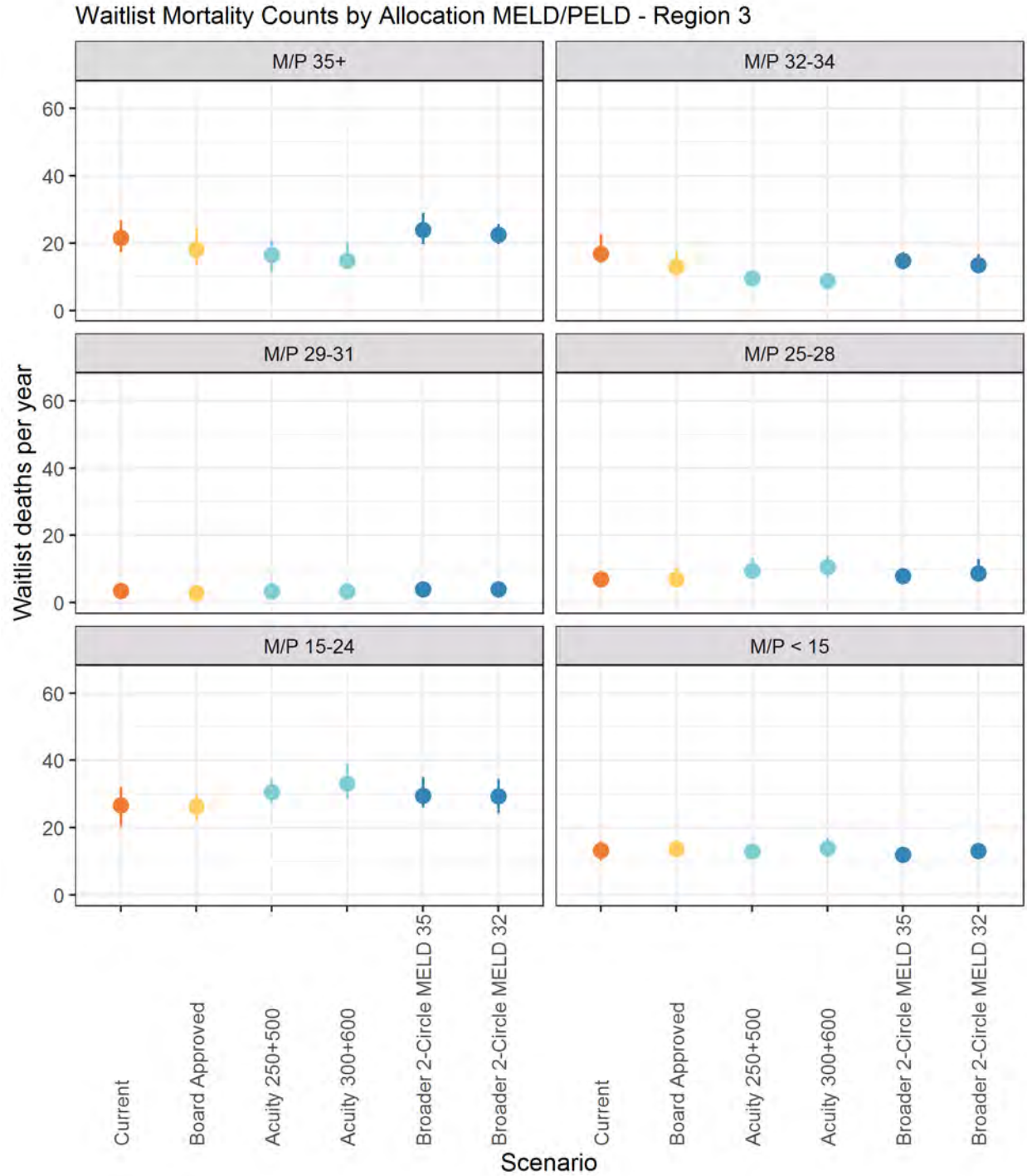


Figure 120 Waitlist Mortality Counts by Allocation MELD/PELD - Region 3

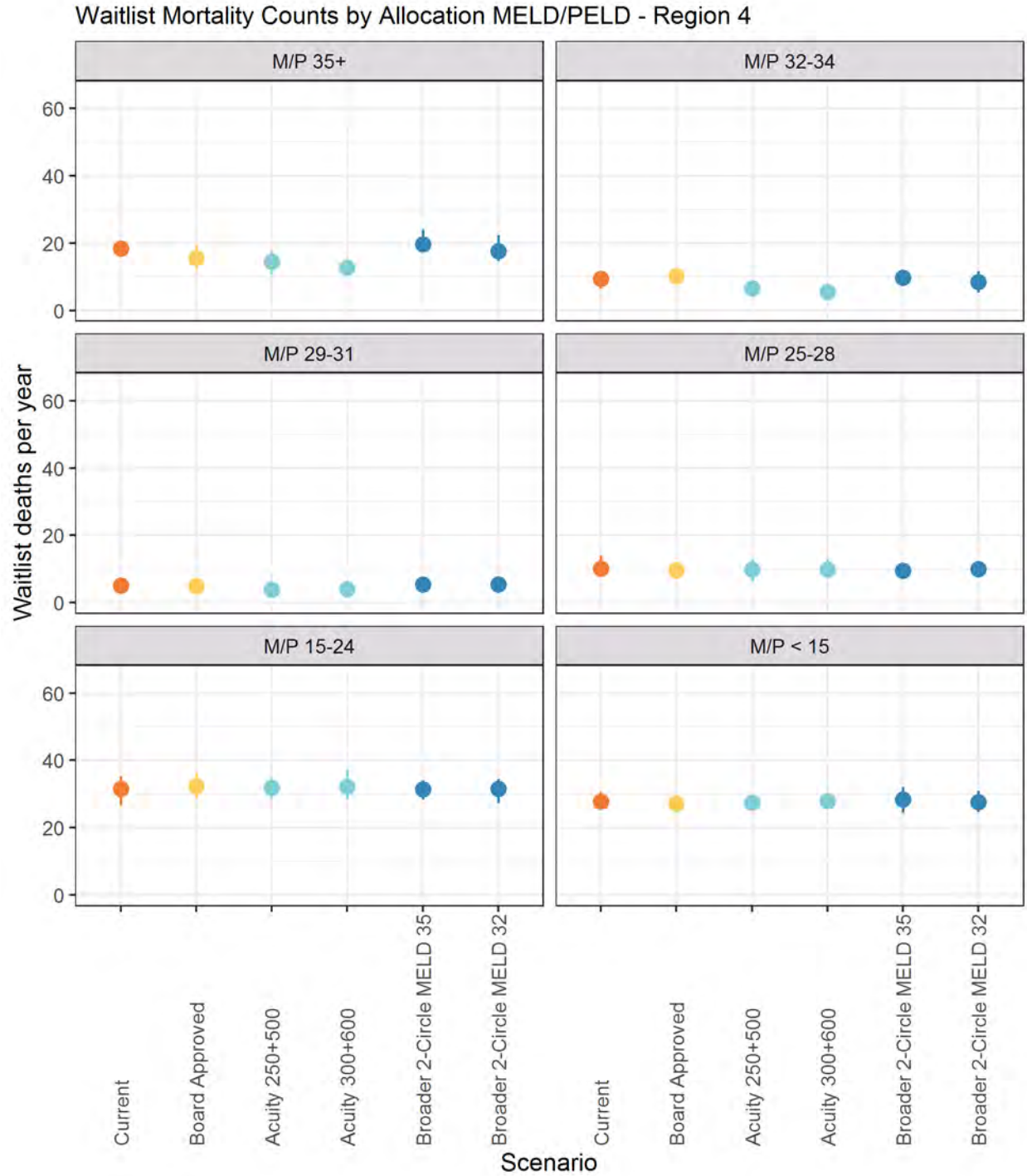


Figure 121 Waitlist Mortality Counts by Allocation MELD/PELD - Region 4

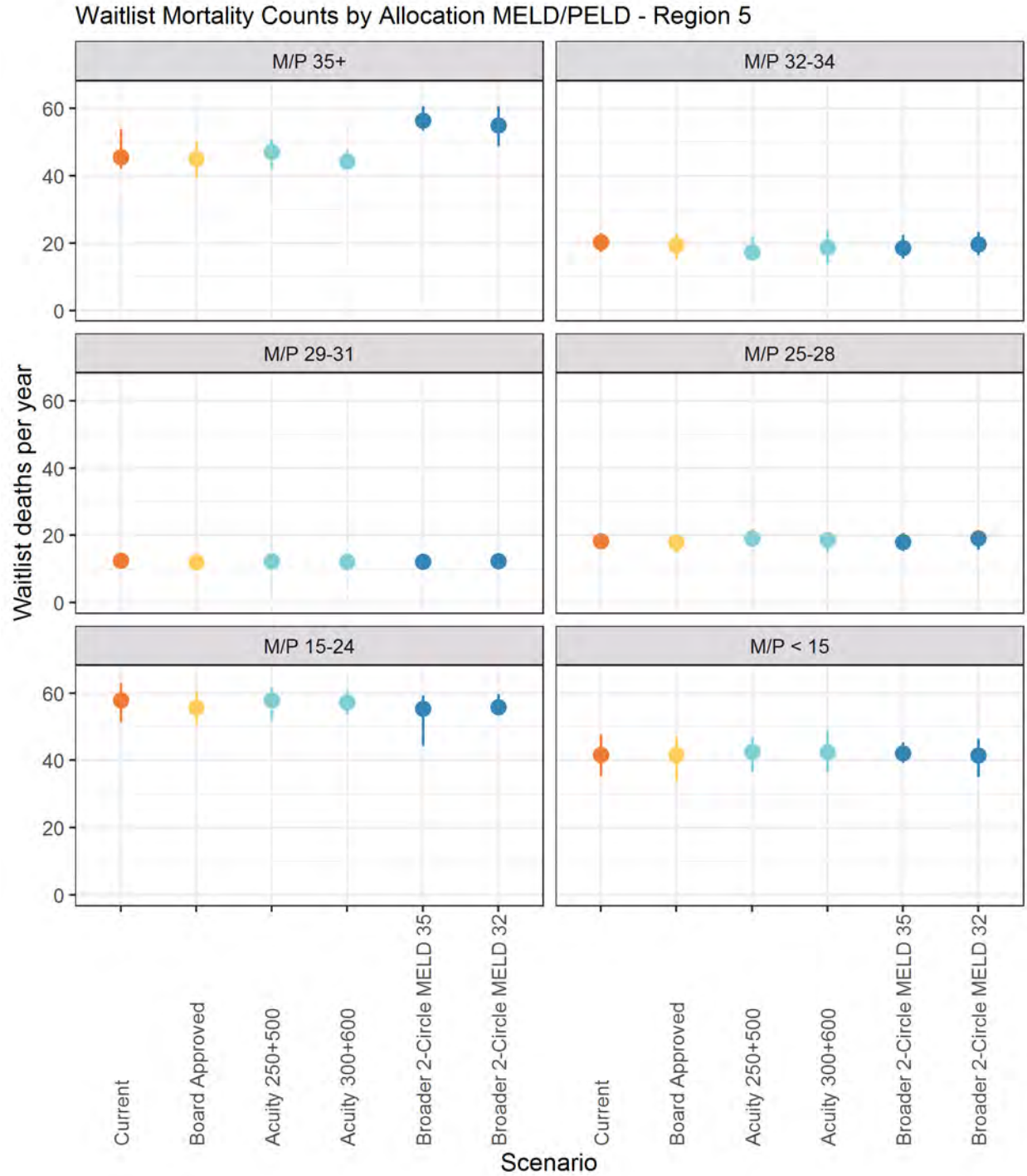


Figure 122 Waitlist Mortality Counts by Allocation MELD/PELD - Region 5

Waitlist Mortality Counts by Allocation MELD/PELD - Region 6

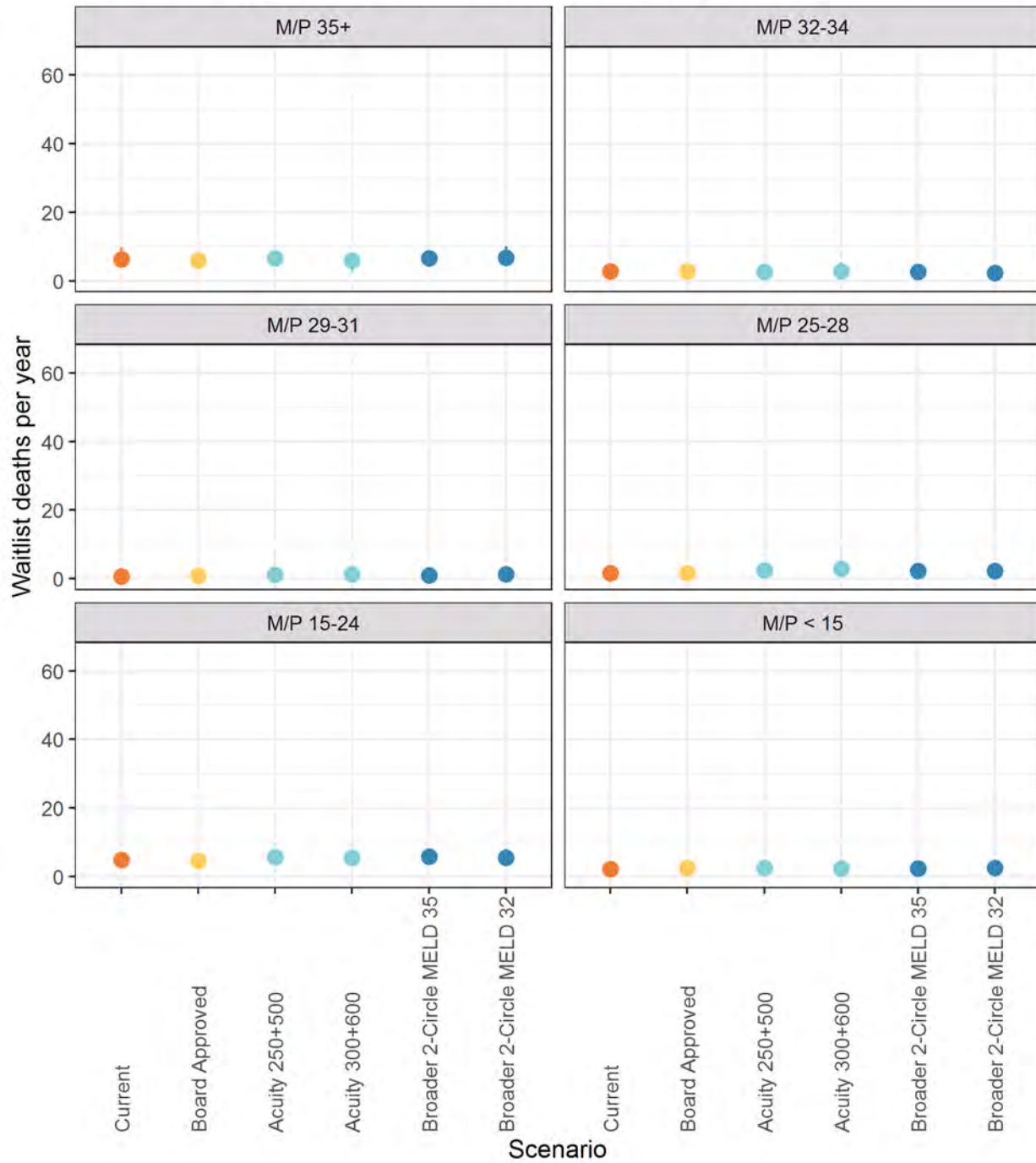


Figure 123 Waitlist Mortality Counts by Allocation MELD/PELD - Region 6

Waitlist Mortality Counts by Allocation MELD/PELD - Region 7

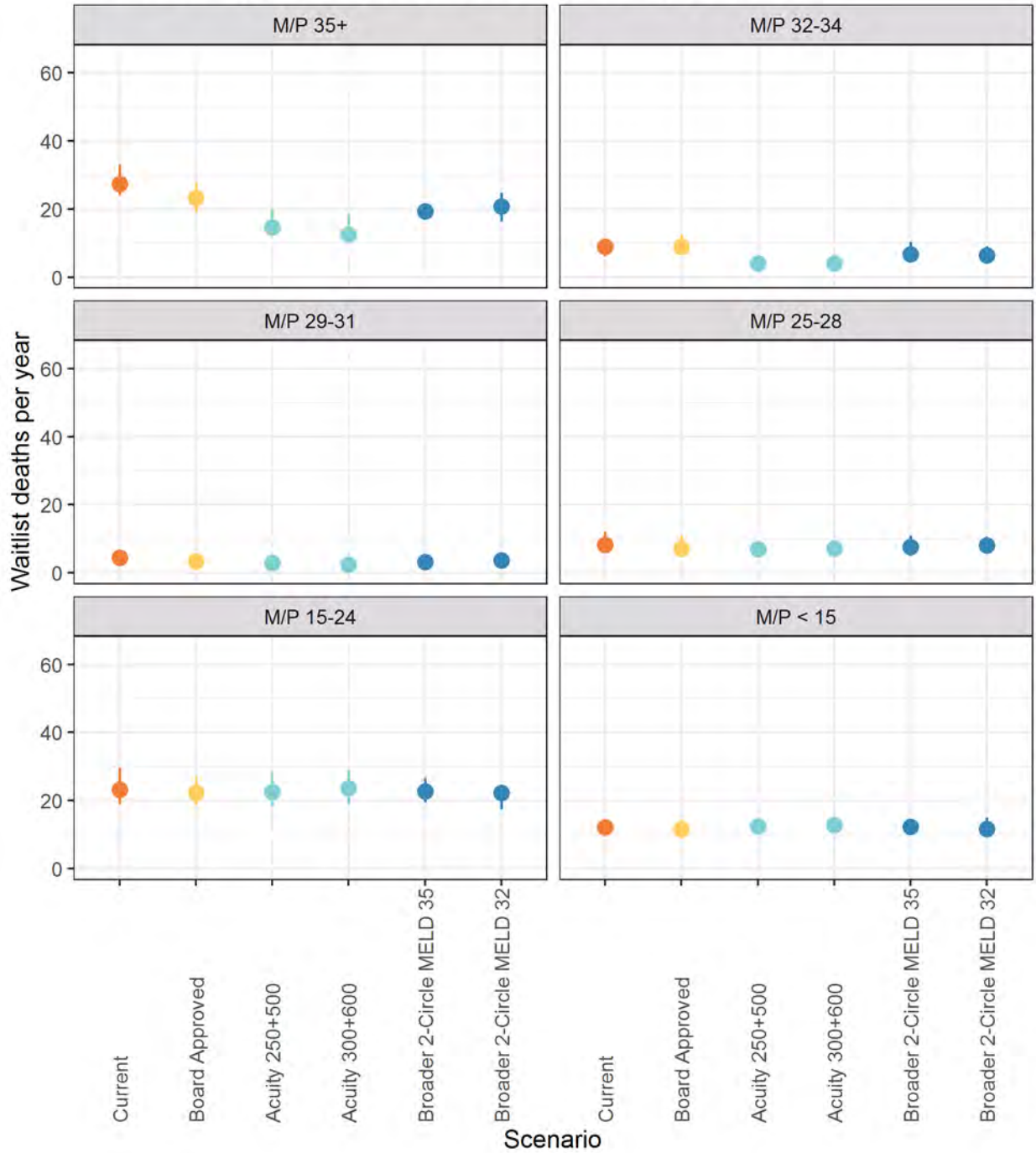


Figure 124 Waitlist Mortality Counts by Allocation MELD/PELD - Region 7

Waitlist Mortality Counts by Allocation MELD/PELD - Region 8

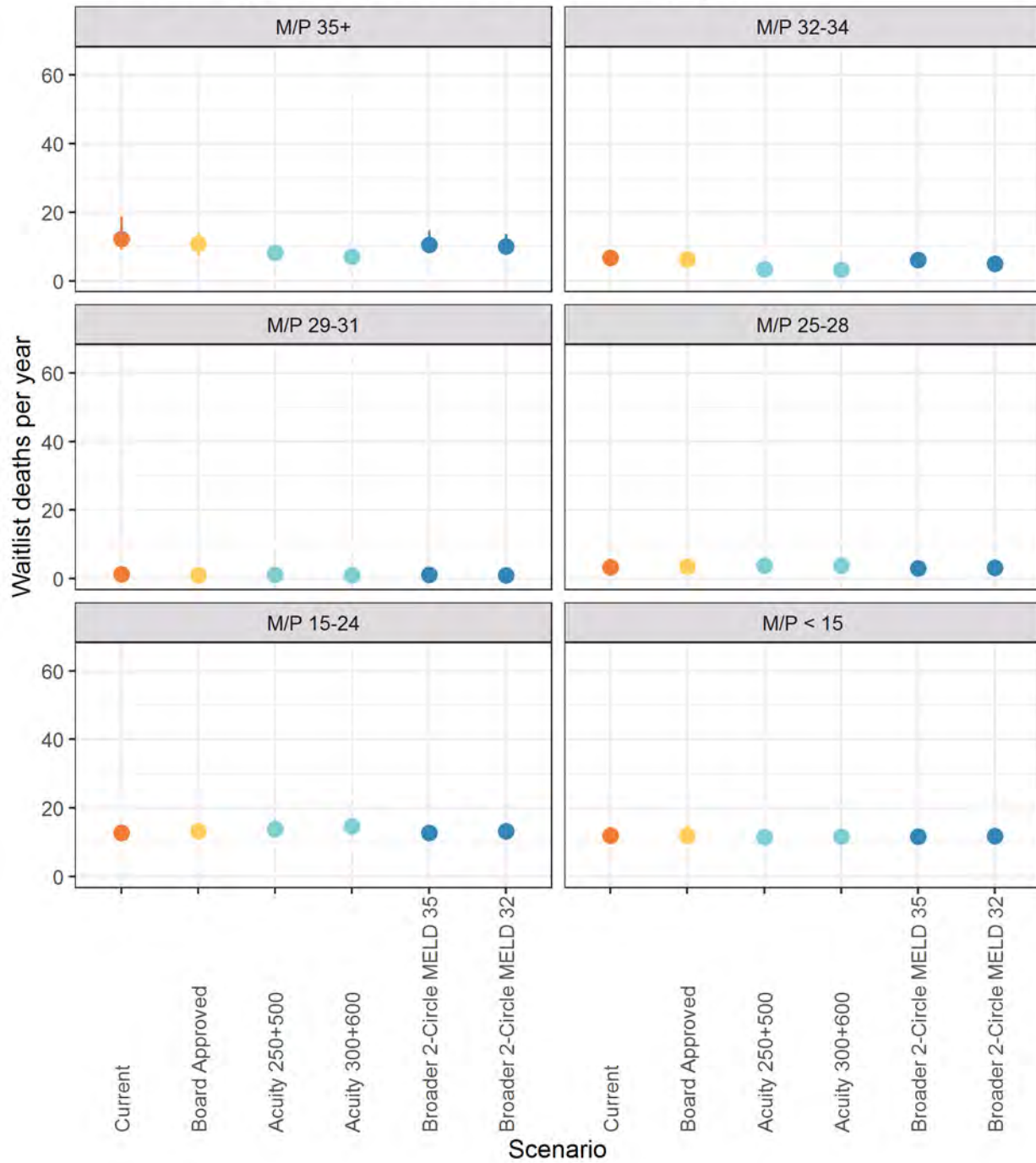


Figure 125 Waitlist Mortality Counts by Allocation MELD/PELD - Region 8

Waitlist Mortality Counts by Allocation MELD/PELD - Region 9

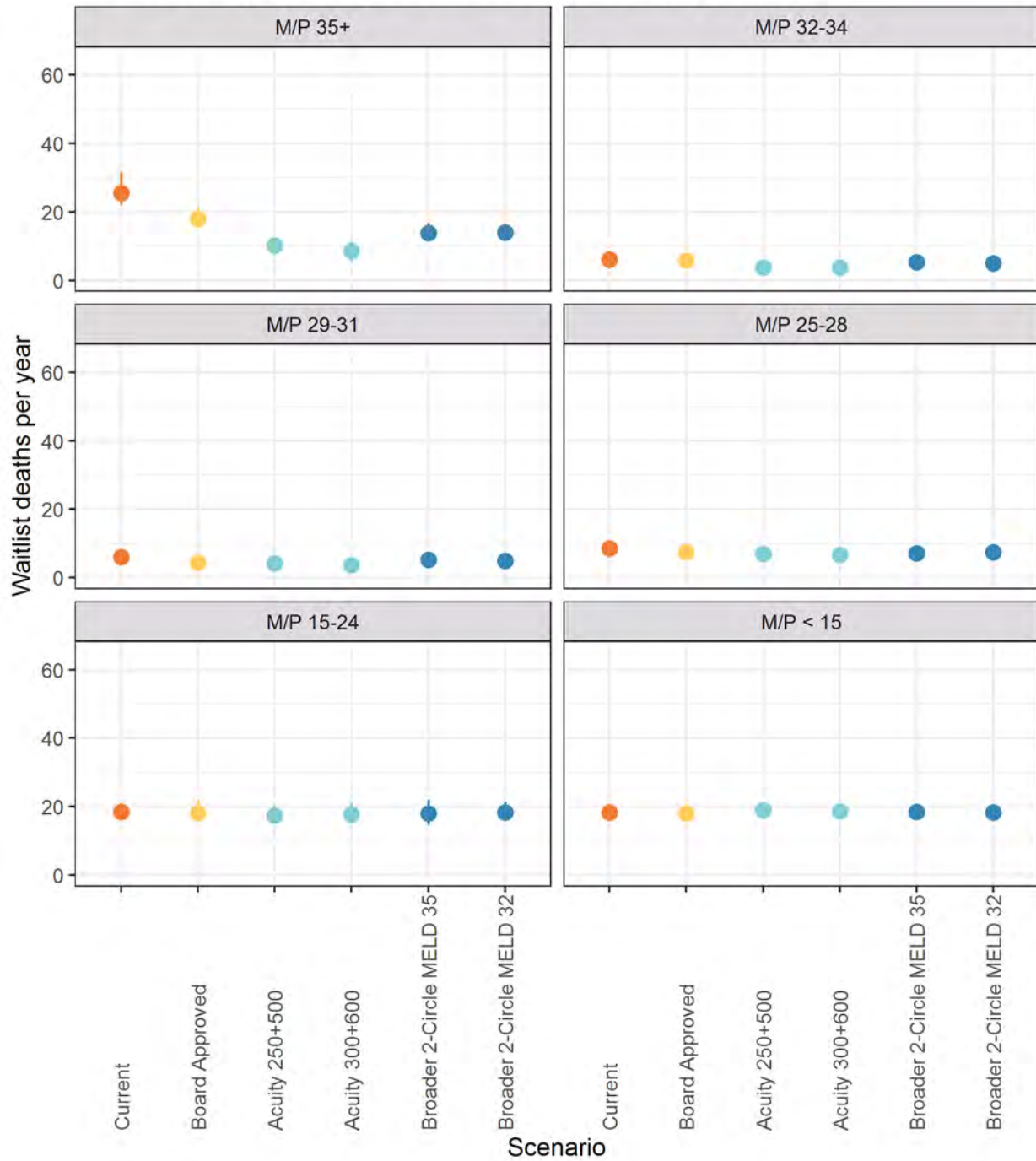


Figure 126 Waitlist Mortality Counts by Allocation MELD/PELD - Region 9

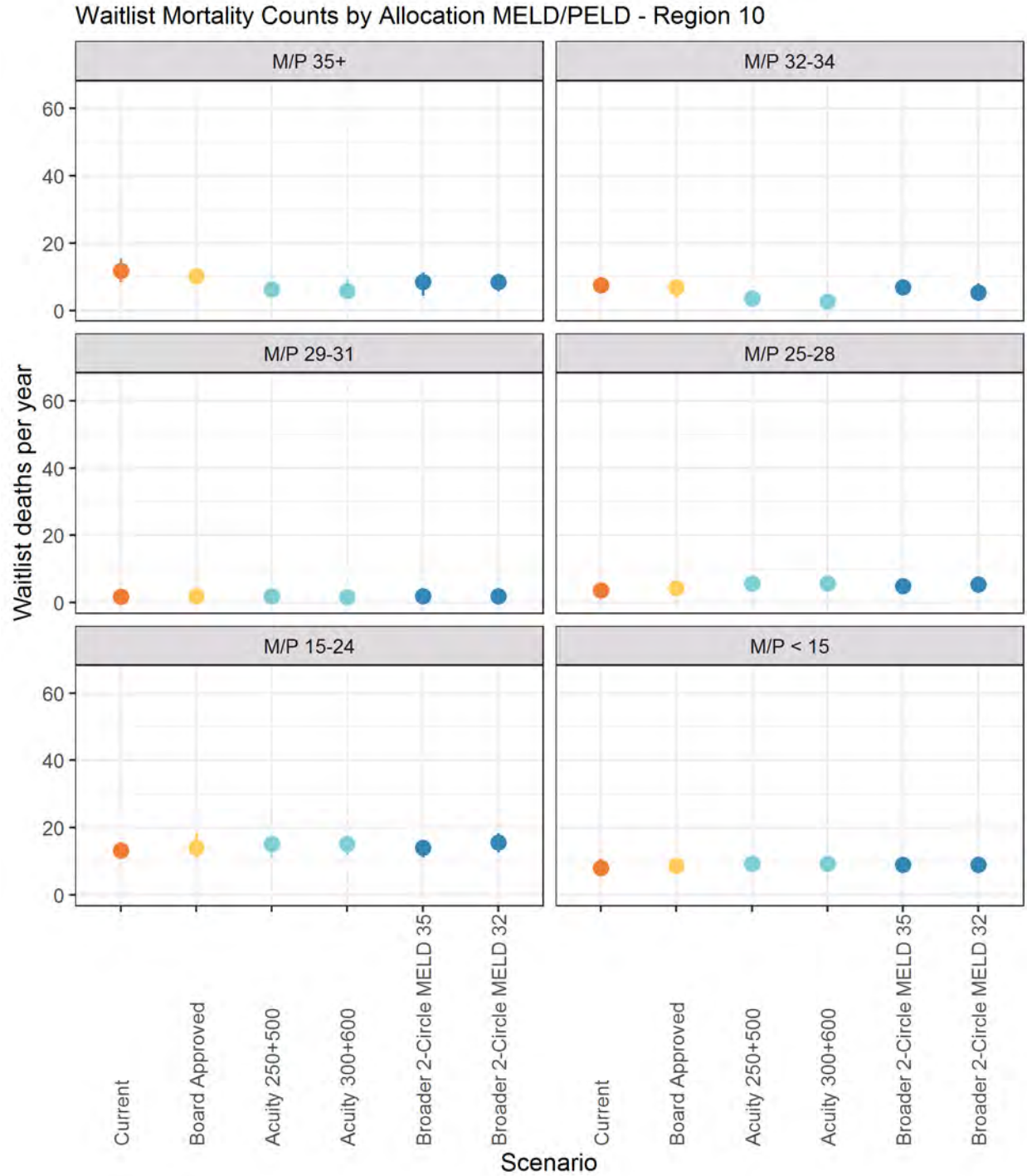


Figure 127 Waitlist Mortality Counts by Allocation MELD/PELD - Region 10

Waitlist Mortality Counts by Allocation MELD/PELD - Region 11

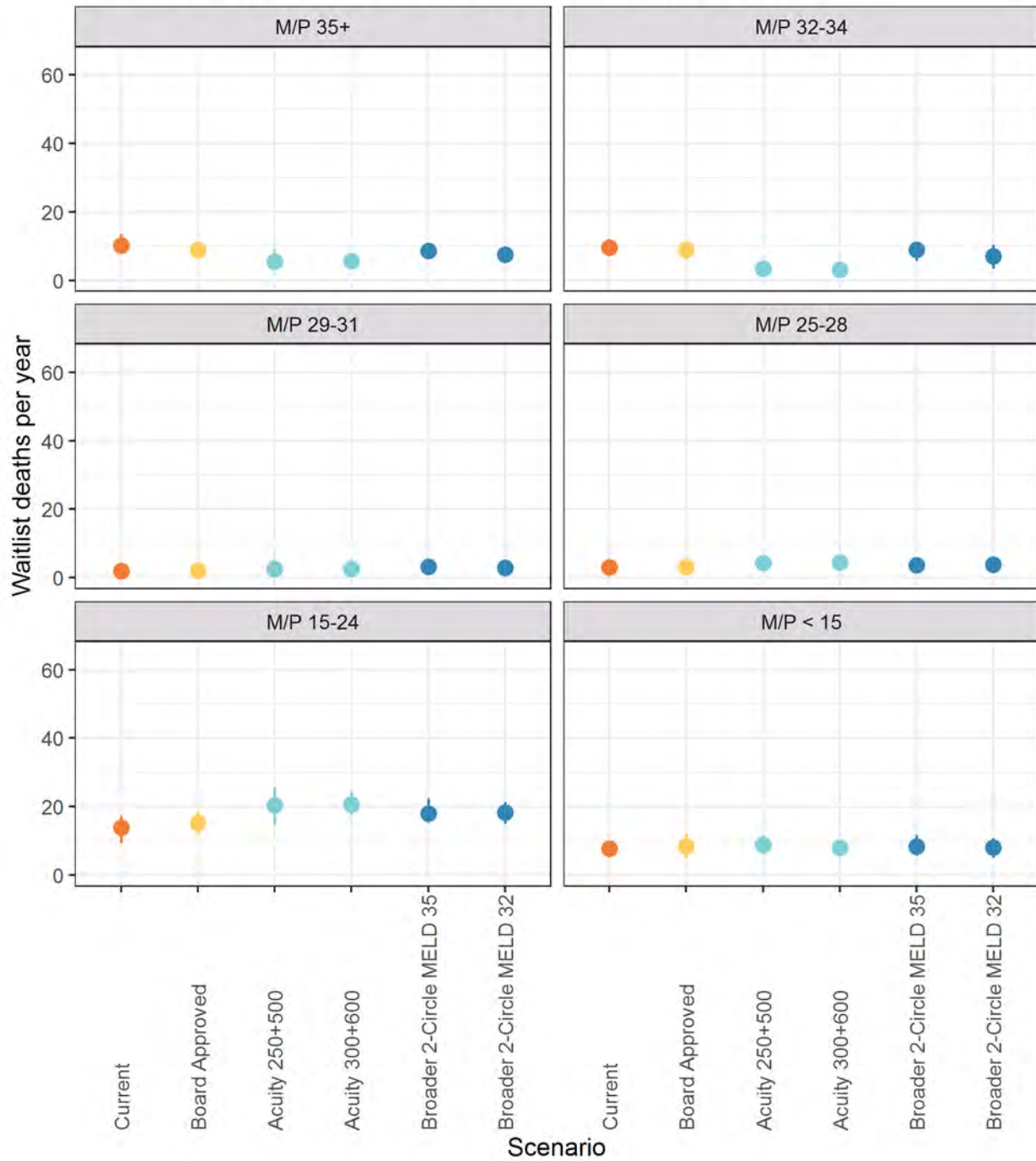


Figure 128 Waitlist Mortality Counts by Allocation MELD/PELD - Region 11

Posttransplant Mortality

Posttransplant Mortality Rates by Exception Status

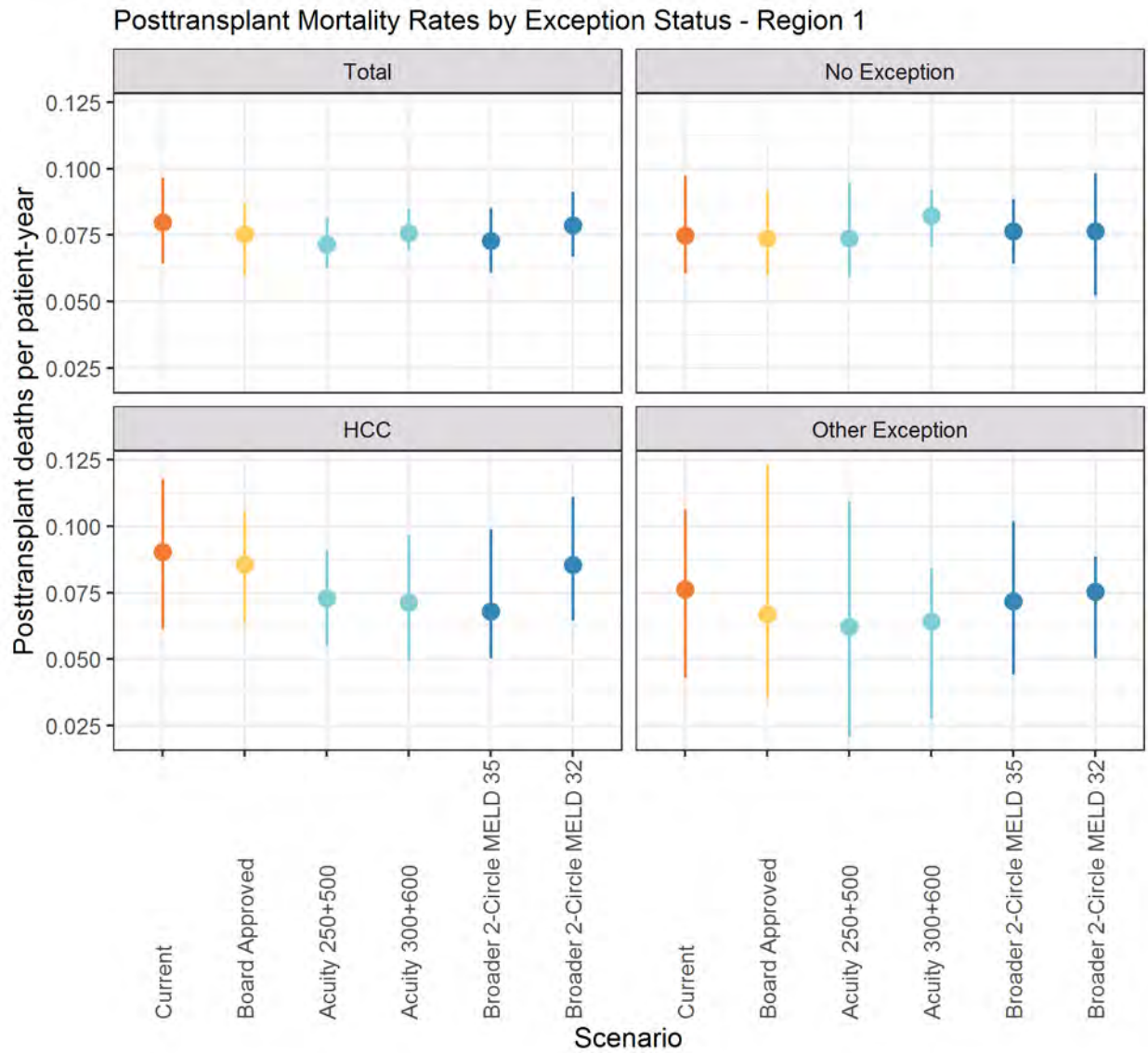


Figure 129 Posttransplant Mortality Rates by Exception Status - Region 1

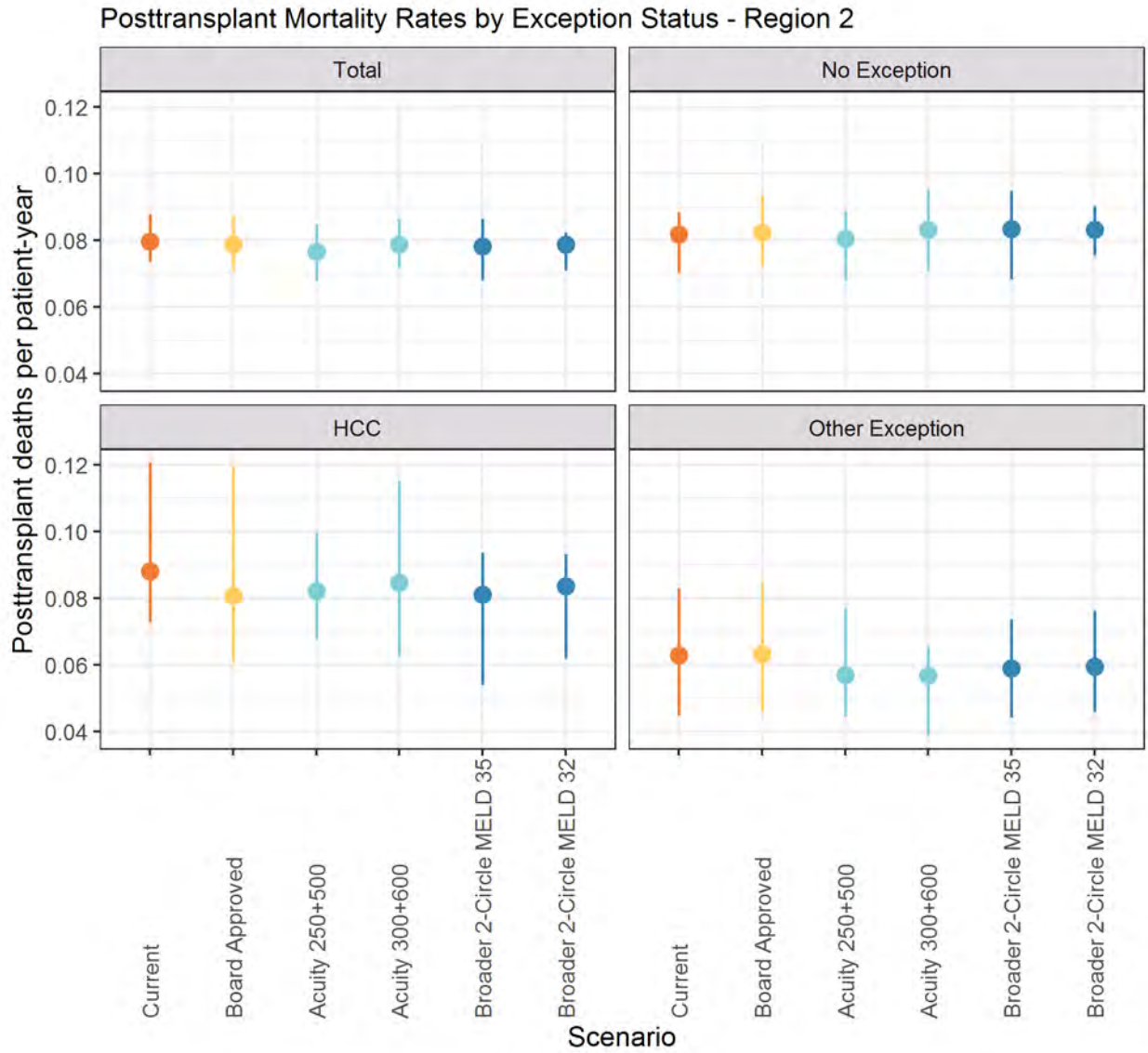


Figure 130 Posttransplant Mortality Rates by Exception Status - Region 2

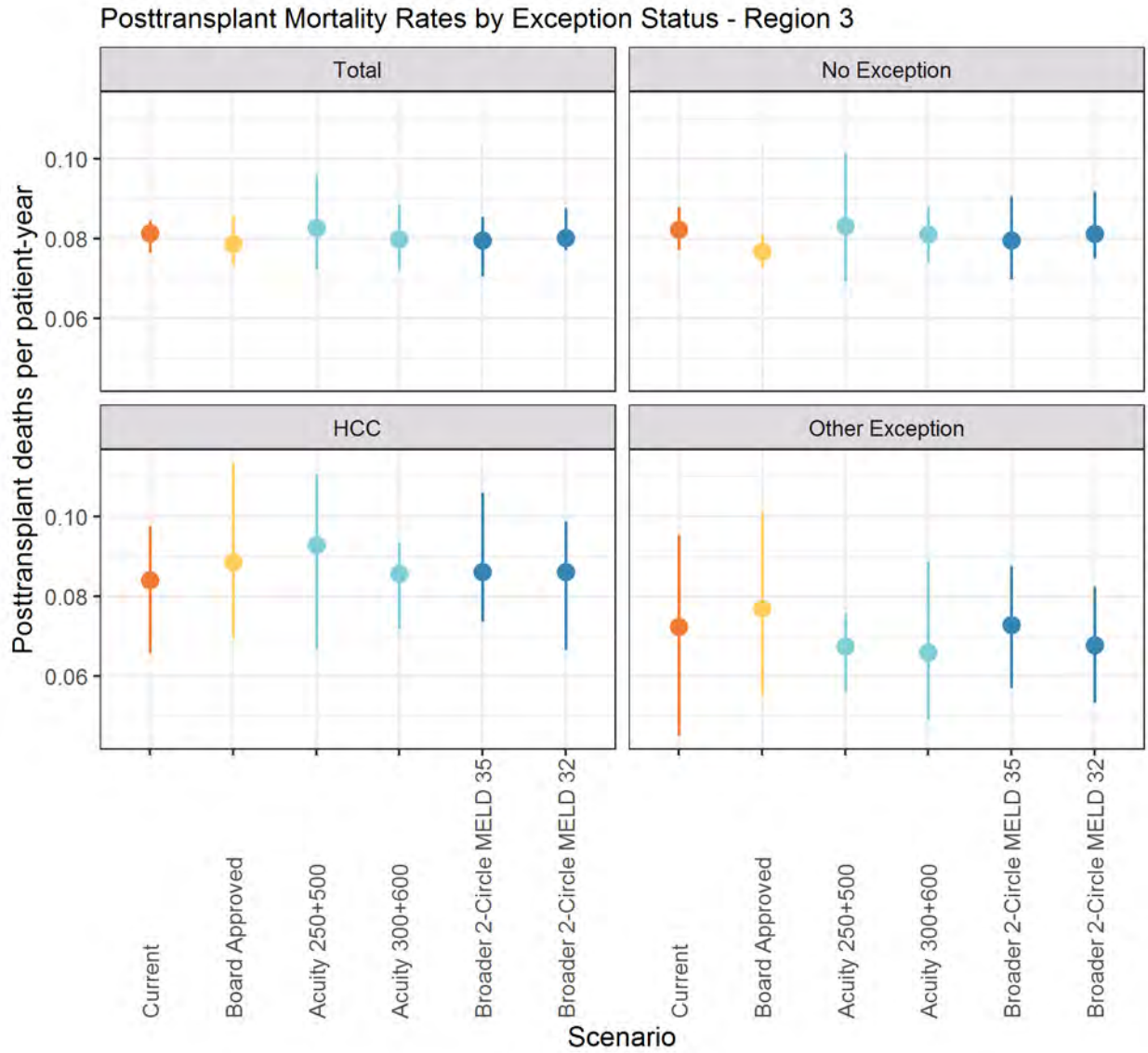


Figure 131 Posttransplant Mortality Rates by Exception Status - Region 3

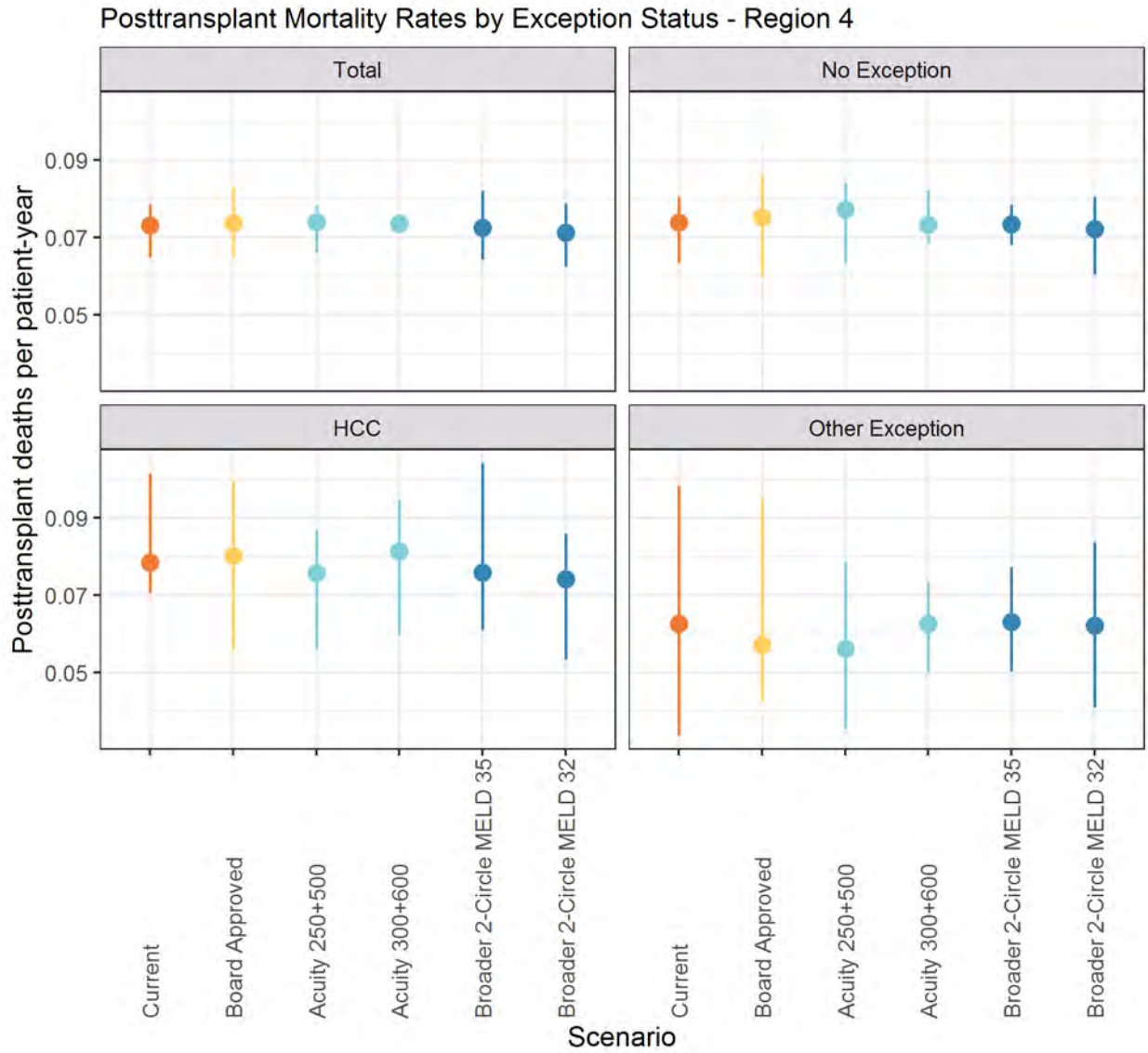


Figure 132 Posttransplant Mortality Rates by Exception Status - Region 4

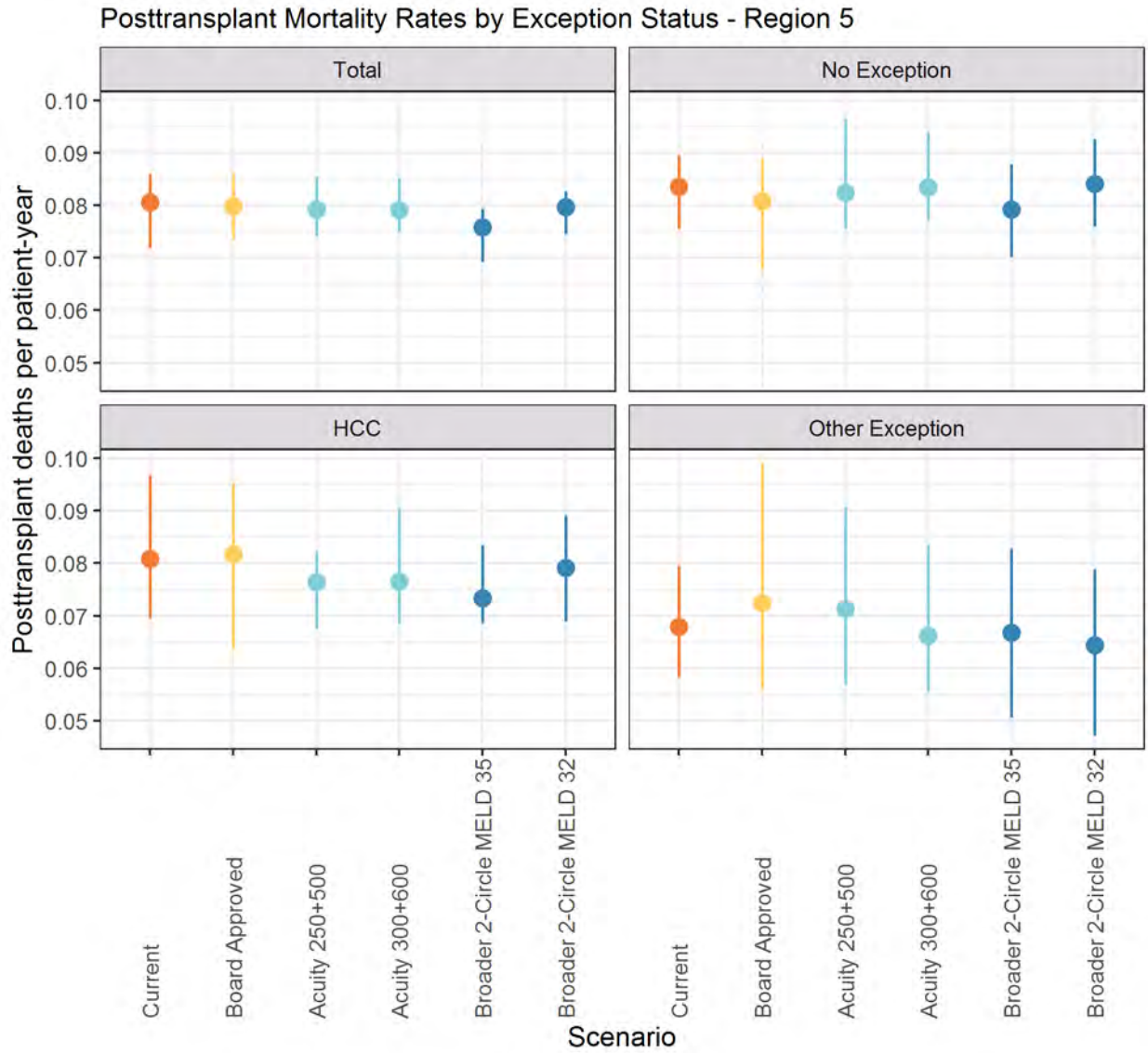


Figure 133 Posttransplant Mortality Rates by Exception Status - Region 5

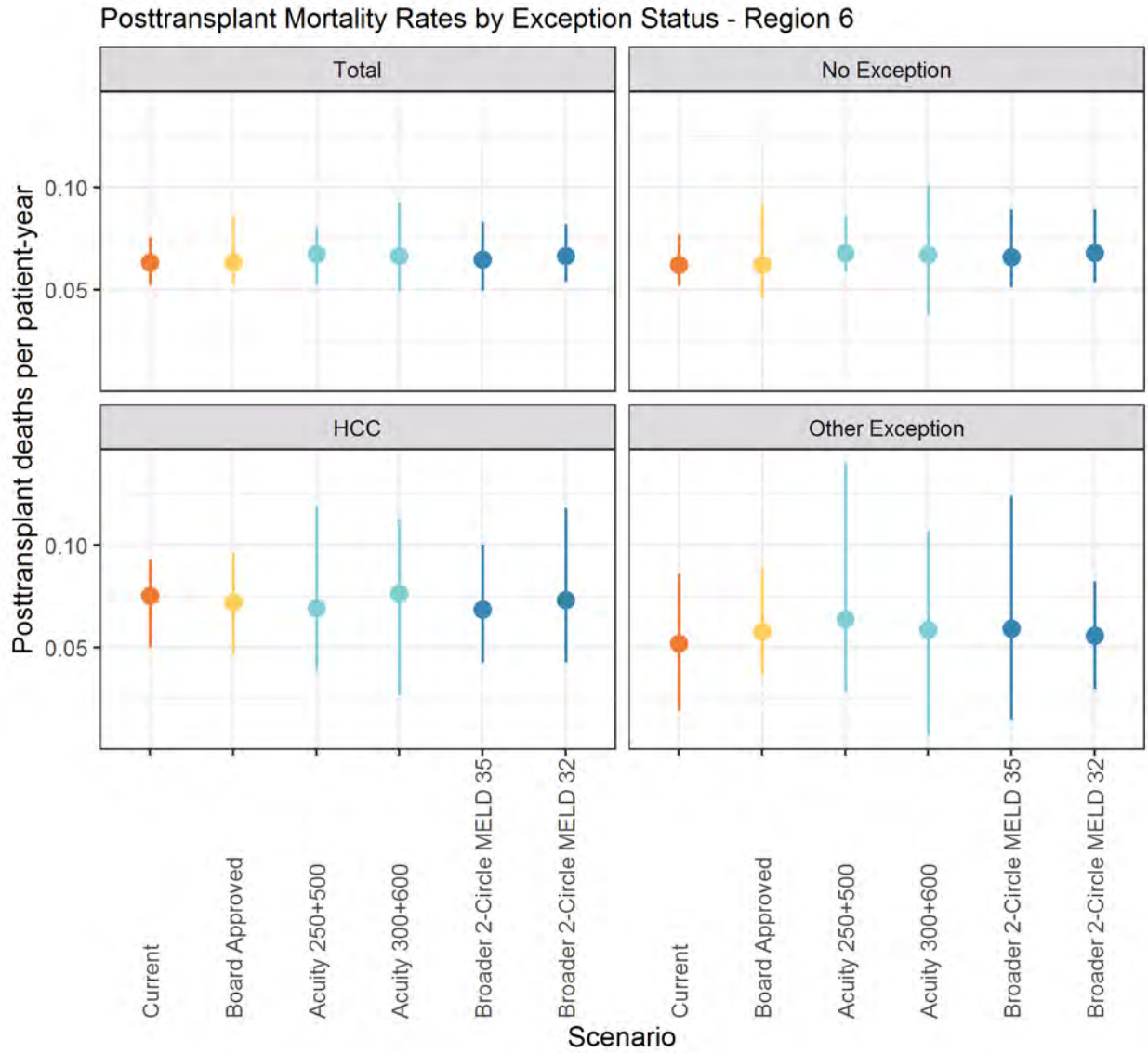


Figure 134 Posttransplant Mortality Rates by Exception Status - Region 6

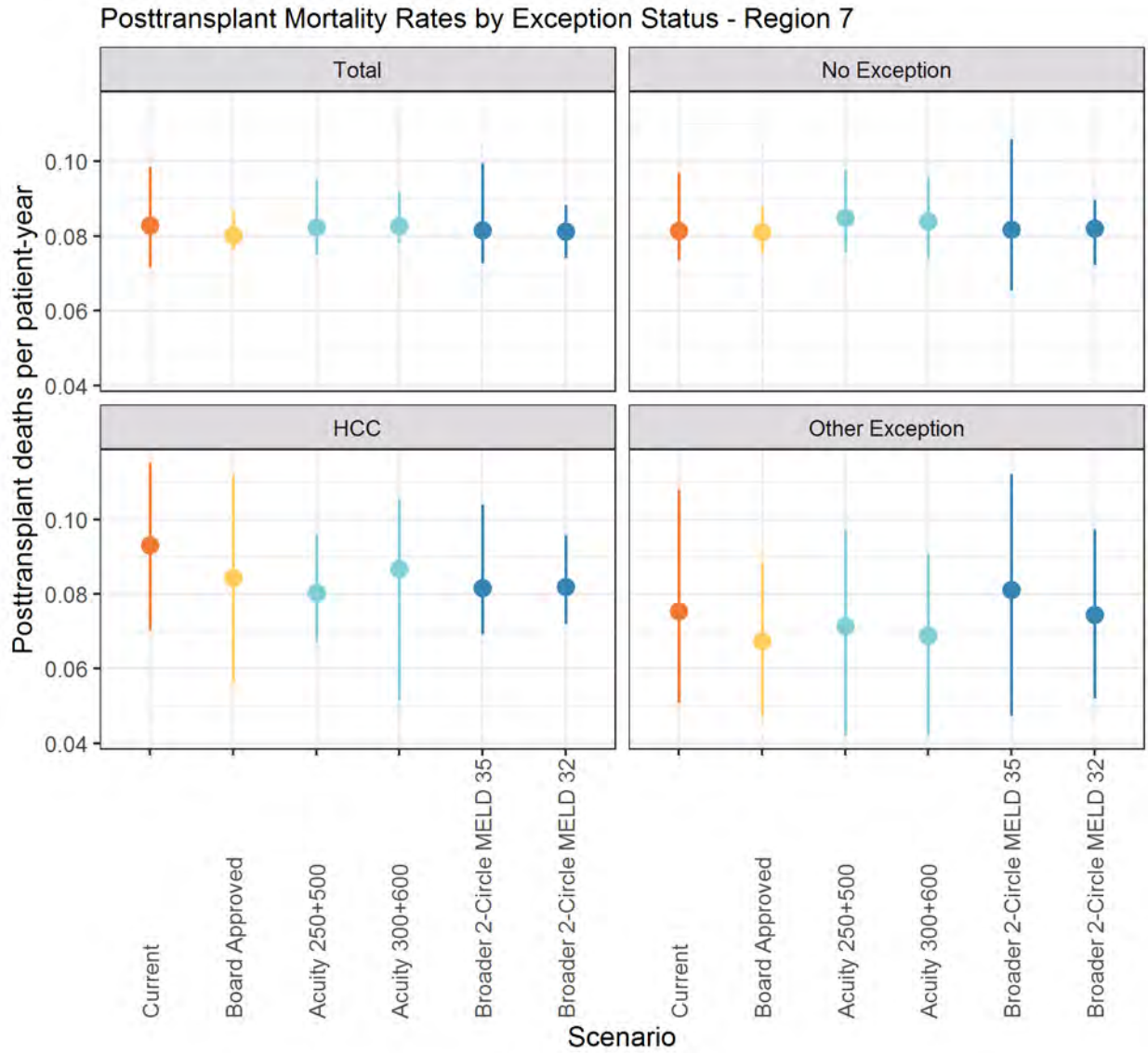


Figure 135 Posttransplant Mortality Rates by Exception Status - Region 7

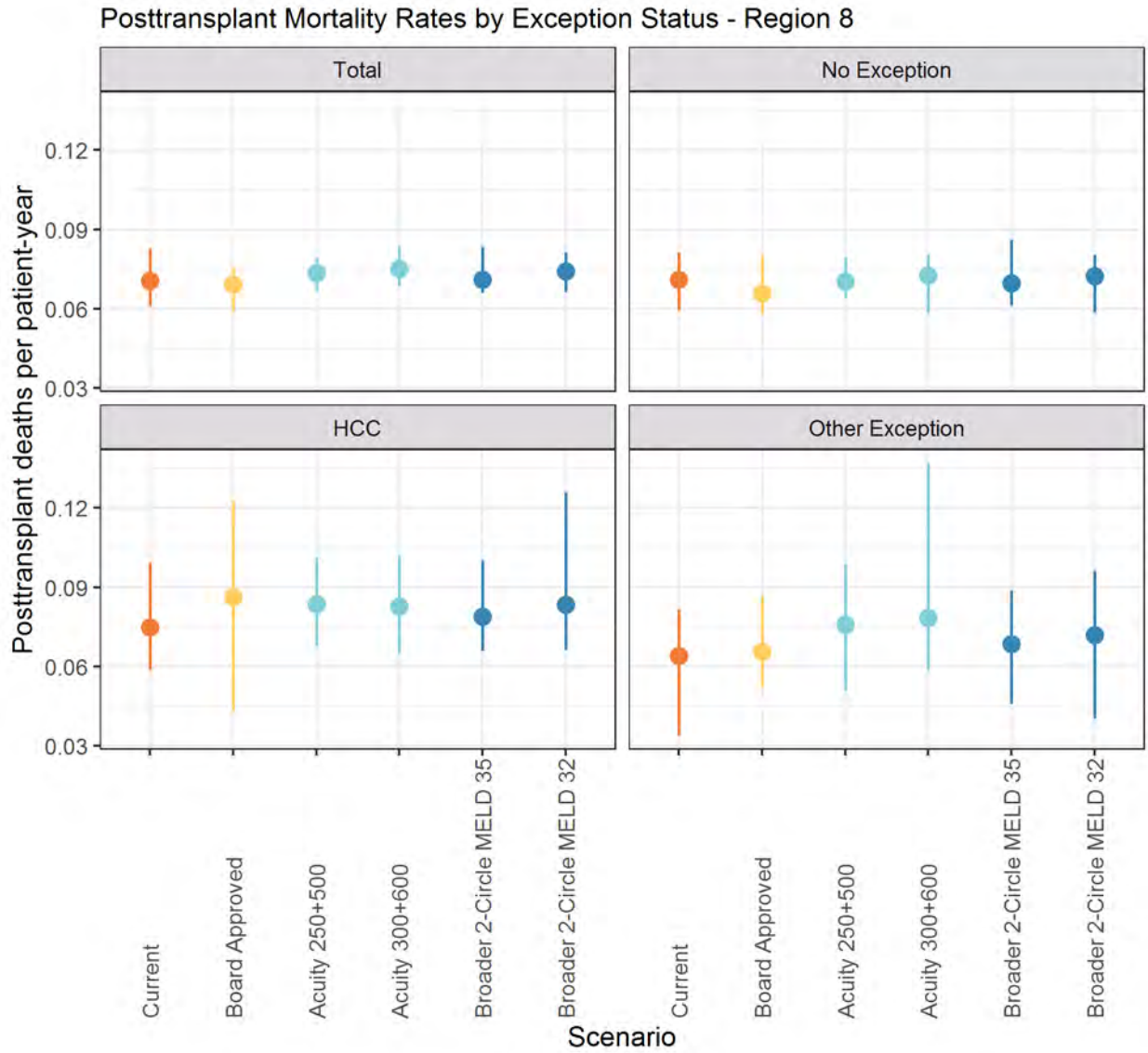


Figure 136 Posttransplant Mortality Rates by Exception Status - Region 8

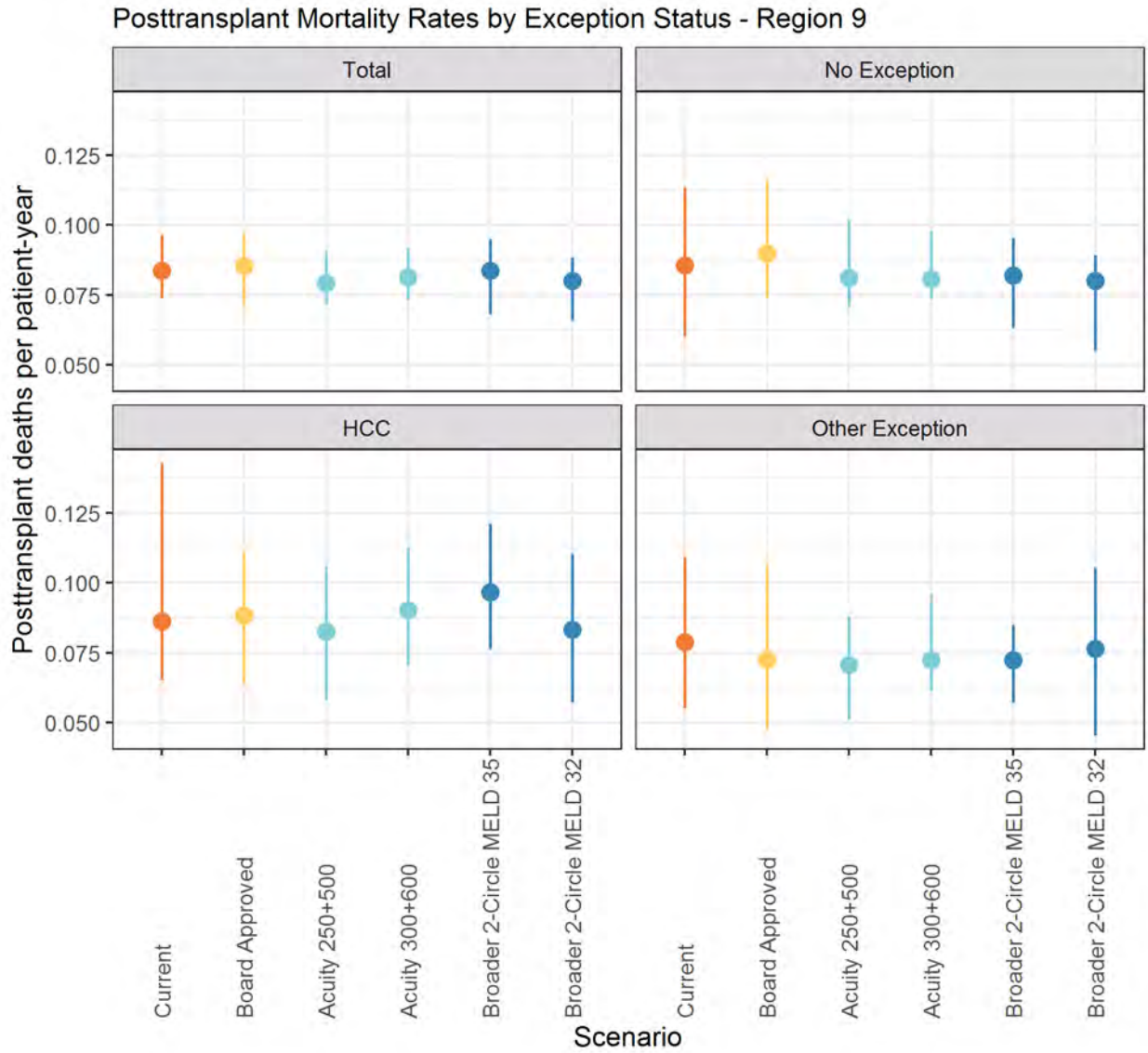


Figure 137 Posttransplant Mortality Rates by Exception Status - Region 9

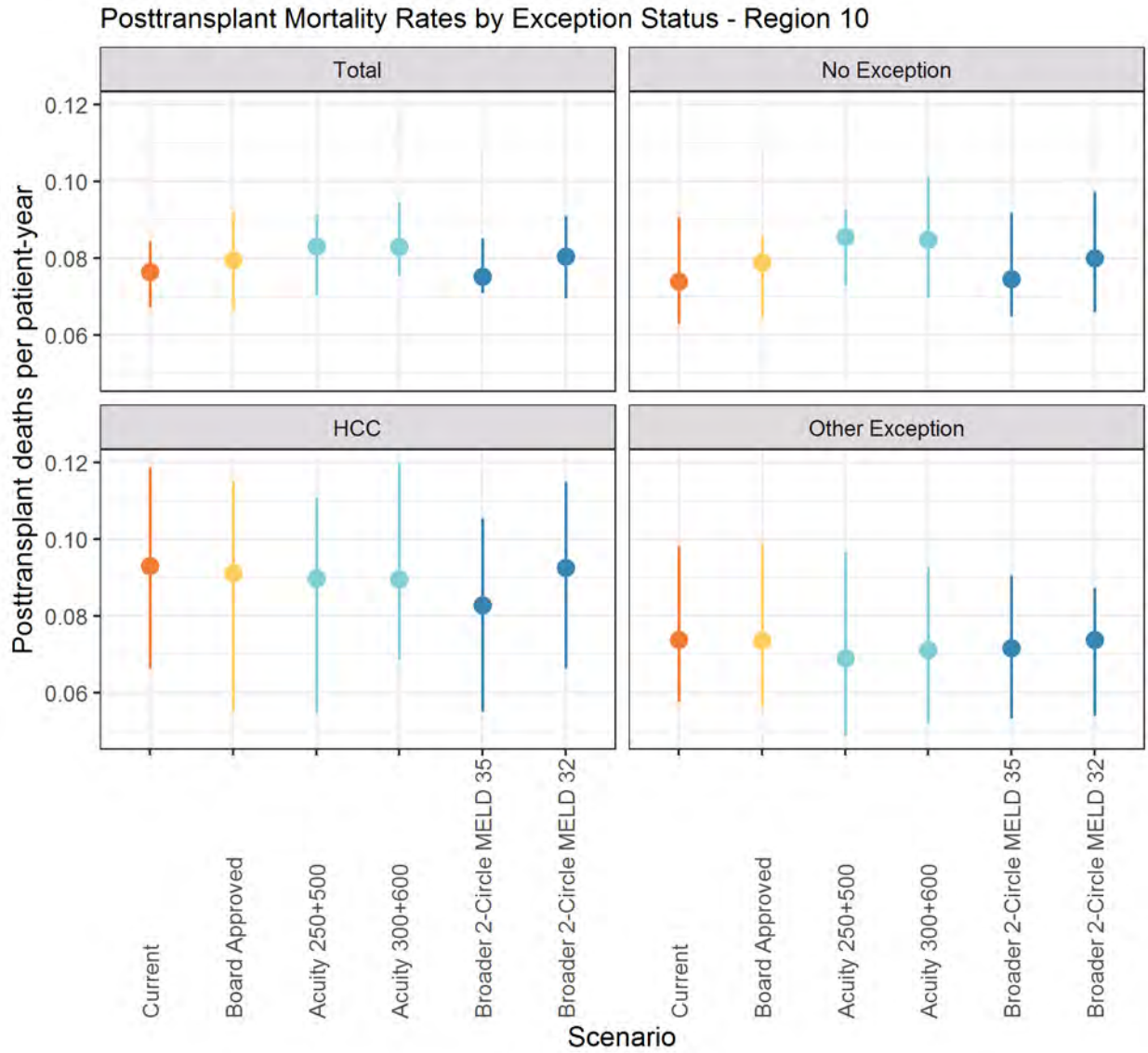


Figure 138 Posttransplant Mortality Rates by Exception Status - Region 10

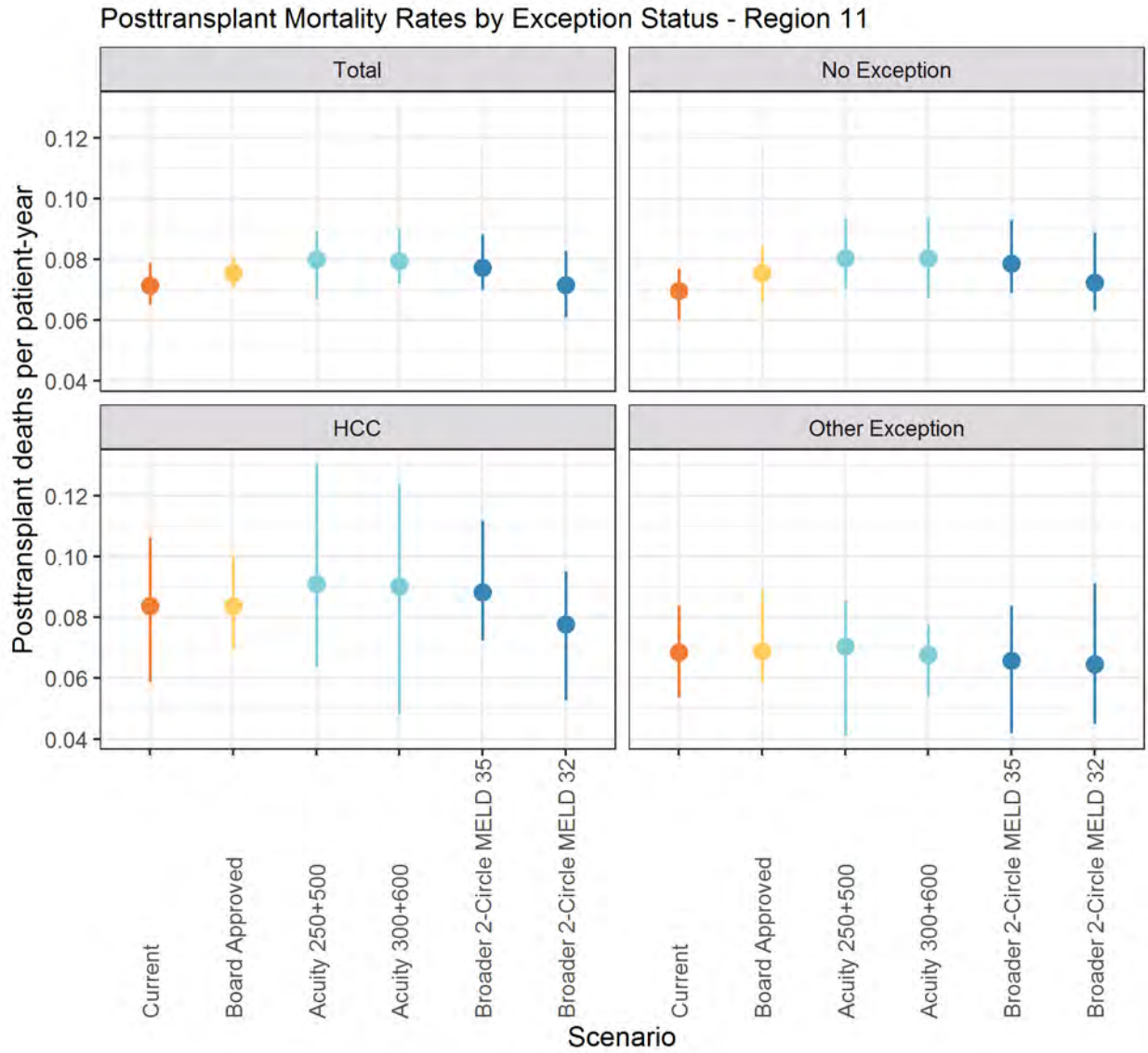


Figure 139 Posttransplant Mortality Rates by Exception Status - Region 11

Posttransplant Mortality Counts by Exception Status

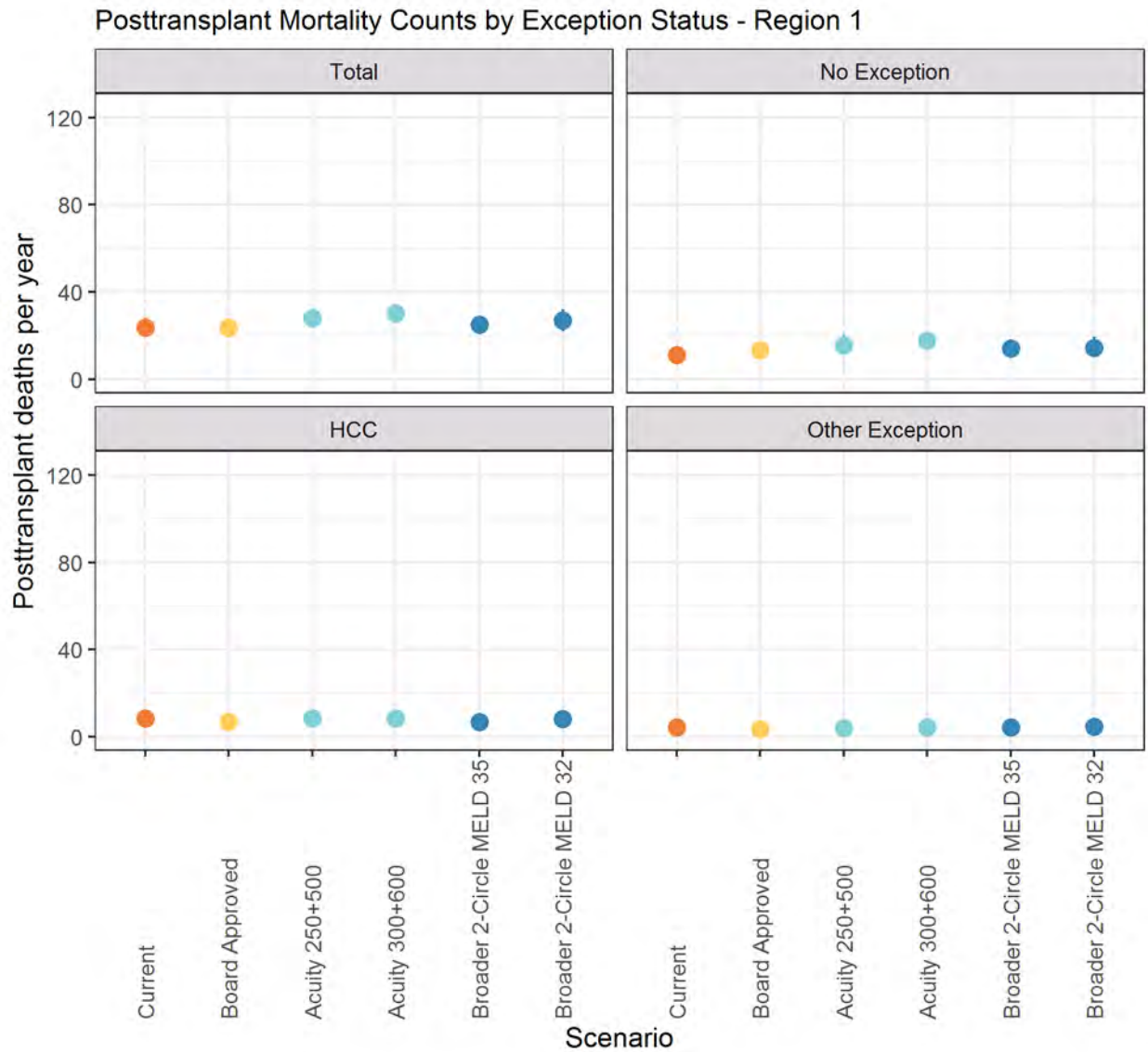


Figure 140 Posttransplant Mortality Counts by Exception Status - Region 1

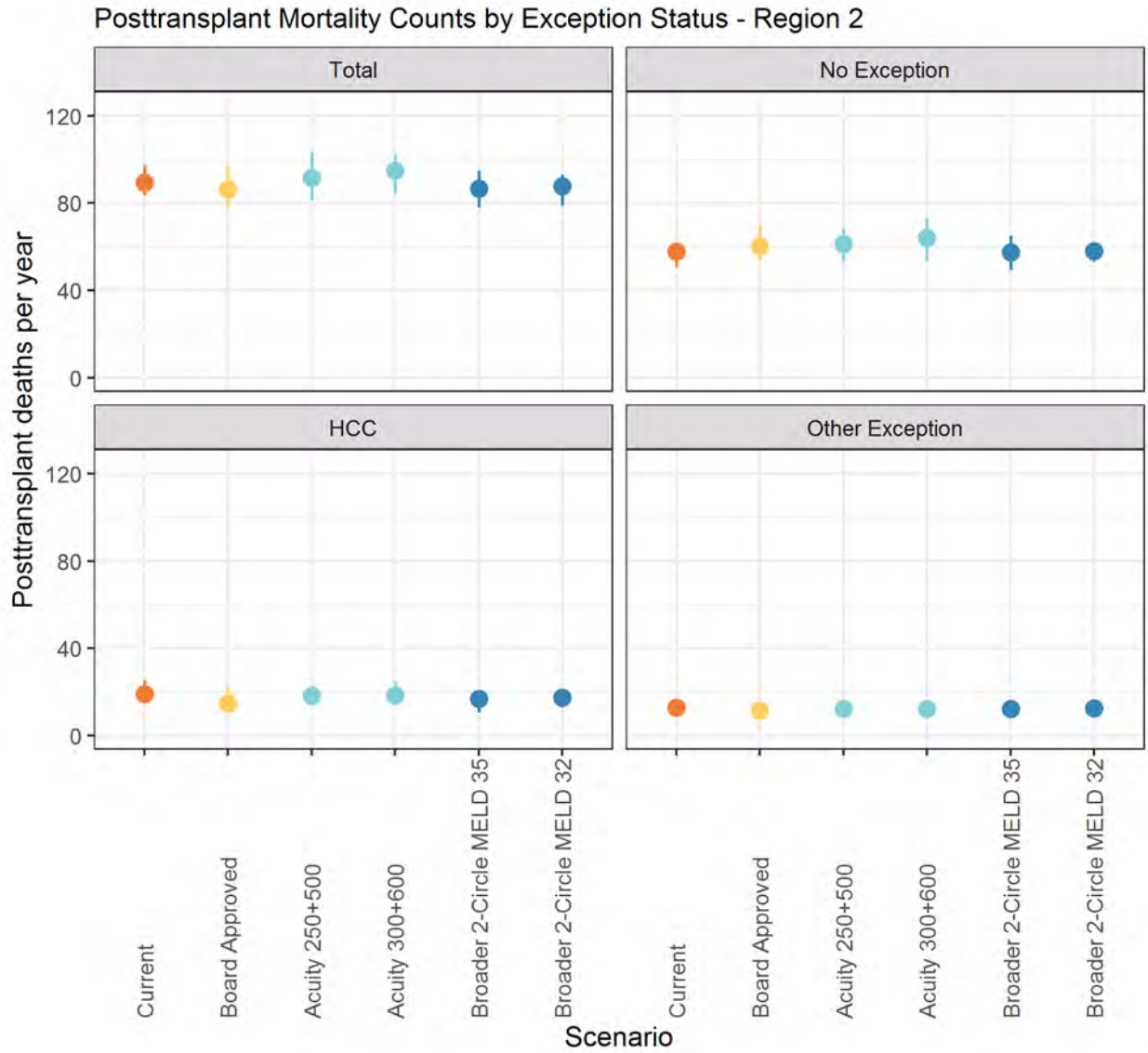


Figure 141 Posttransplant Mortality Counts by Exception Status - Region 2

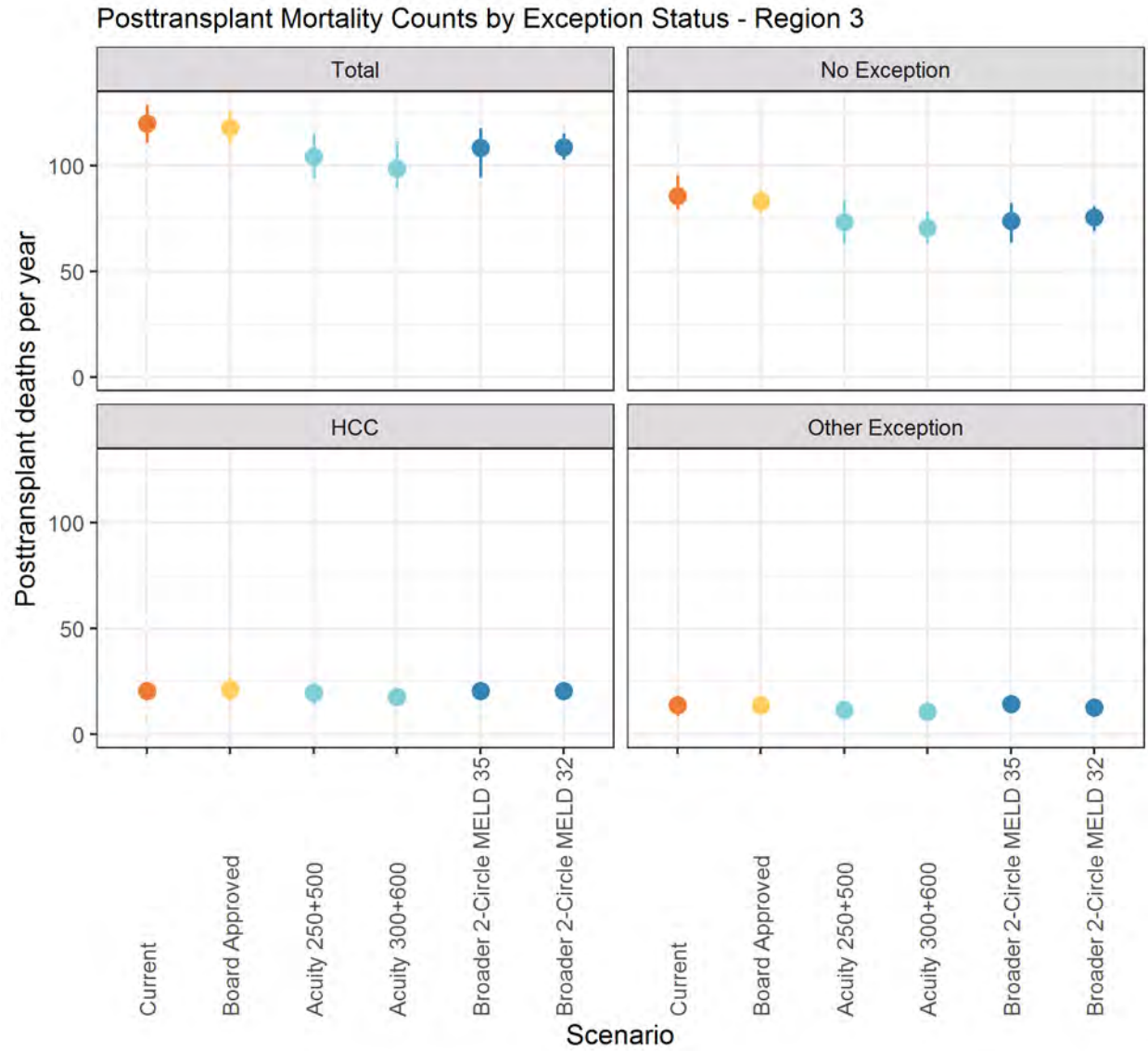


Figure 142 Posttransplant Mortality Counts by Exception Status - Region 3

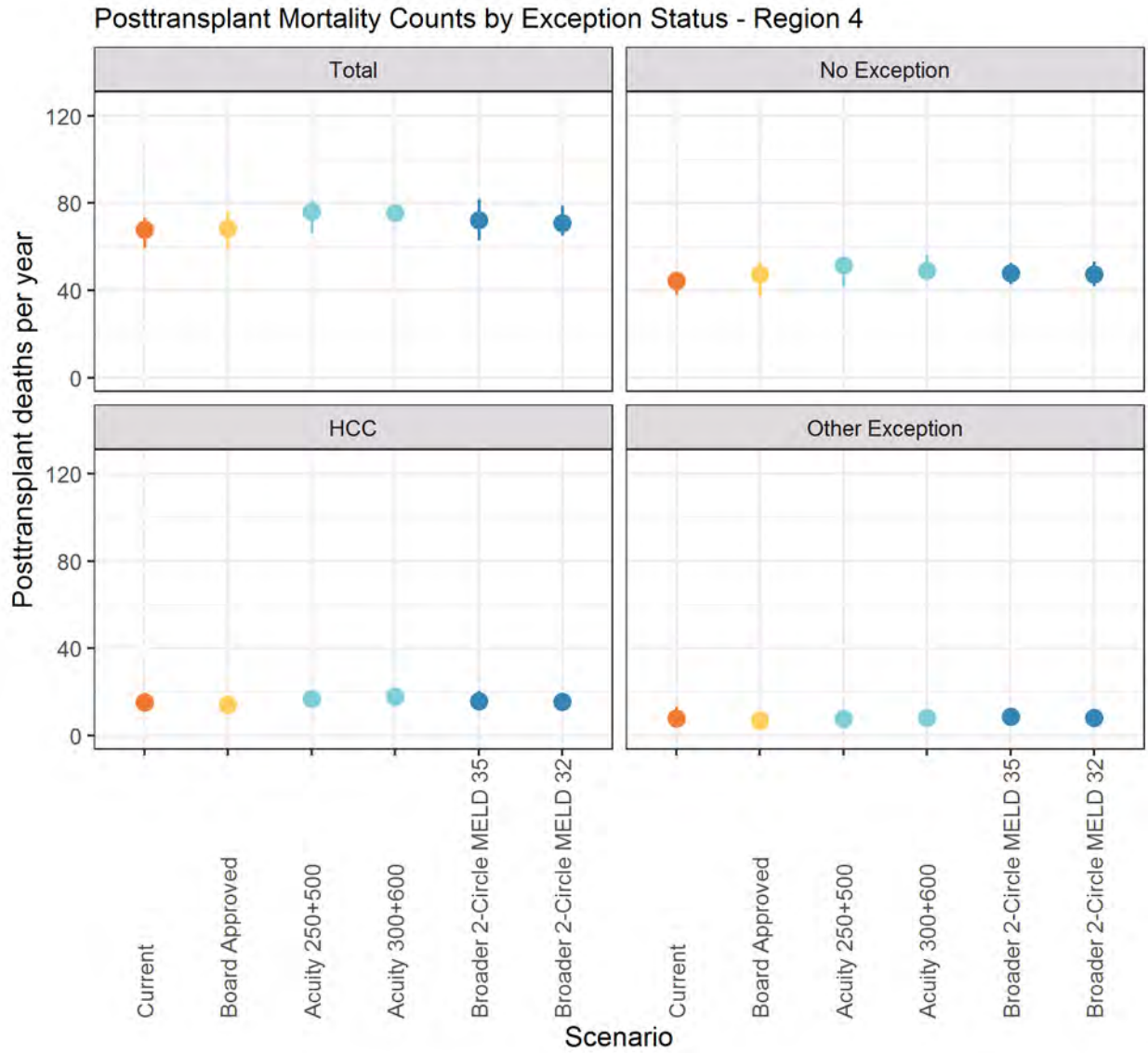


Figure 143 Posttransplant Mortality Counts by Exception Status - Region 4

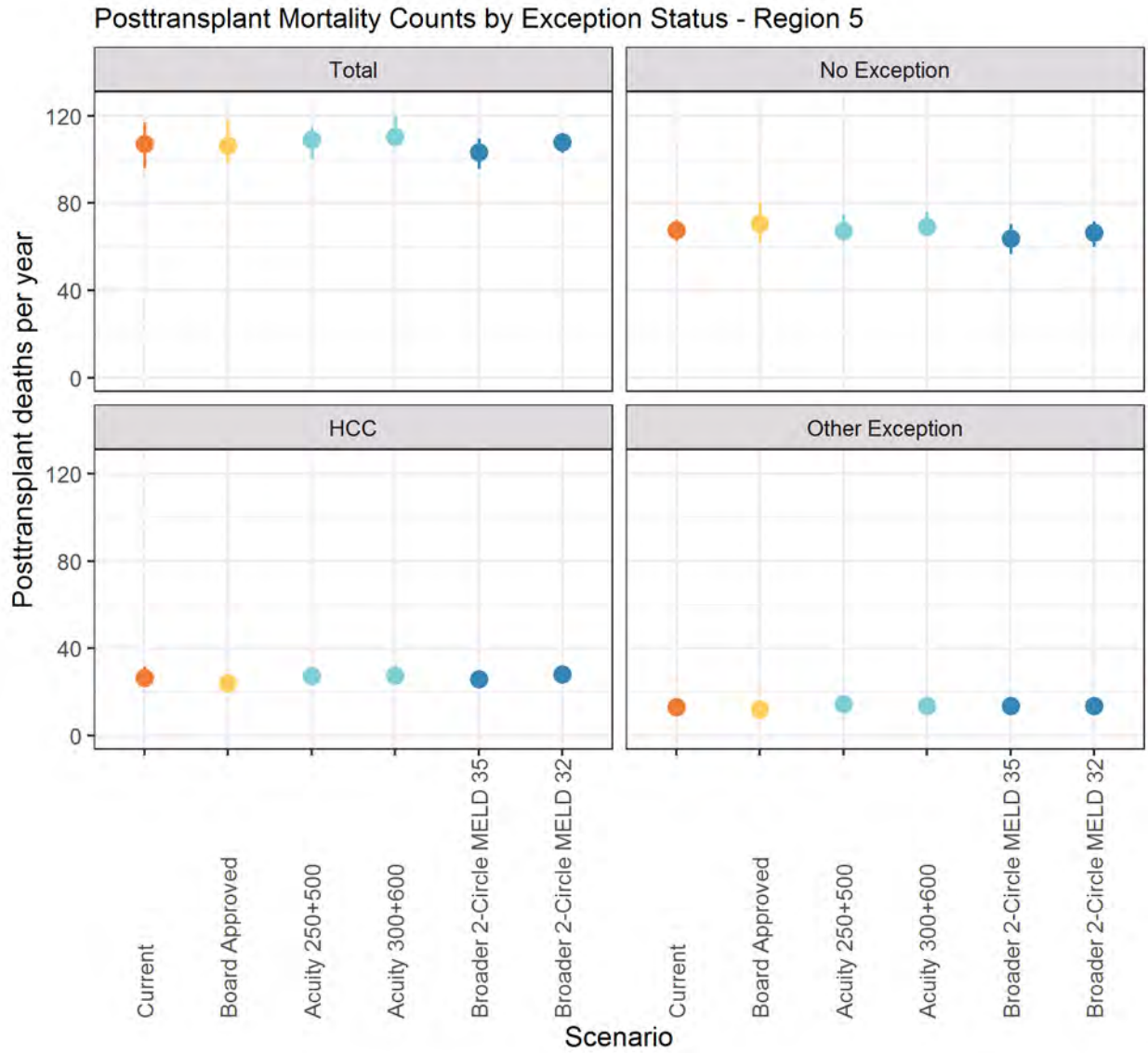


Figure 144 Posttransplant Mortality Counts by Exception Status - Region 5

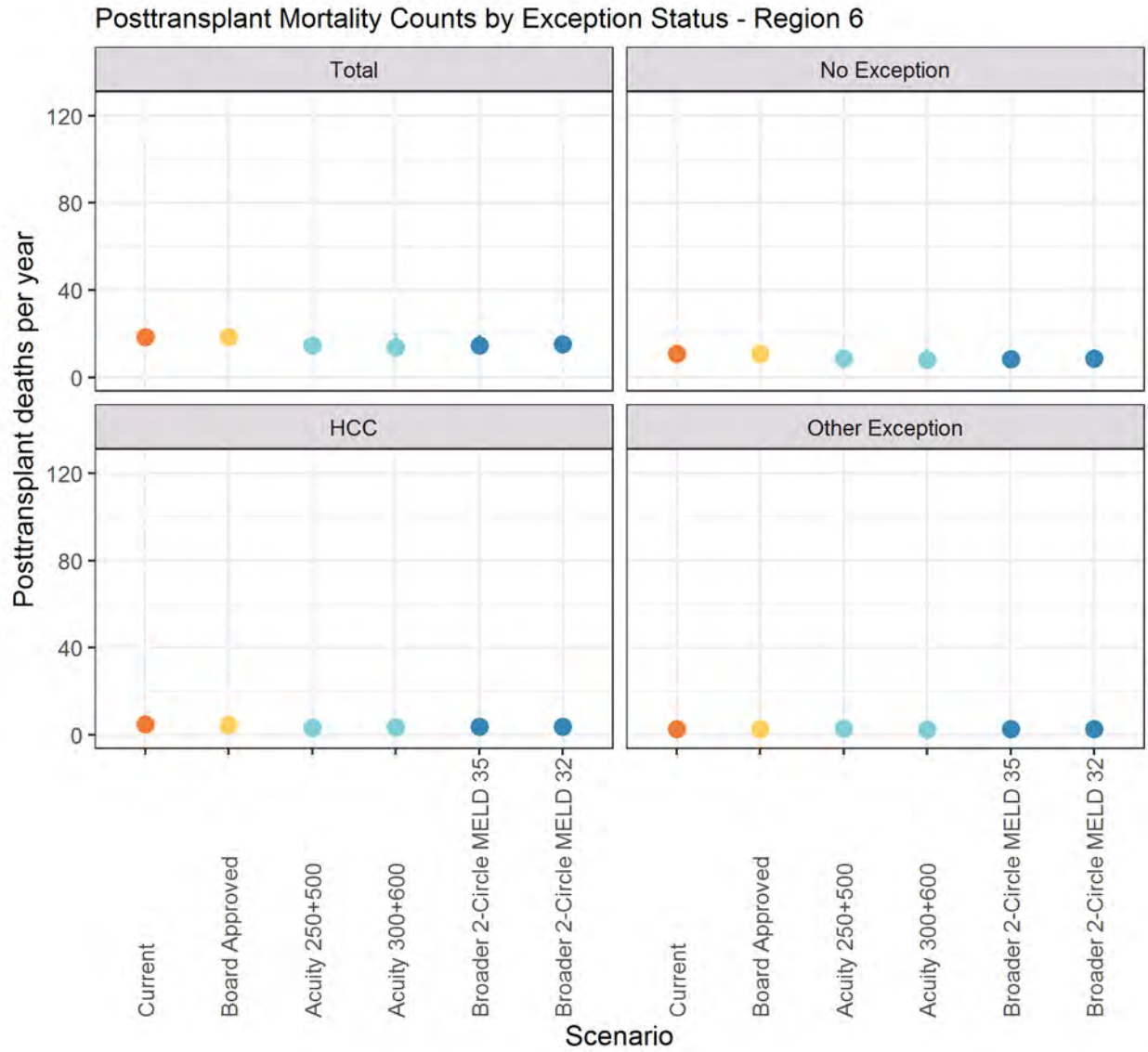


Figure 145 Posttransplant Mortality Counts by Exception Status - Region 6

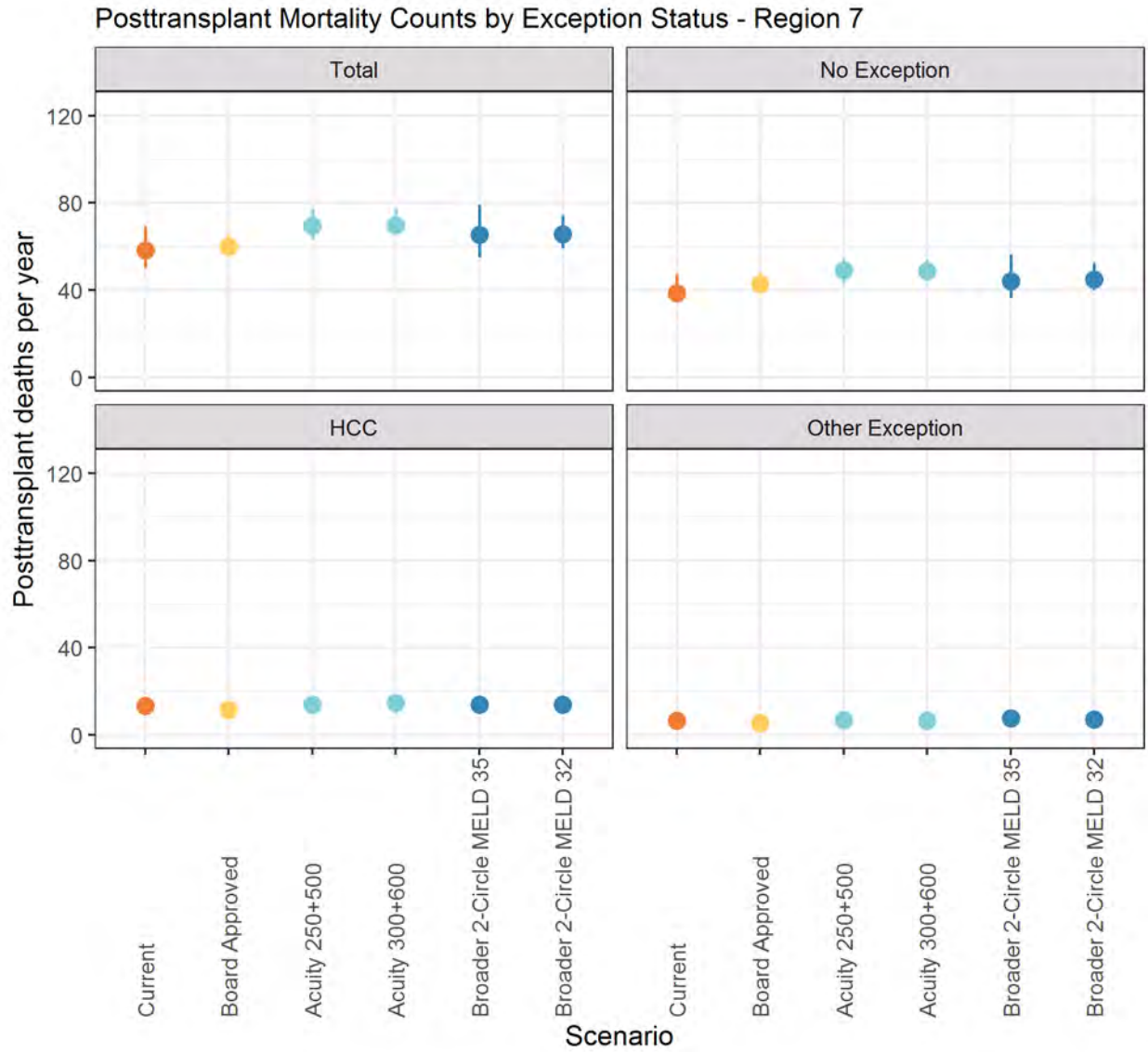


Figure 146 Posttransplant Mortality Counts by Exception Status - Region 7

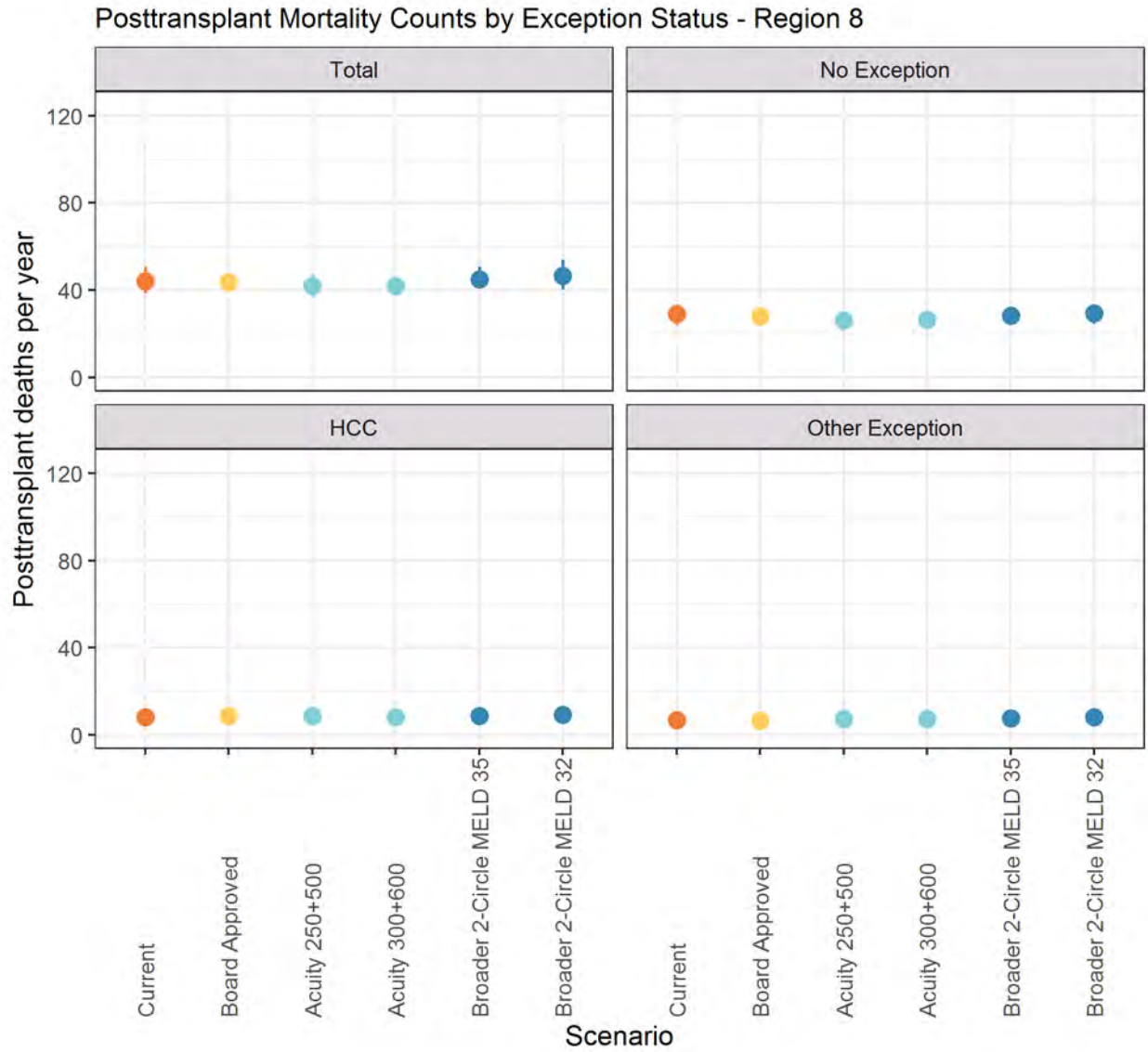


Figure 147 Posttransplant Mortality Counts by Exception Status - Region 8

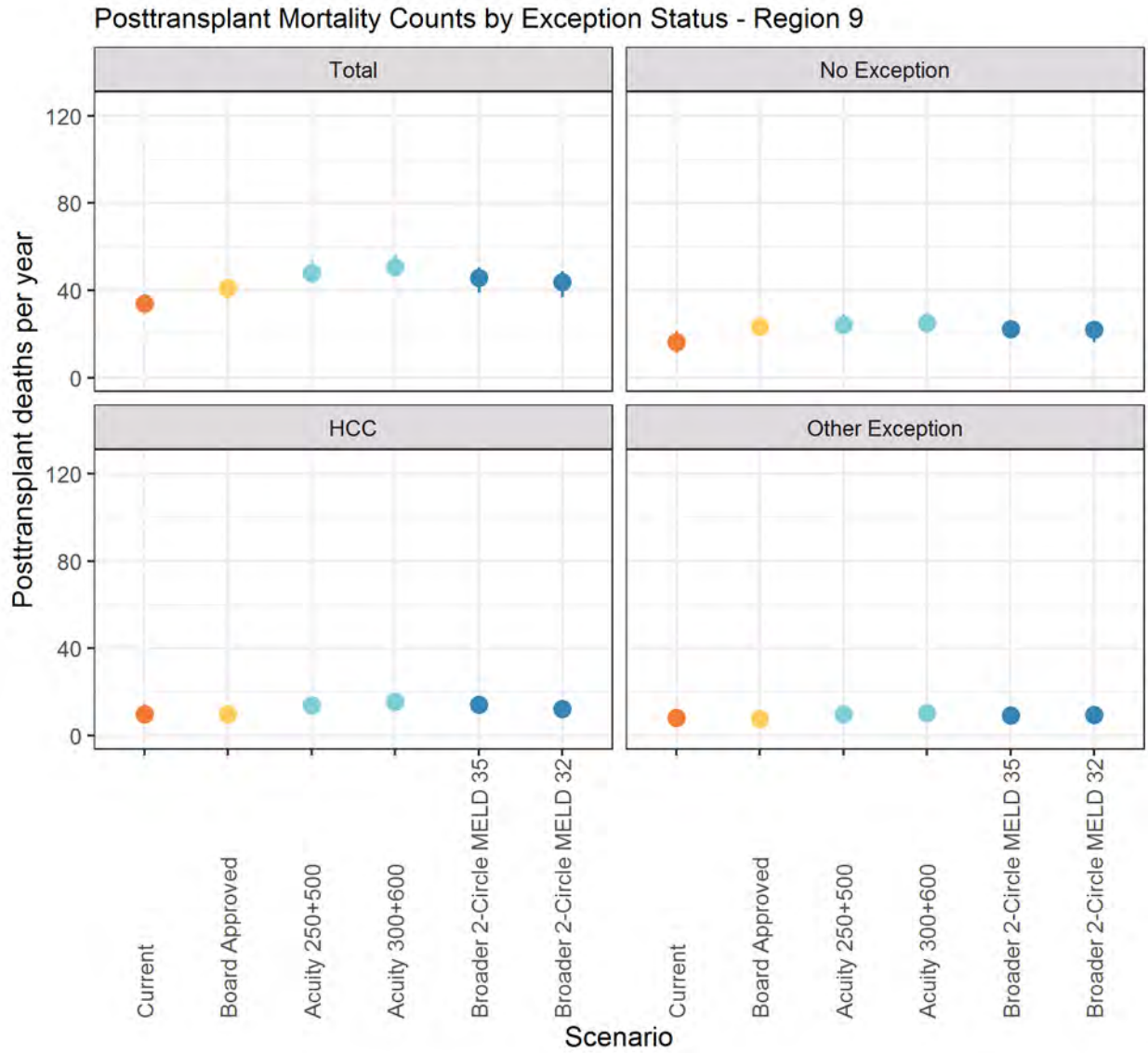


Figure 148 Posttransplant Mortality Counts by Exception Status - Region 9

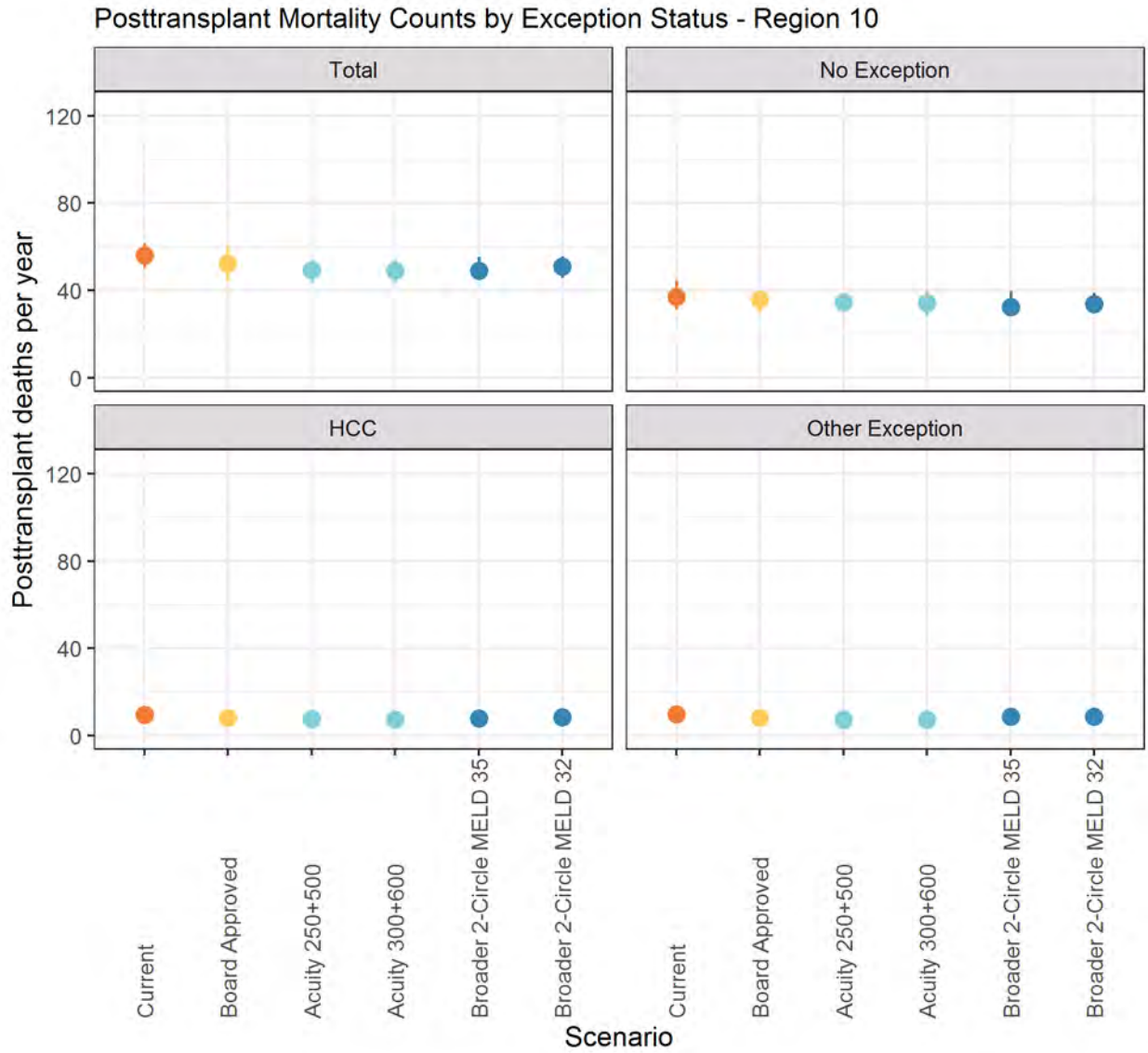


Figure 149 Posttransplant Mortality Counts by Exception Status - Region 10

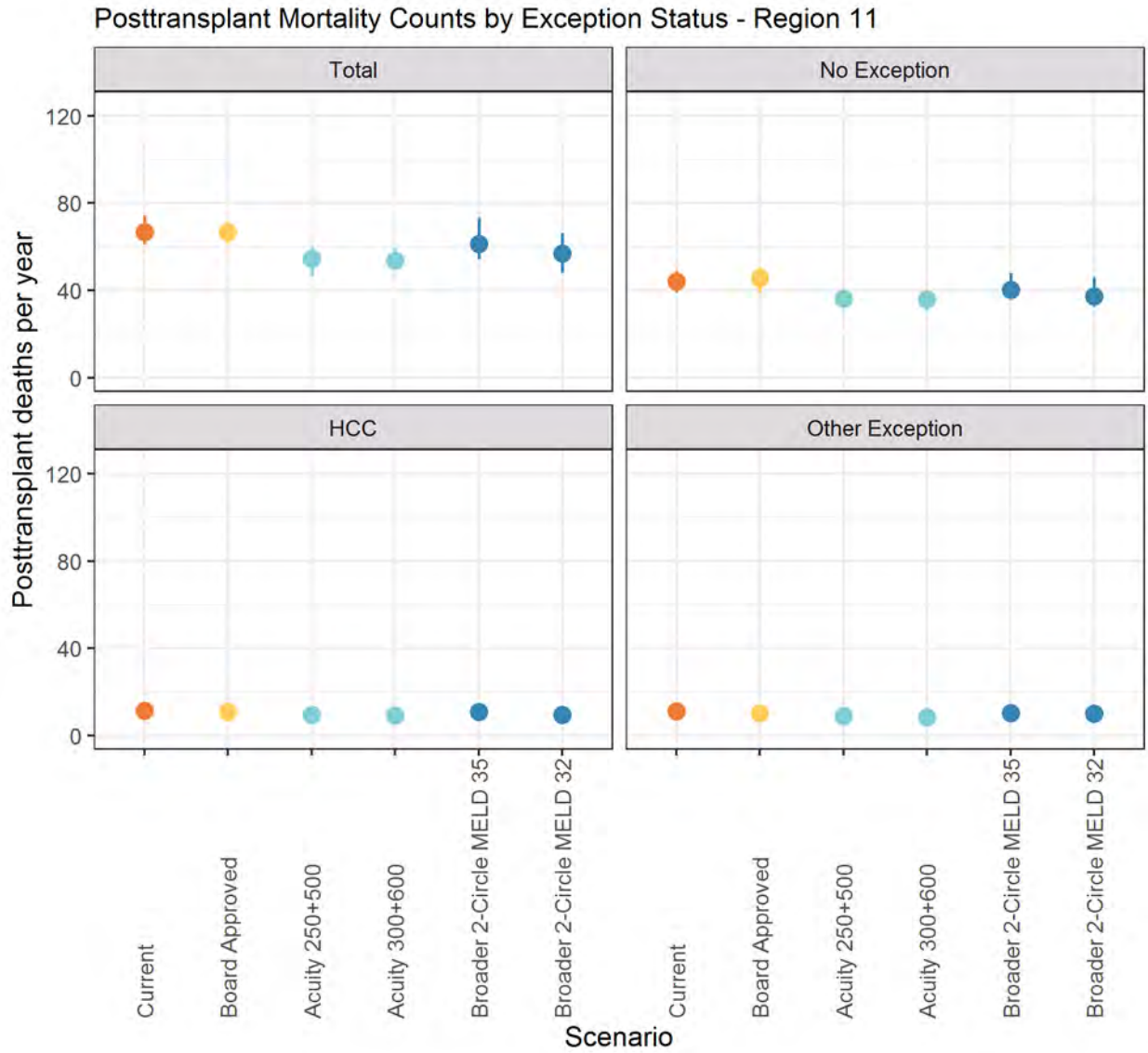


Figure 150 Posttransplant Mortality Counts by Exception Status - Region 11

Posttransplant Mortality Rates by Allocation MELD/PELD

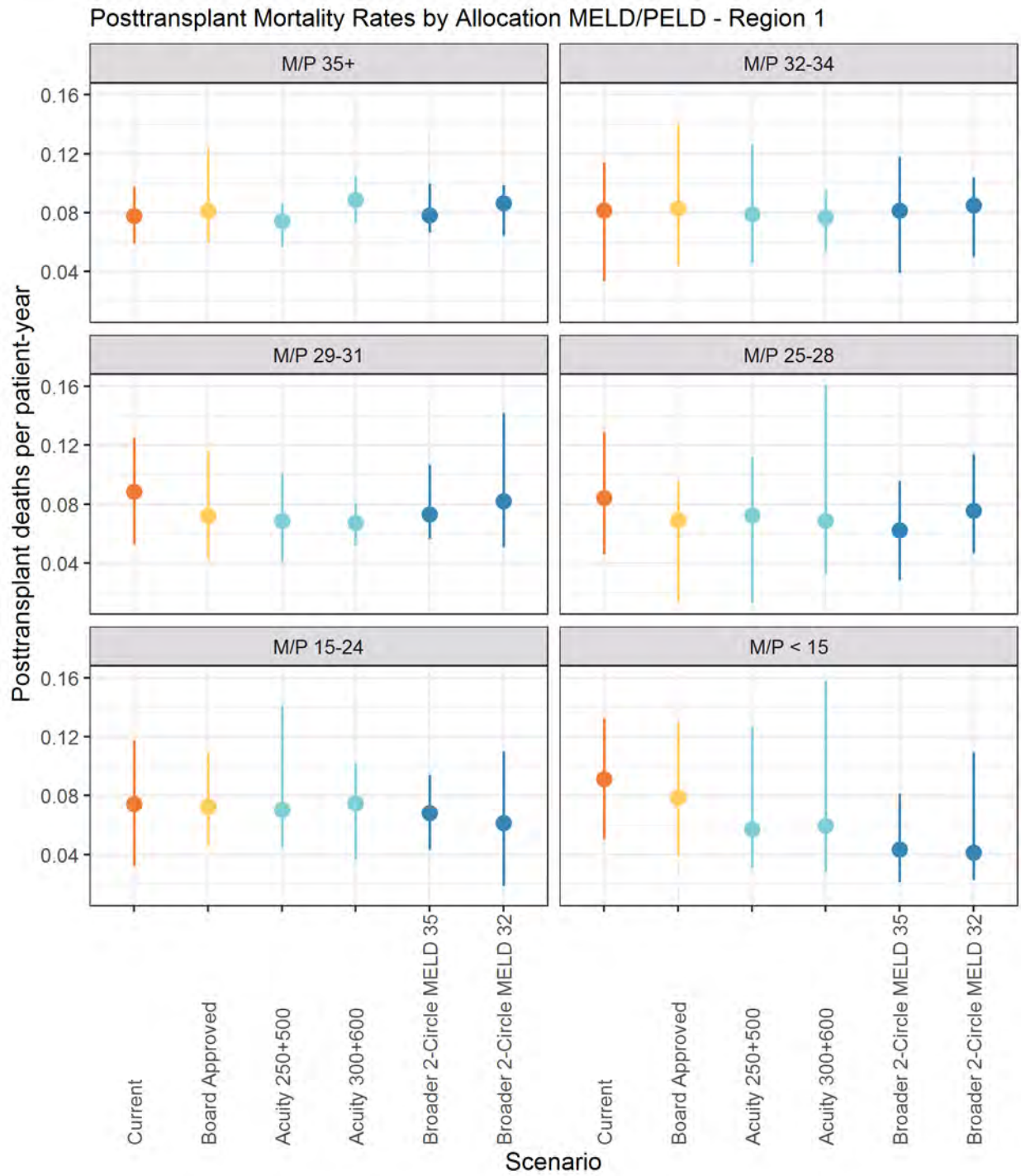


Figure 151 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 1

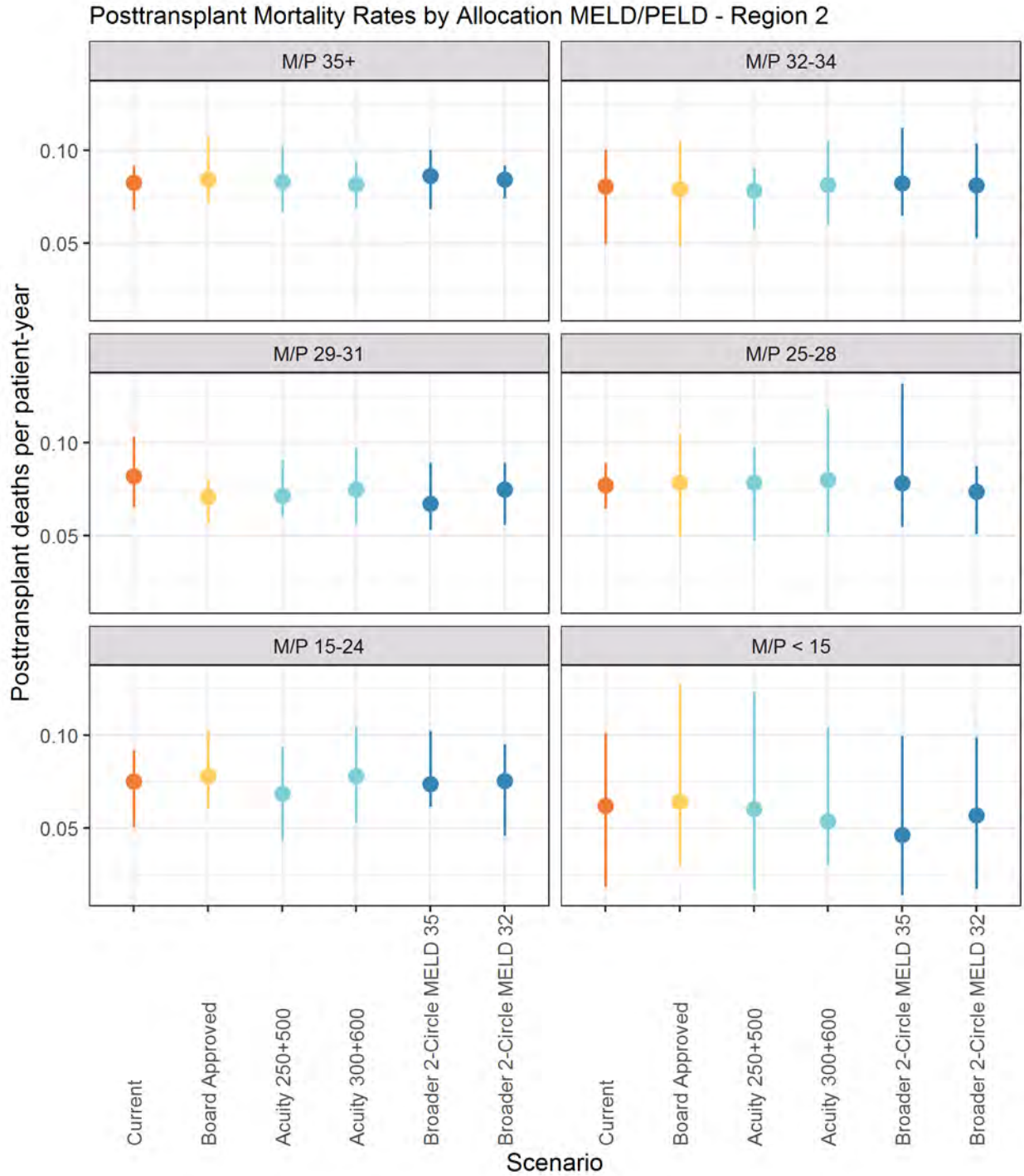


Figure 152 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 2

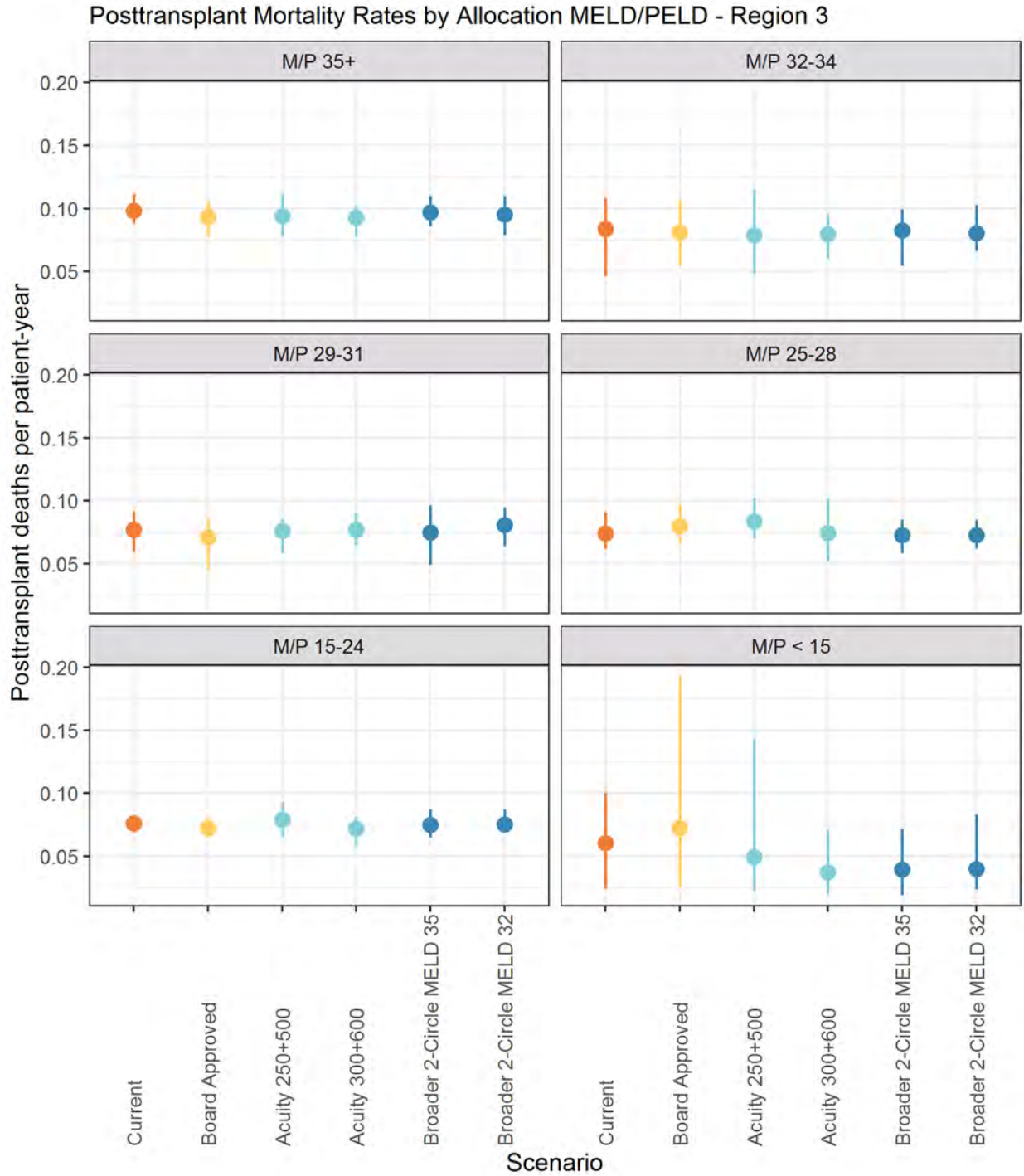


Figure 153 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 3

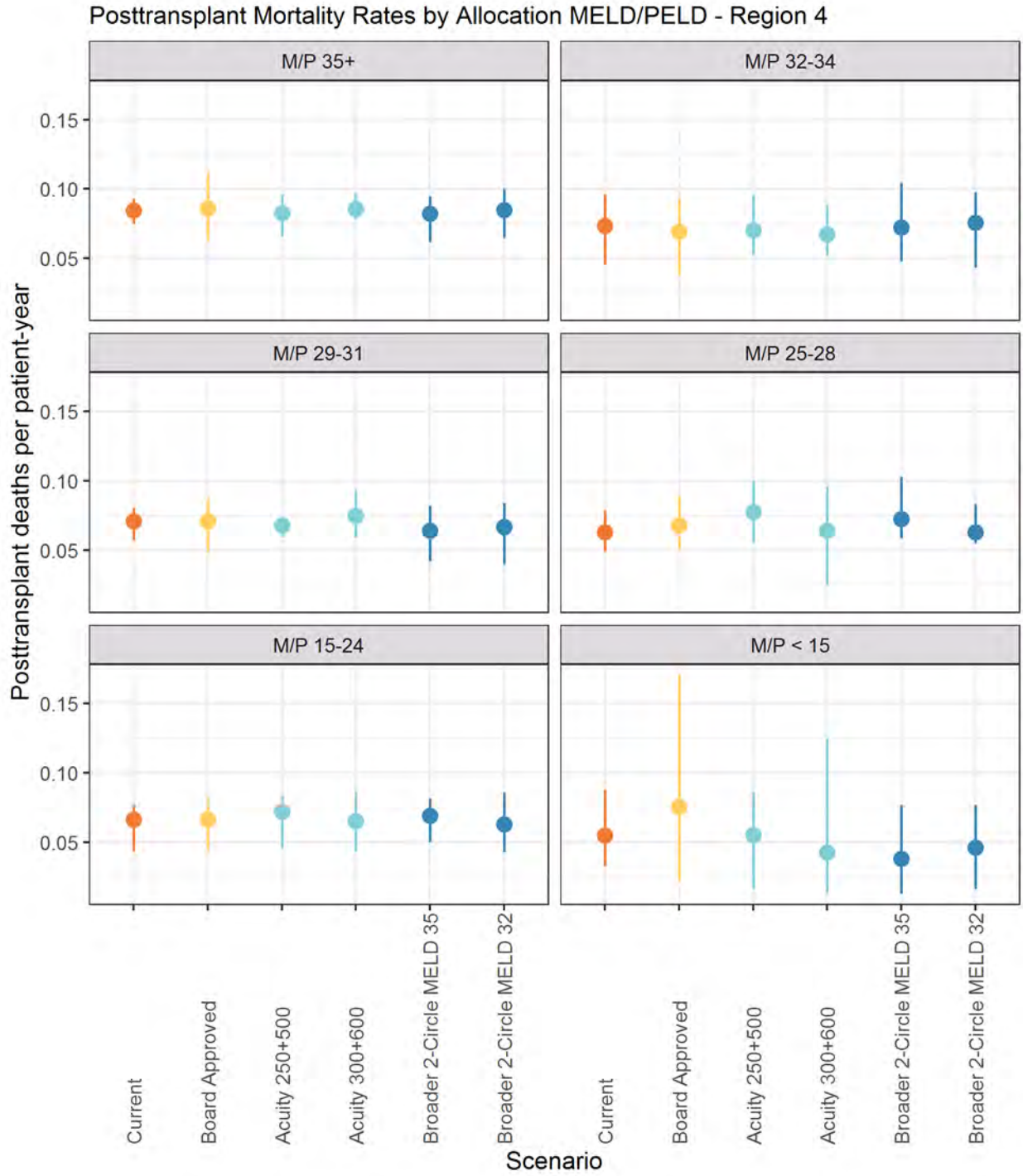


Figure 154 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 4

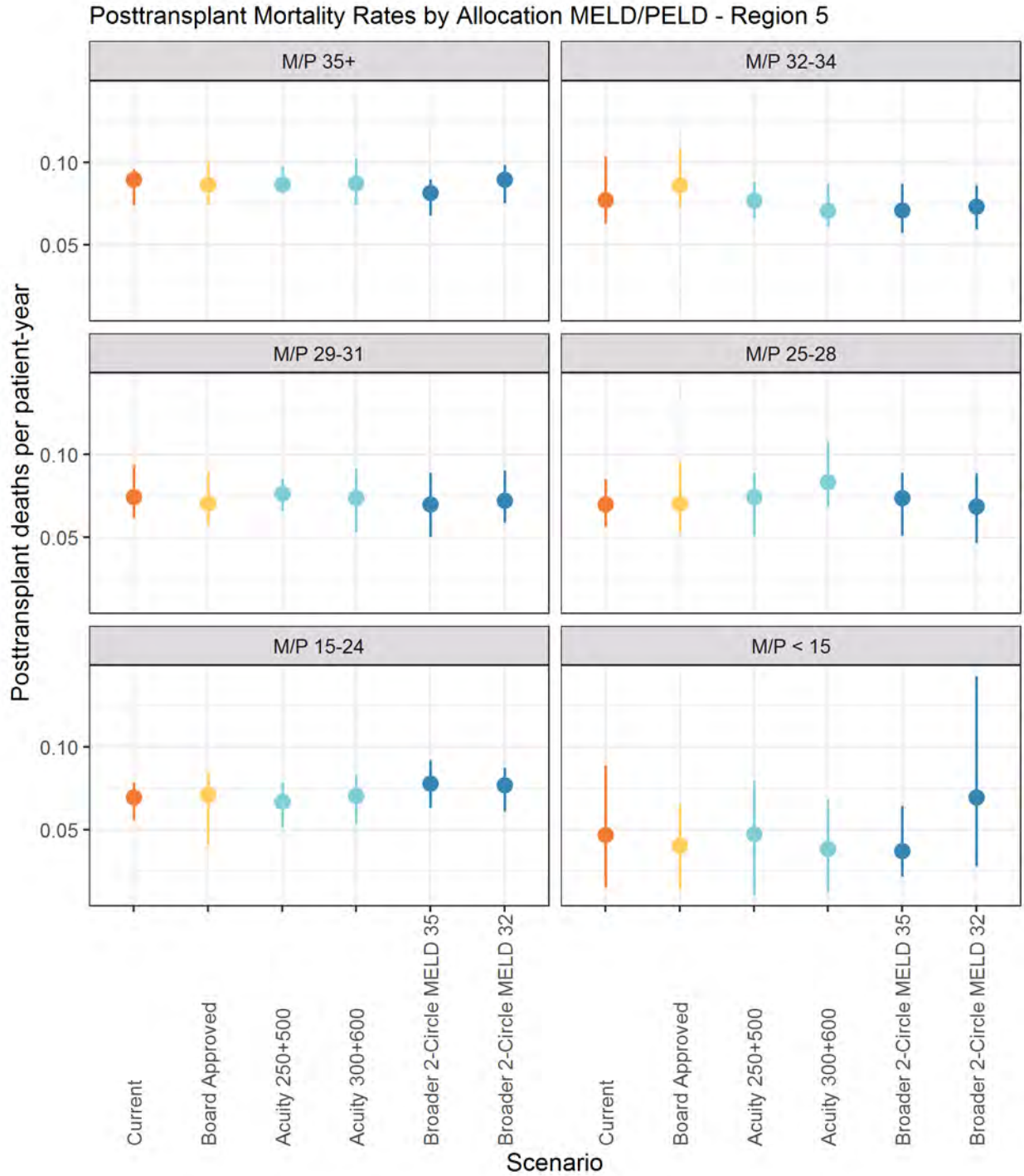


Figure 155 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 5

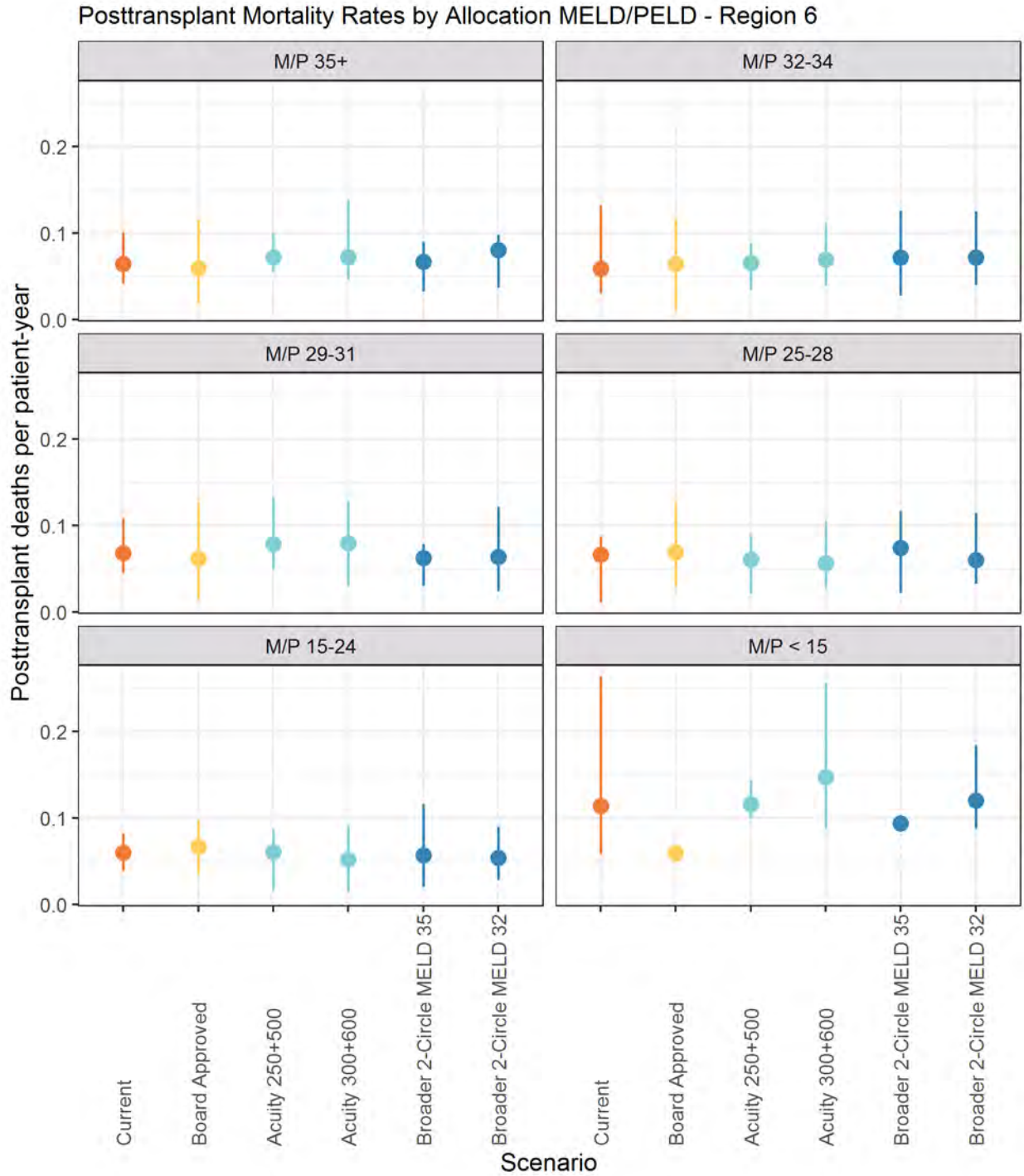


Figure 156 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 6

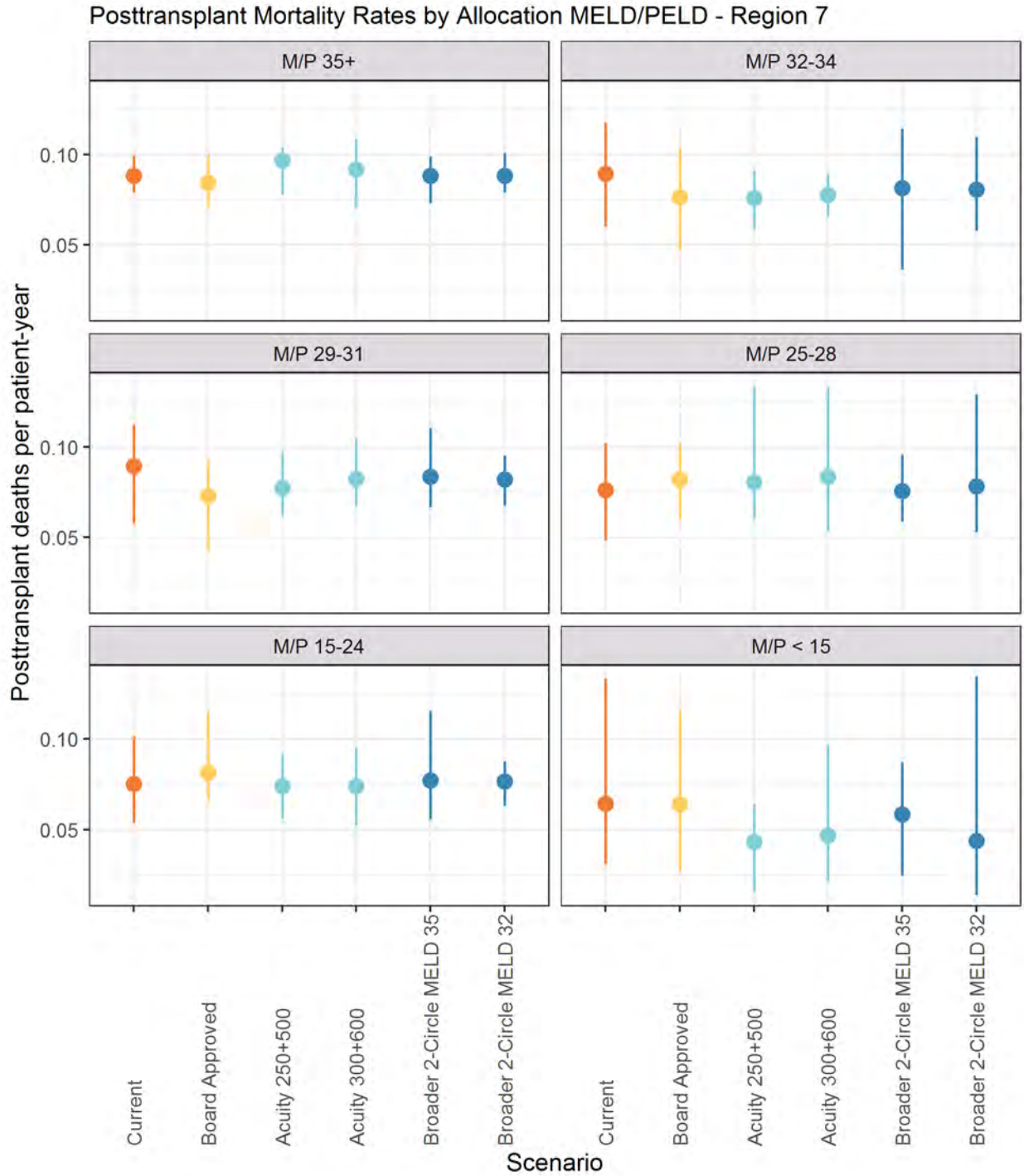


Figure 157 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 7

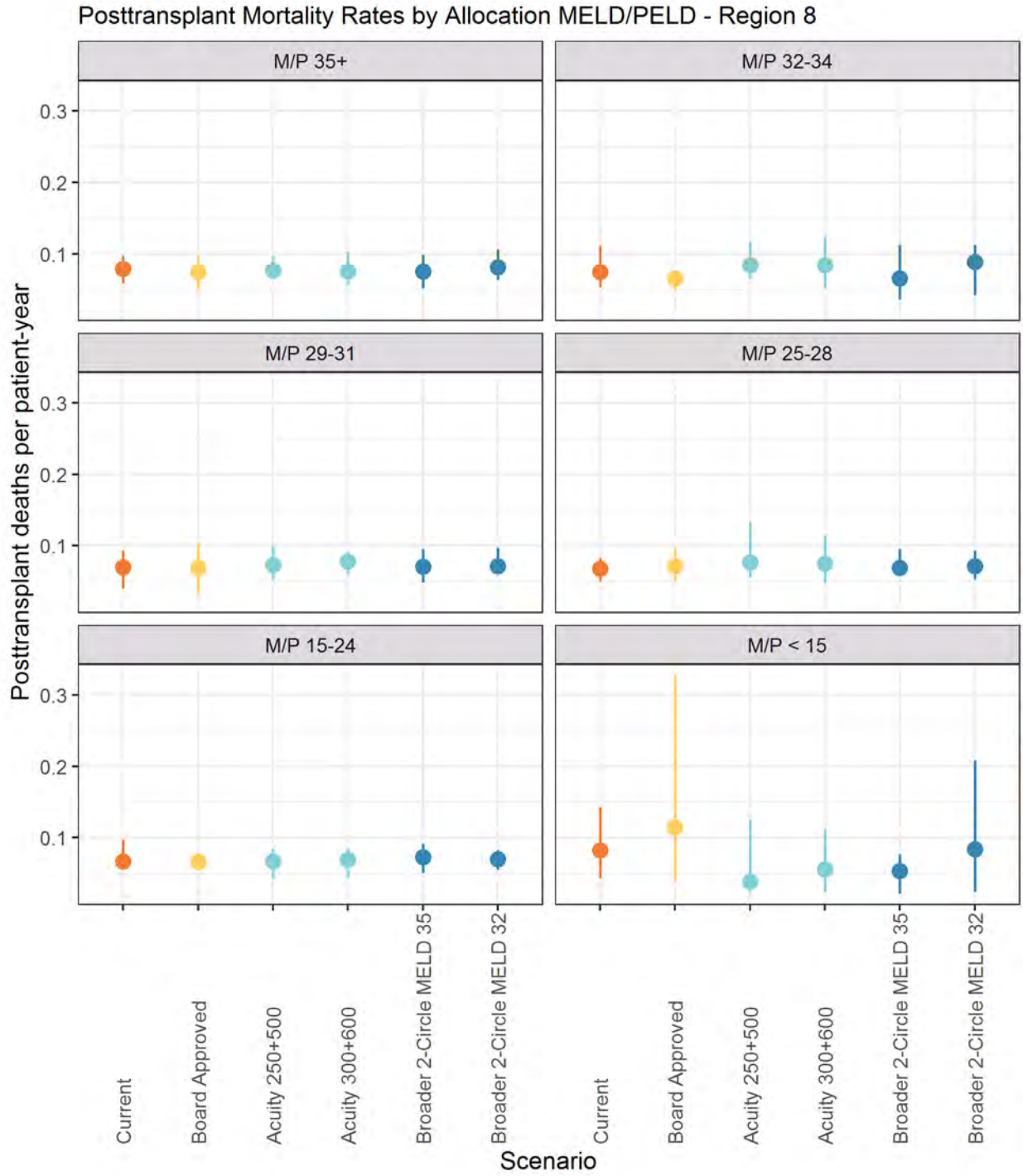


Figure 158 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 8

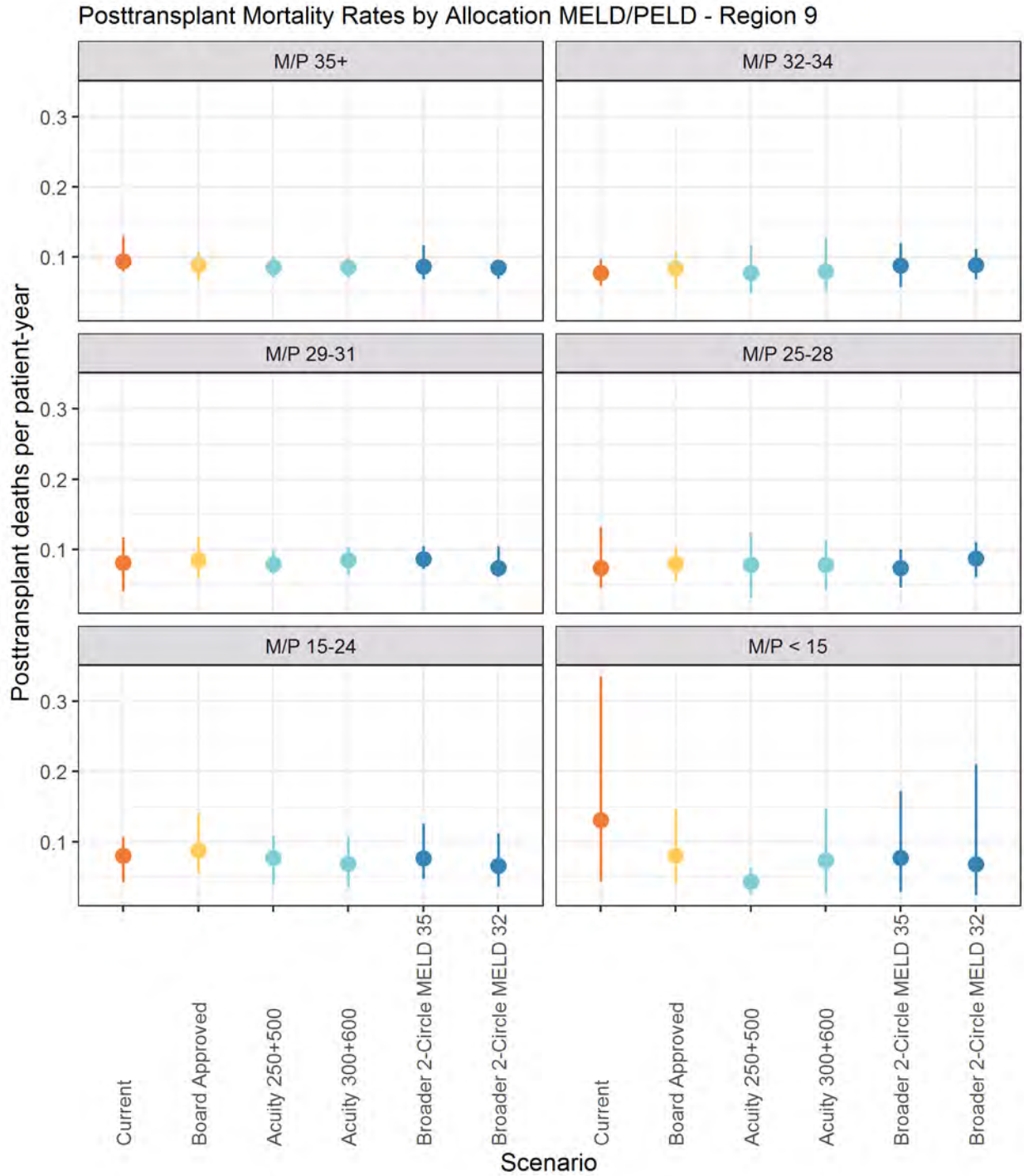


Figure 159 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 9

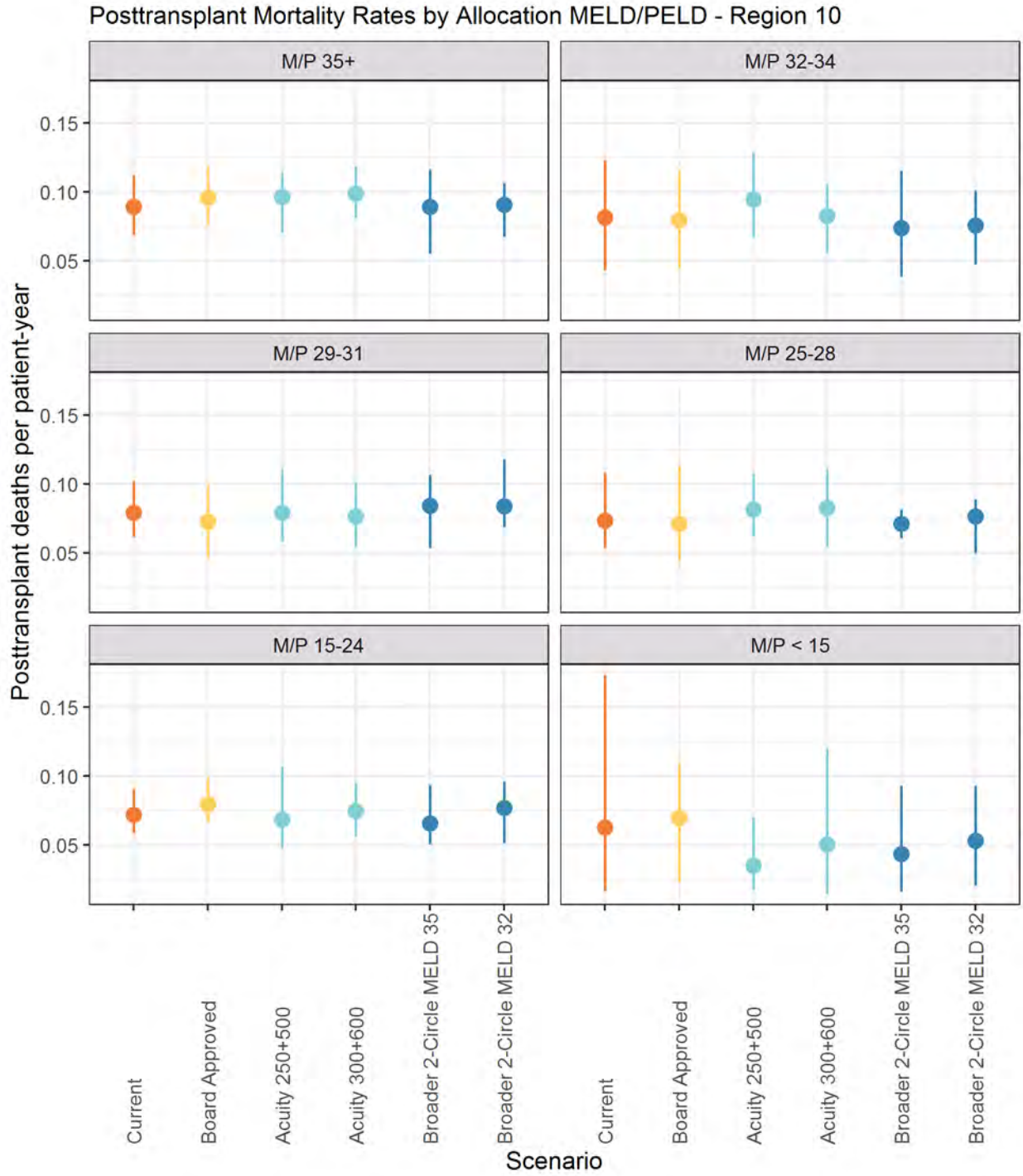


Figure 160 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 10

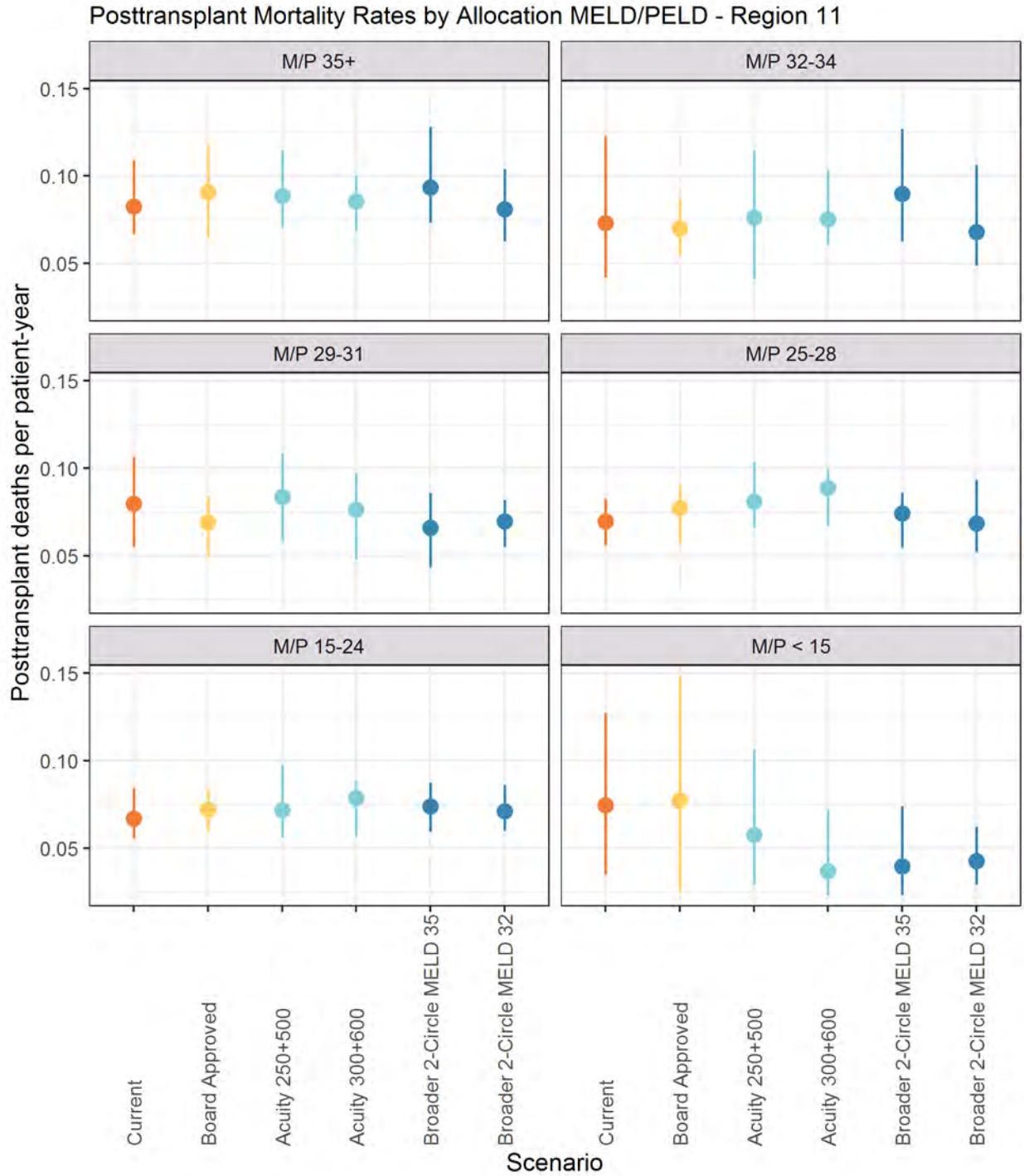


Figure 161 Posttransplant Mortality Rates by Allocation MELD/PELD - Region 11

Posttransplant Mortality Counts by Allocation MELD/PELD

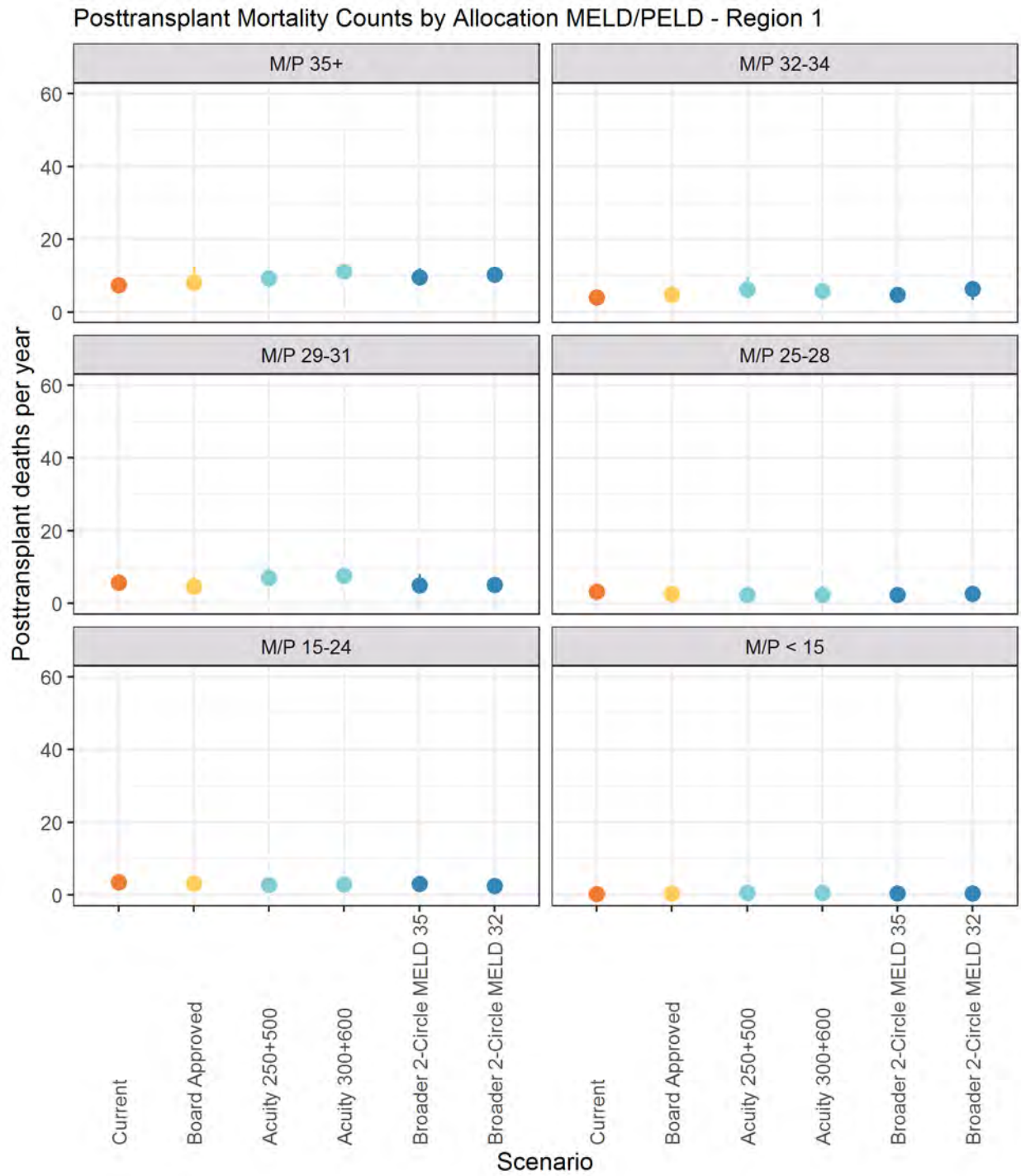


Figure 162 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 1

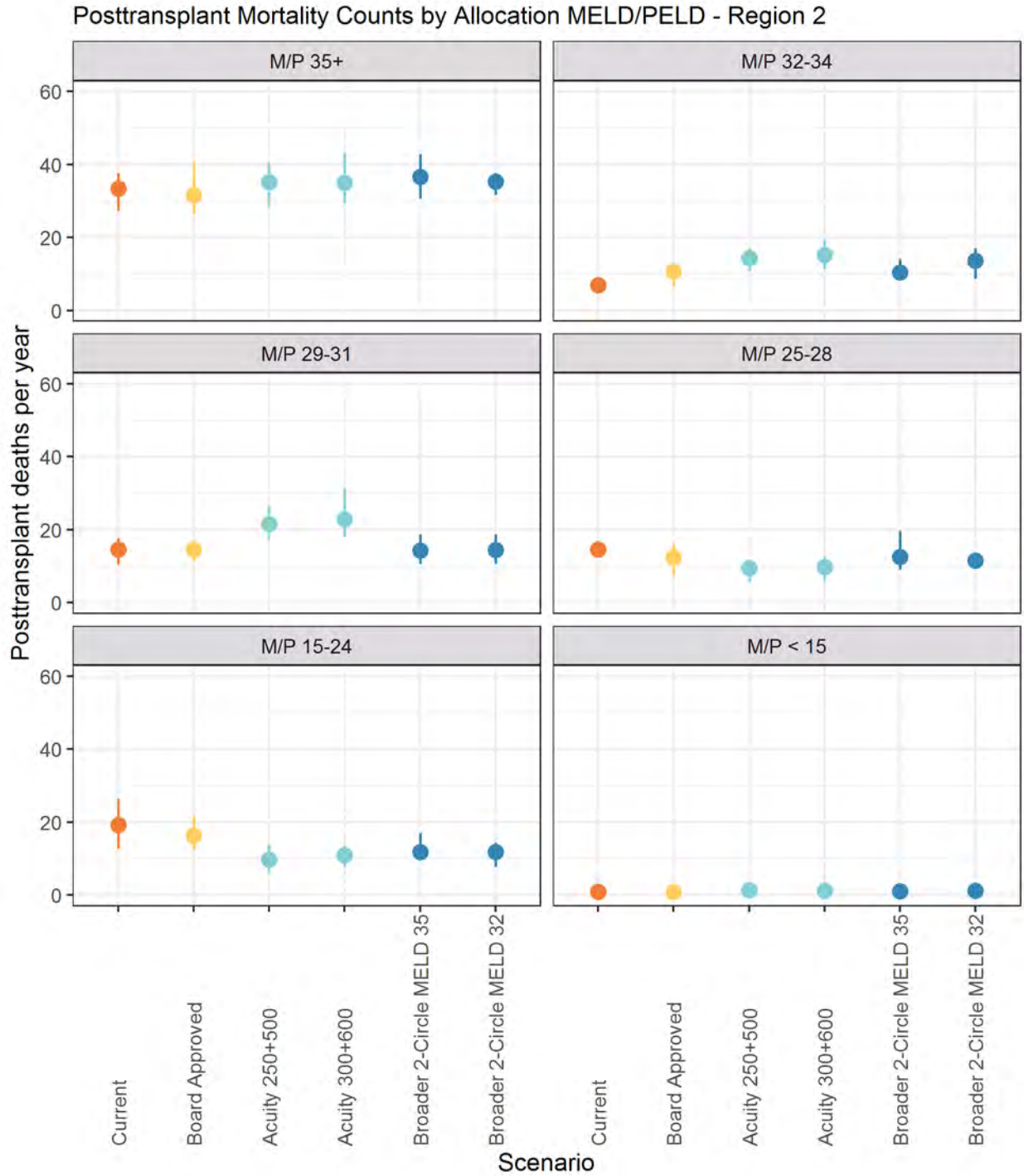


Figure 163 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 2

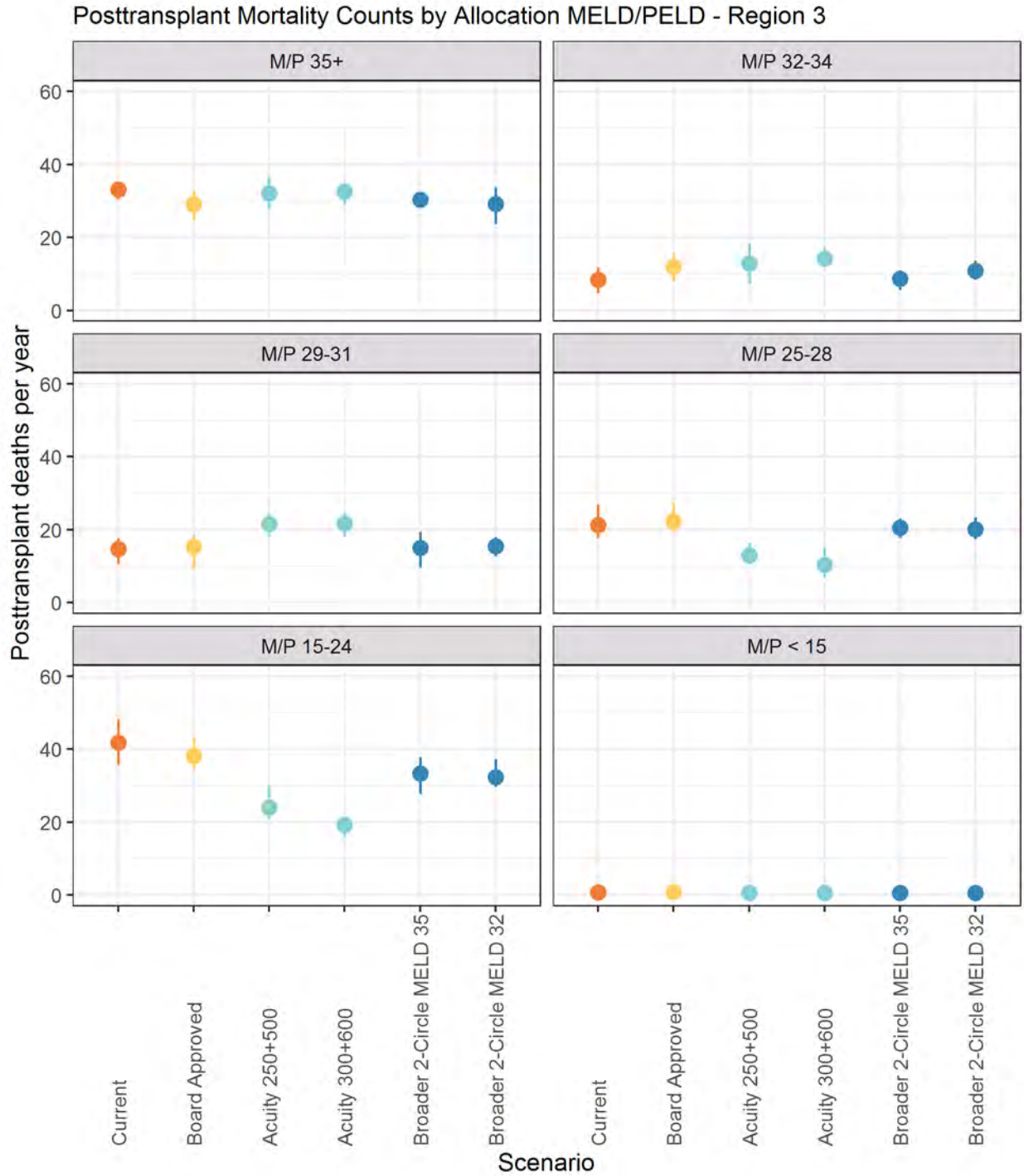


Figure 164 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 3

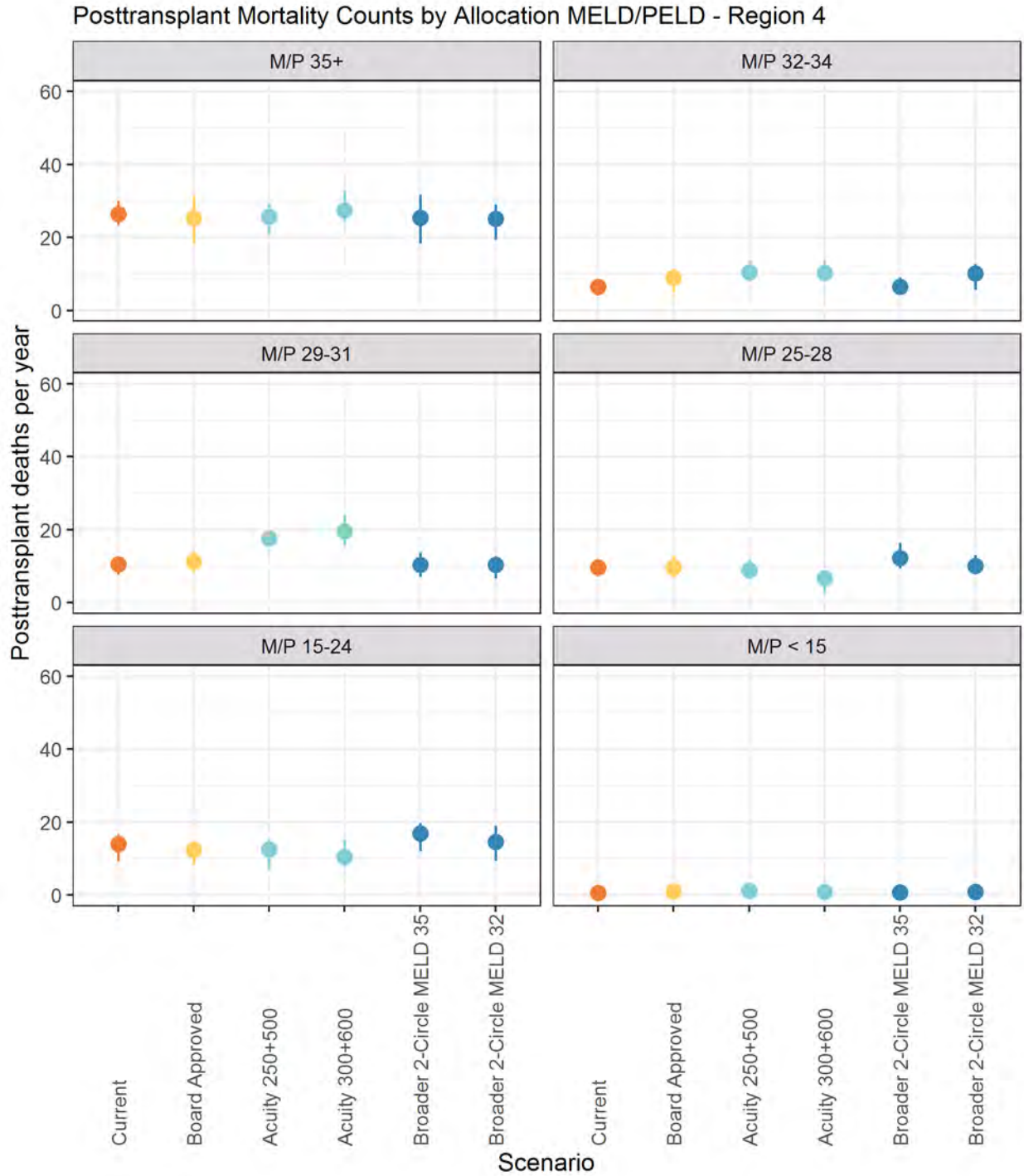


Figure 165 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 4

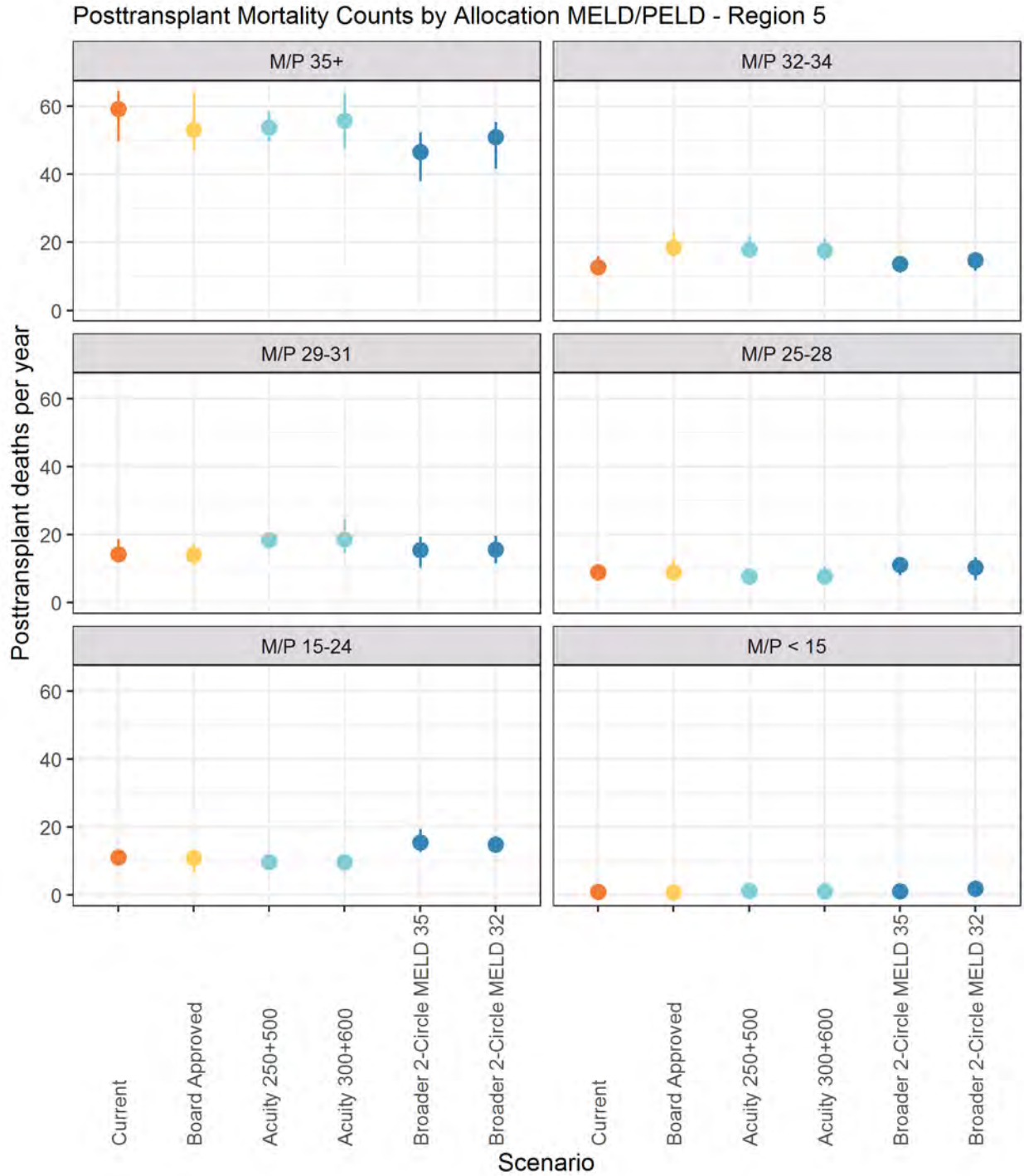


Figure 166 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 5

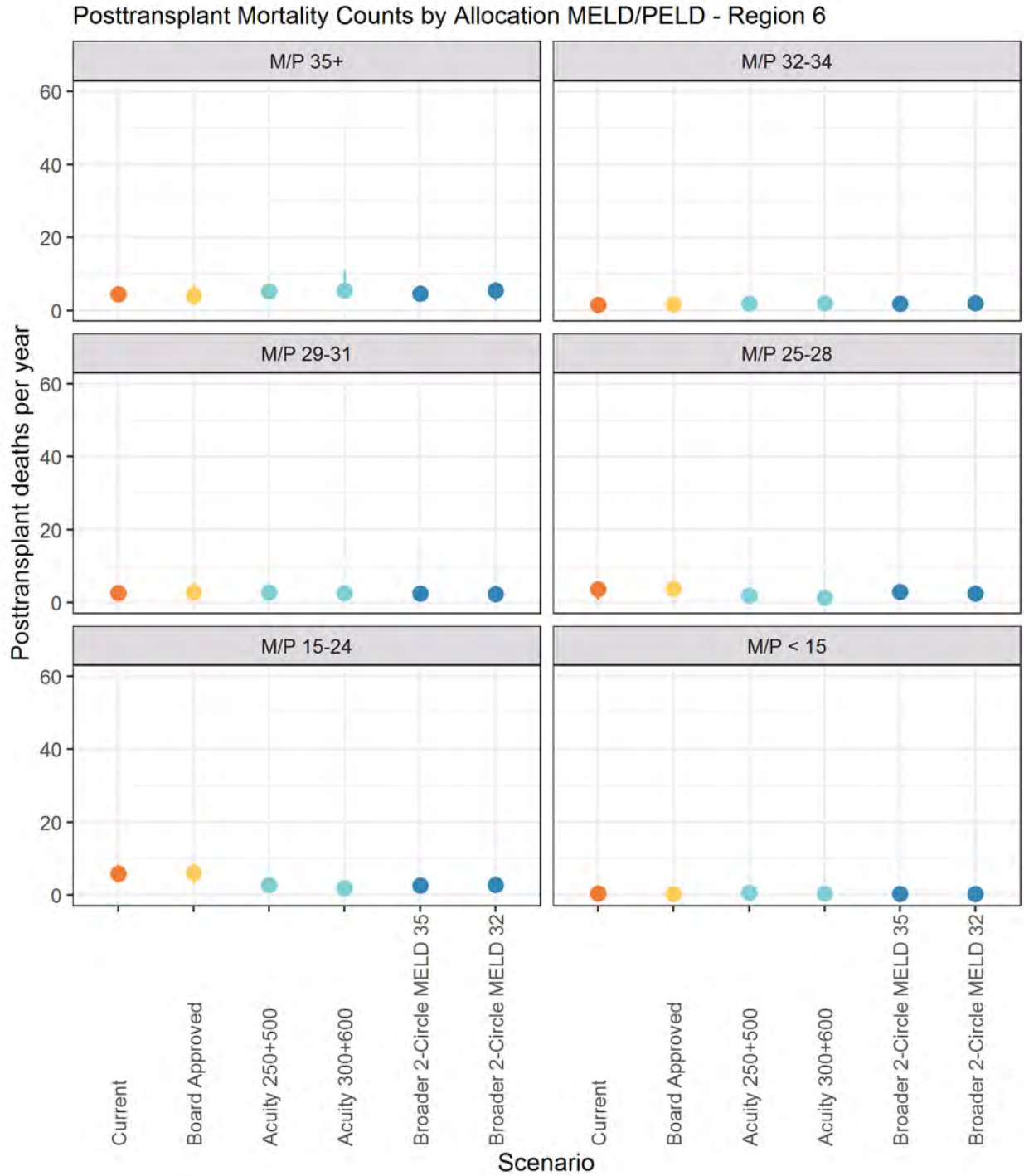


Figure 167 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 6

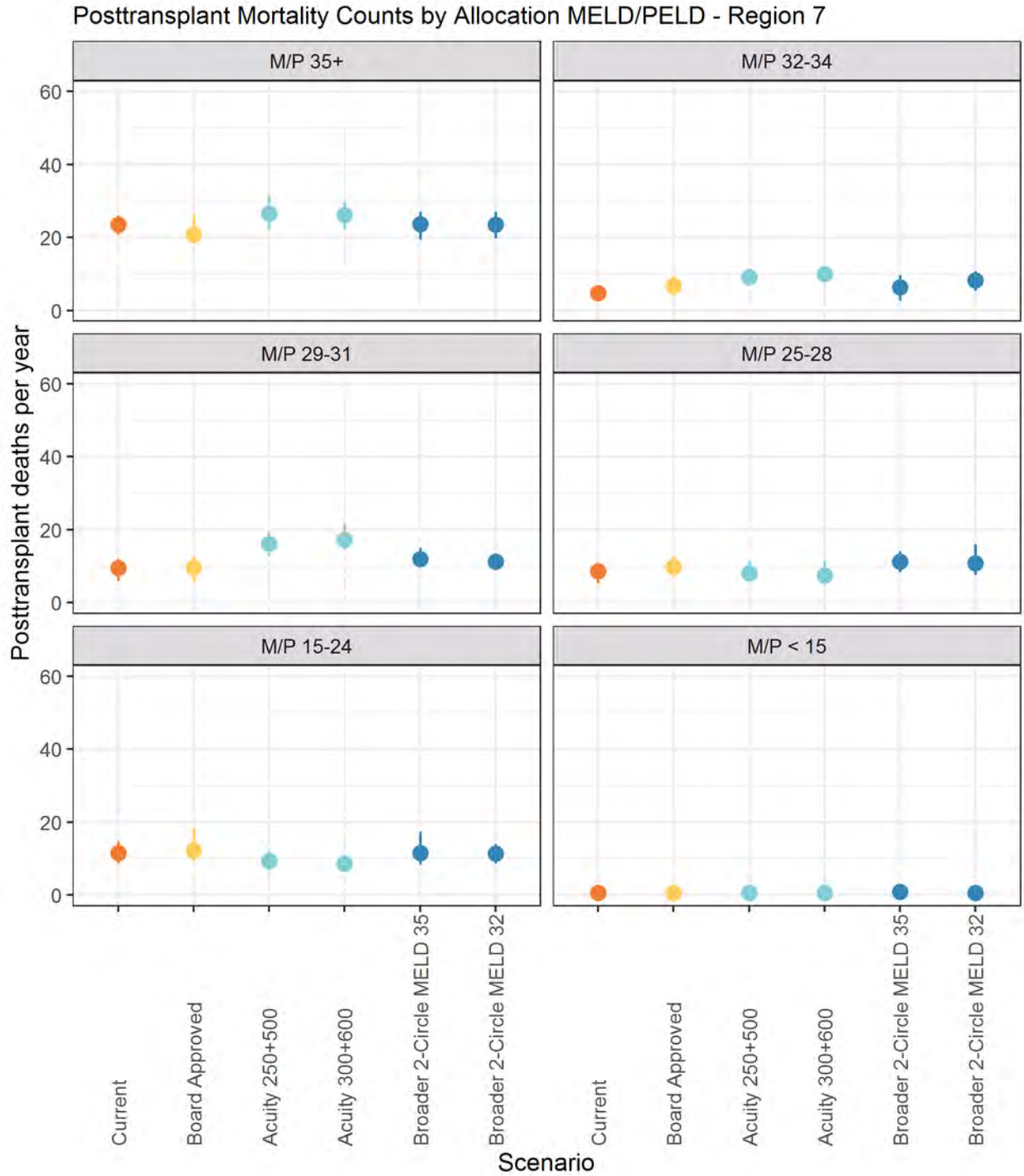


Figure 168 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 7

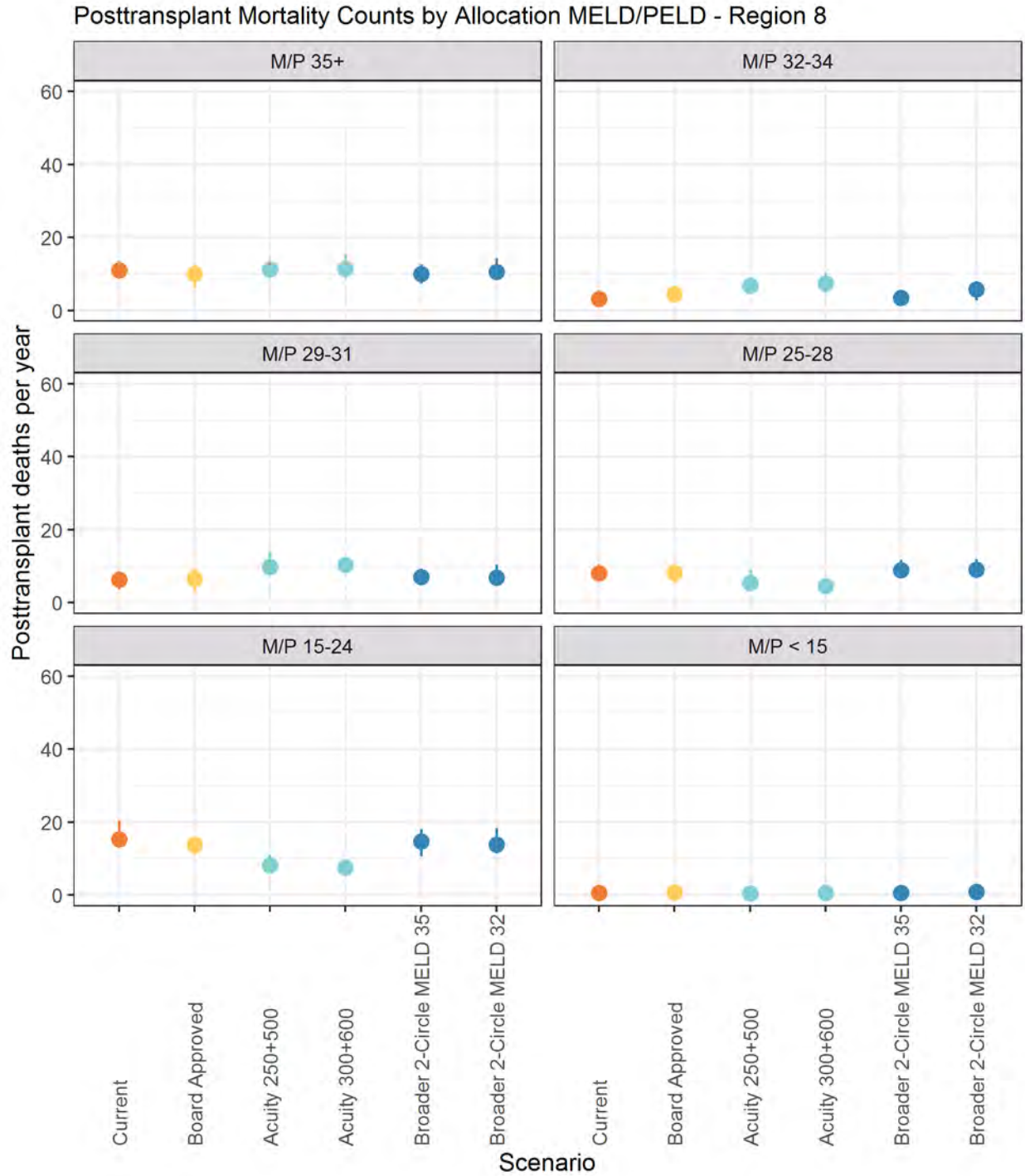


Figure 169 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 8

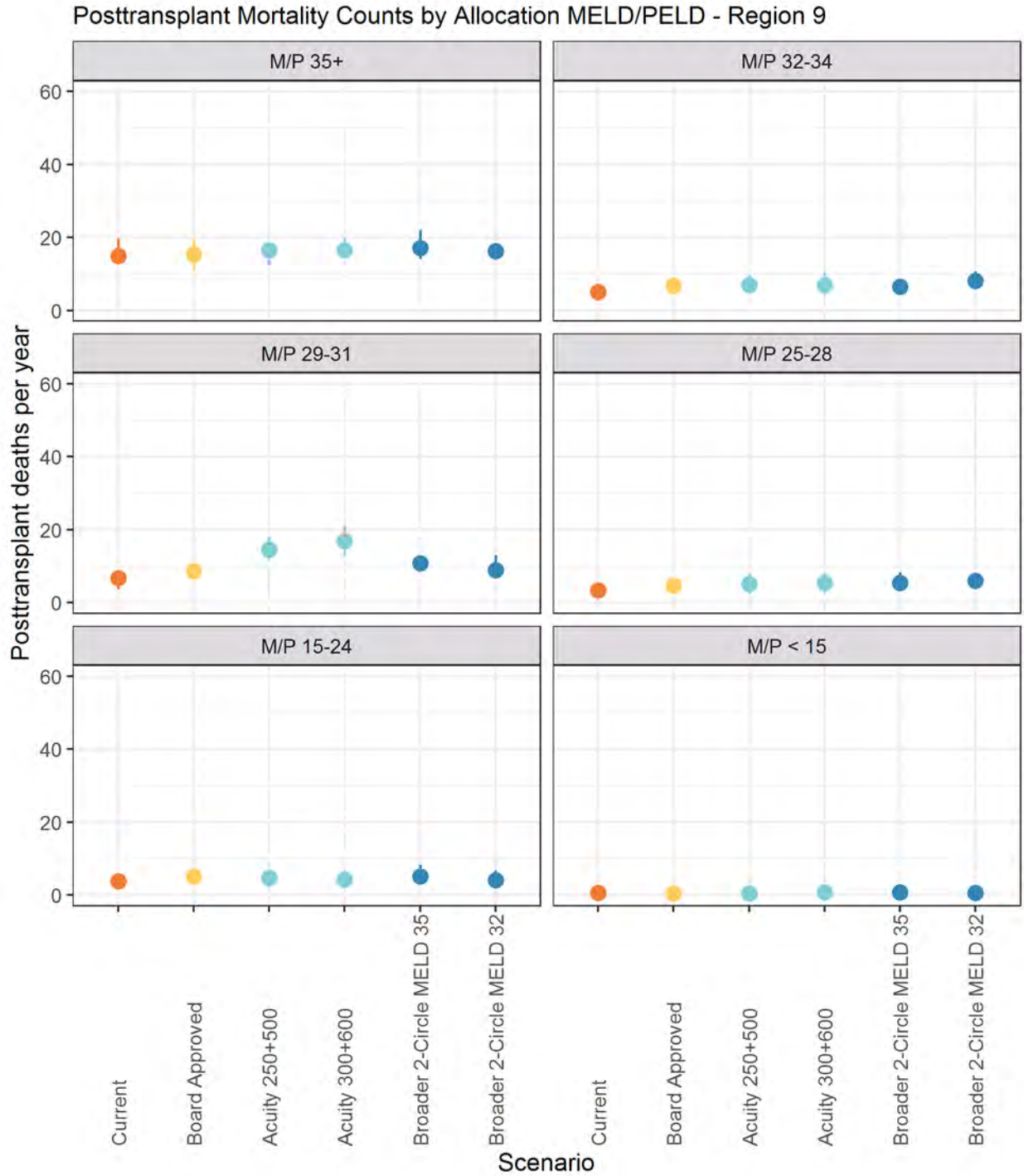


Figure 170 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 9

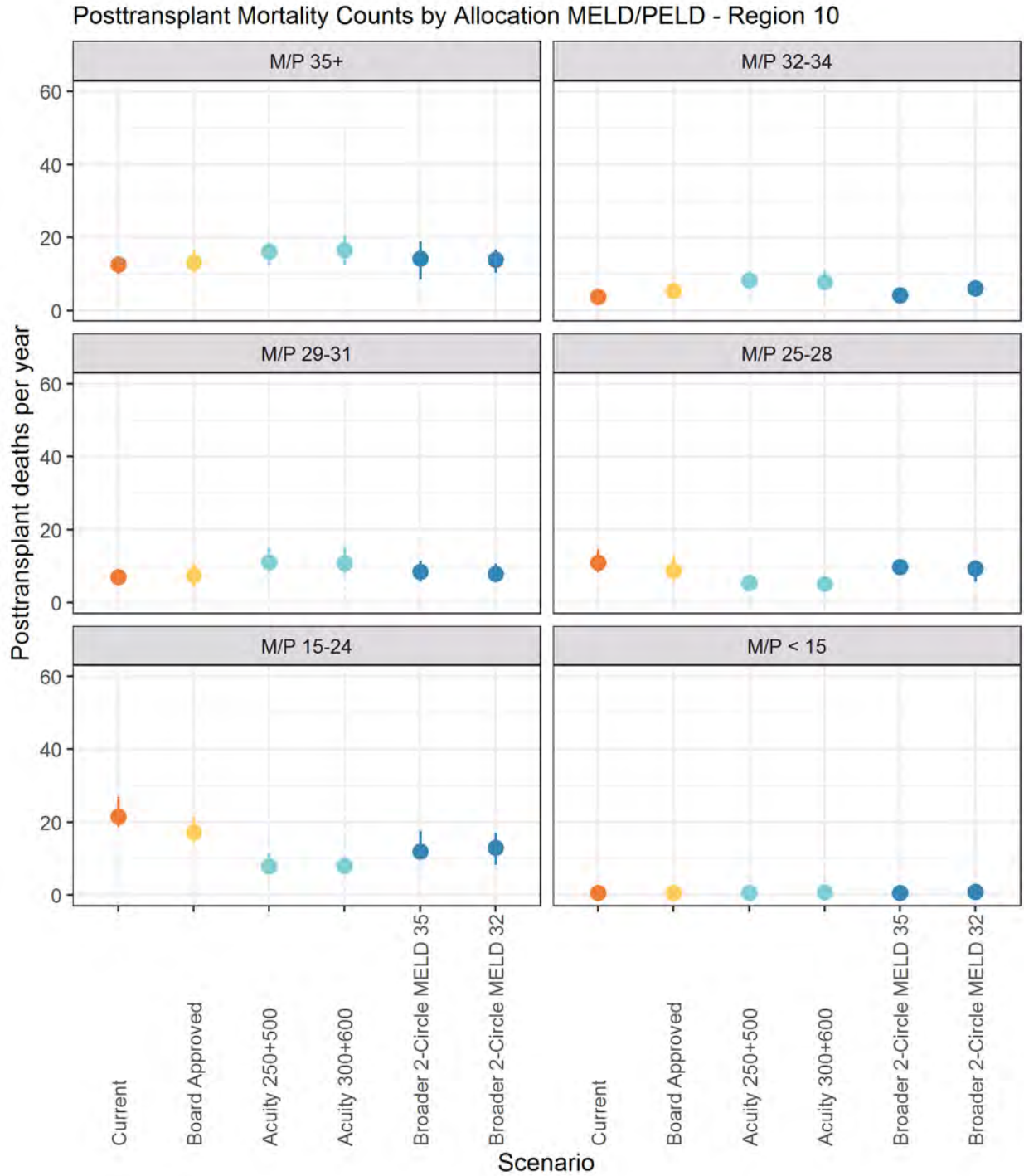


Figure 171 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 10

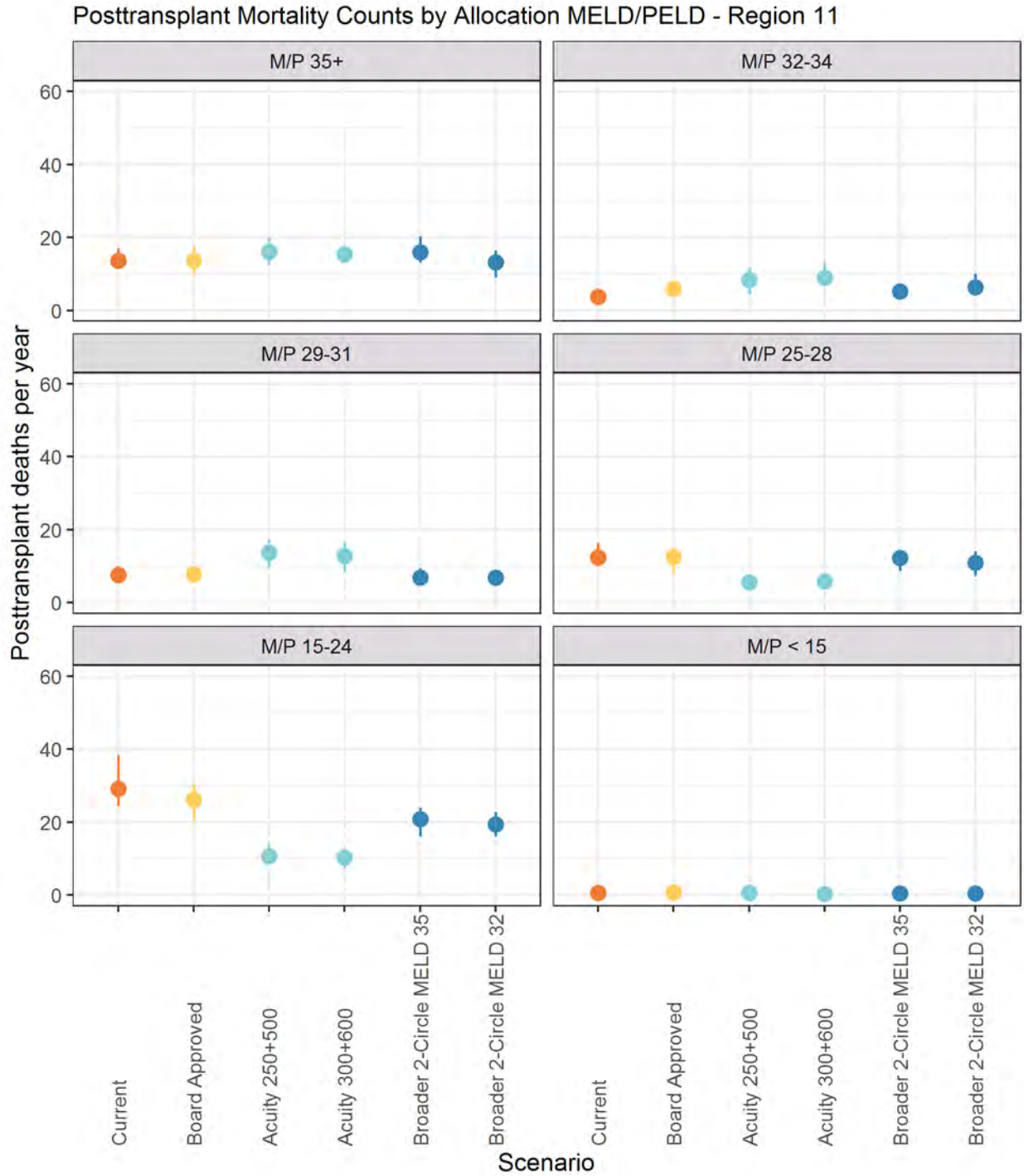


Figure 172 Posttransplant Mortality Counts by Allocation MELD/PELD - Region 11

Transport

Median Transport Time by Exception Status

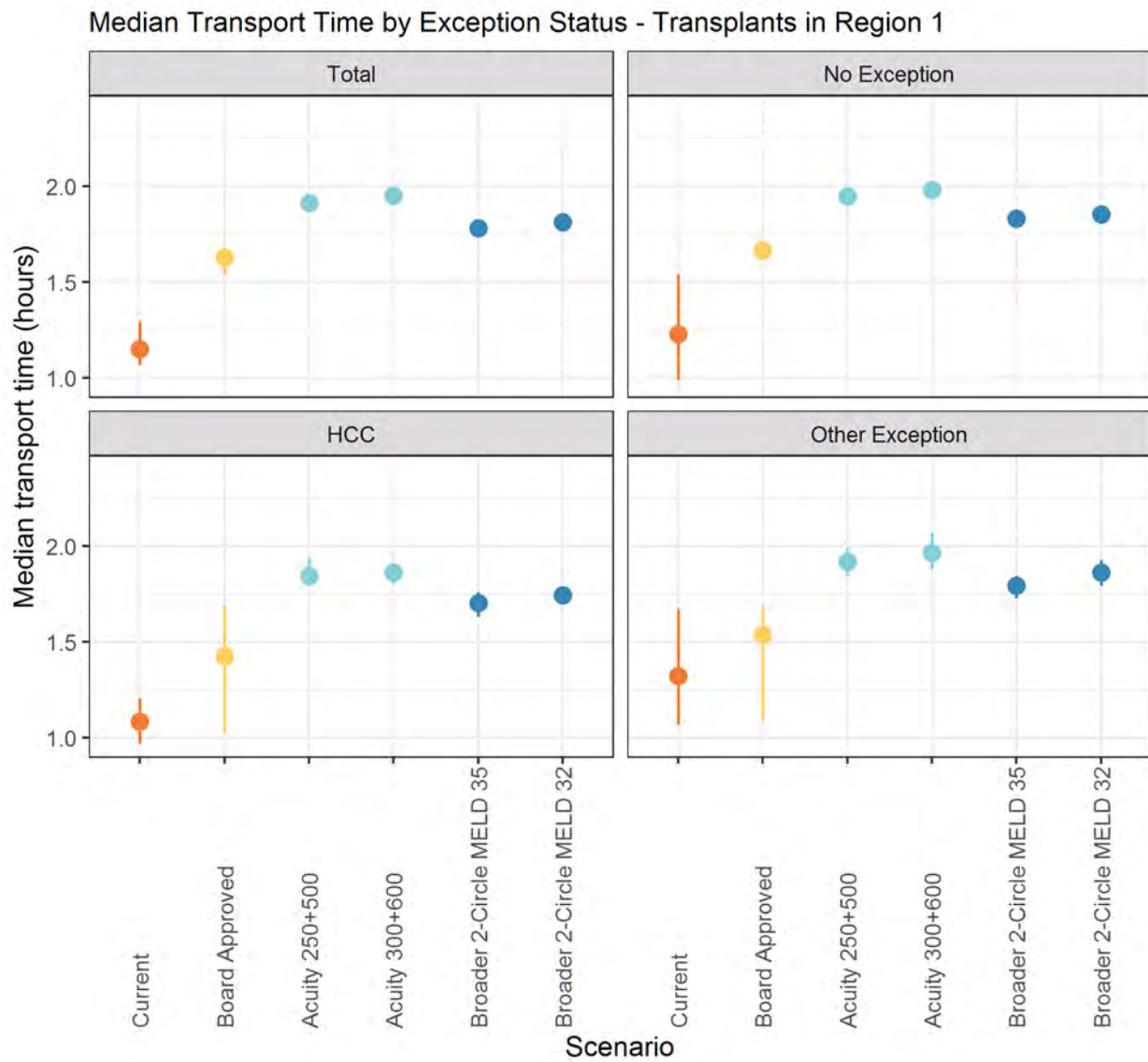


Figure 173 Median Transport Time by Exception Status - Transplants in Region 1

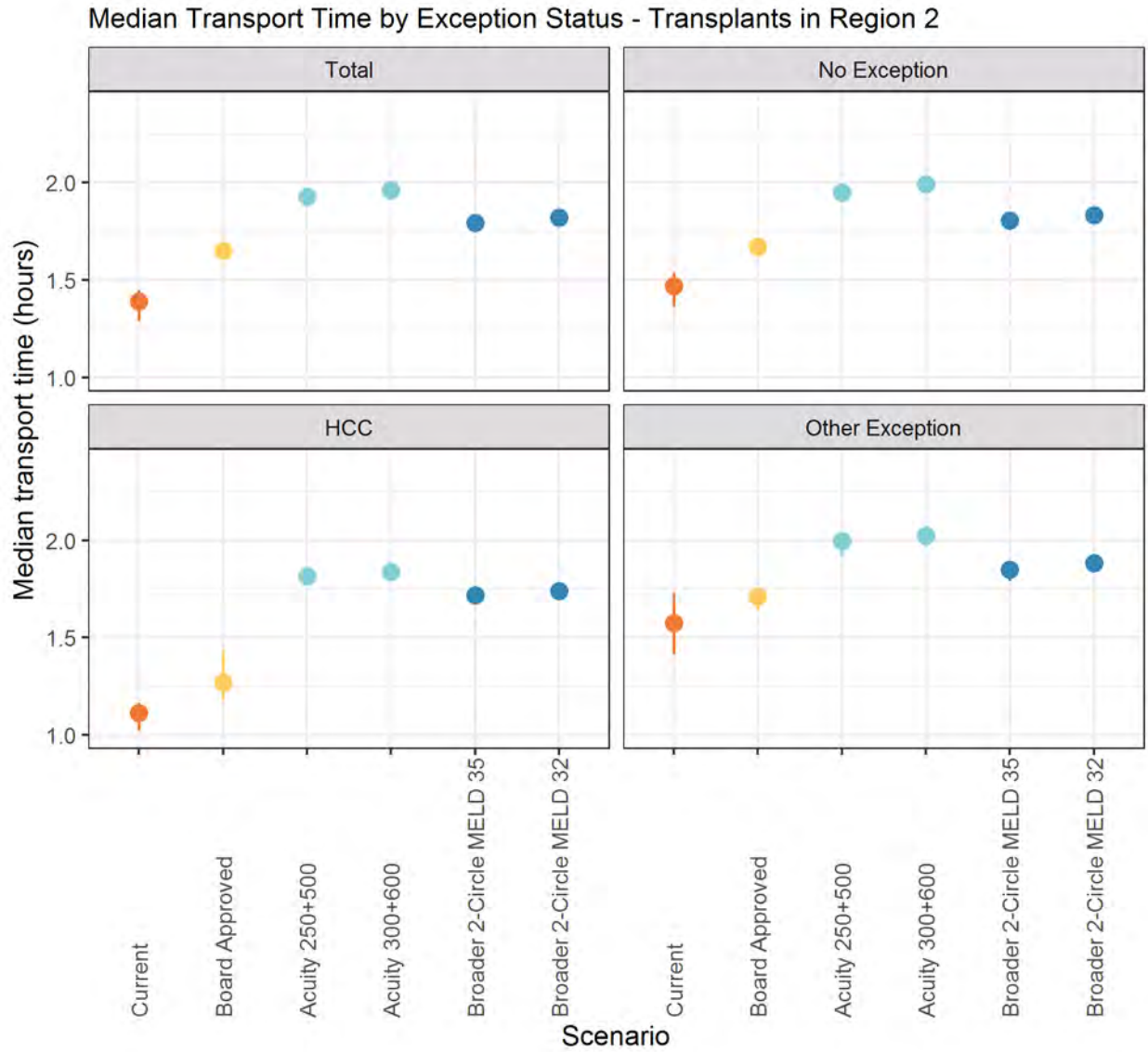


Figure 174 Median Transport Time by Exception Status - Transplants in Region 2

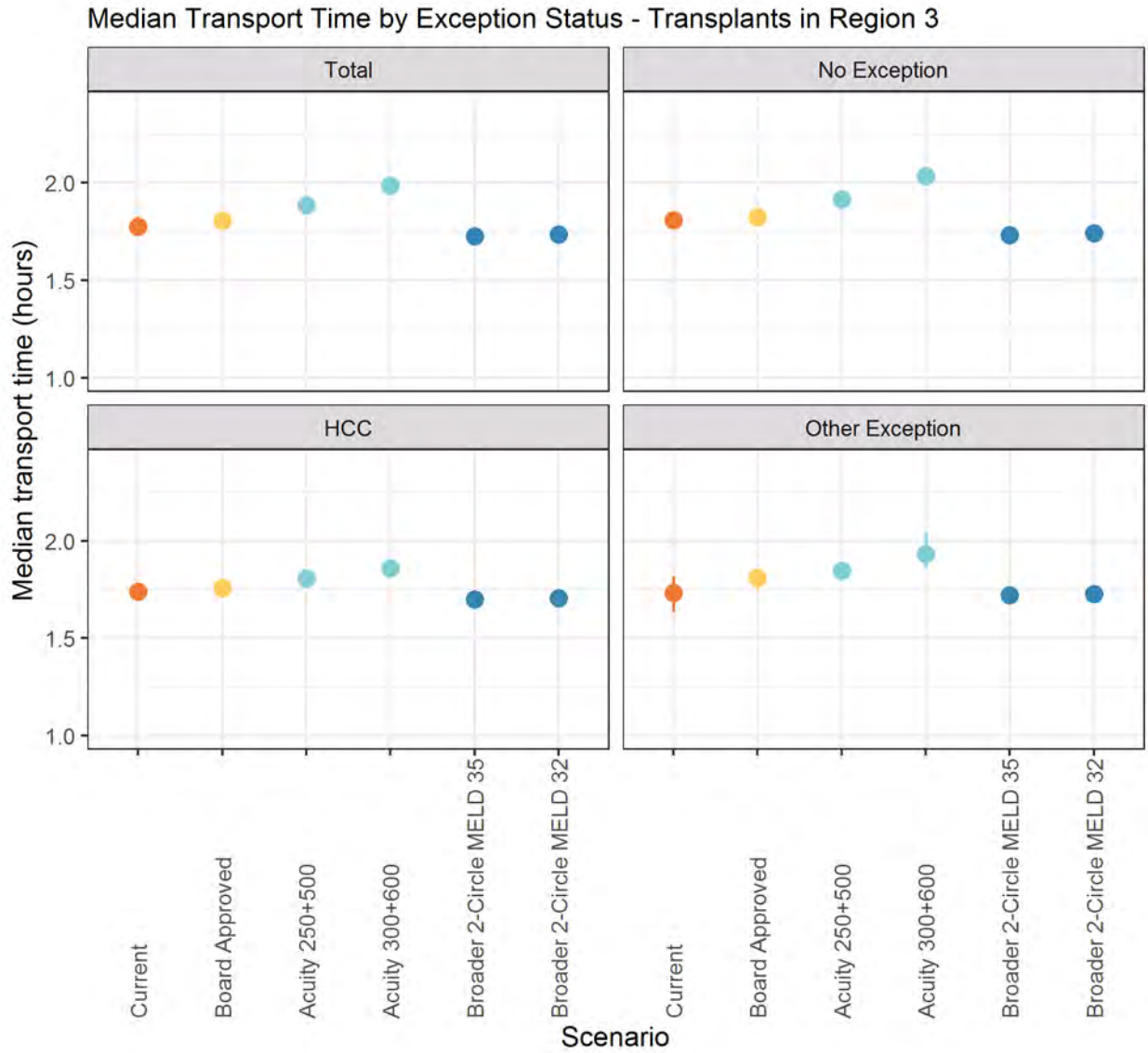


Figure 175 Median Transport Time by Exception Status - Transplants in Region 3

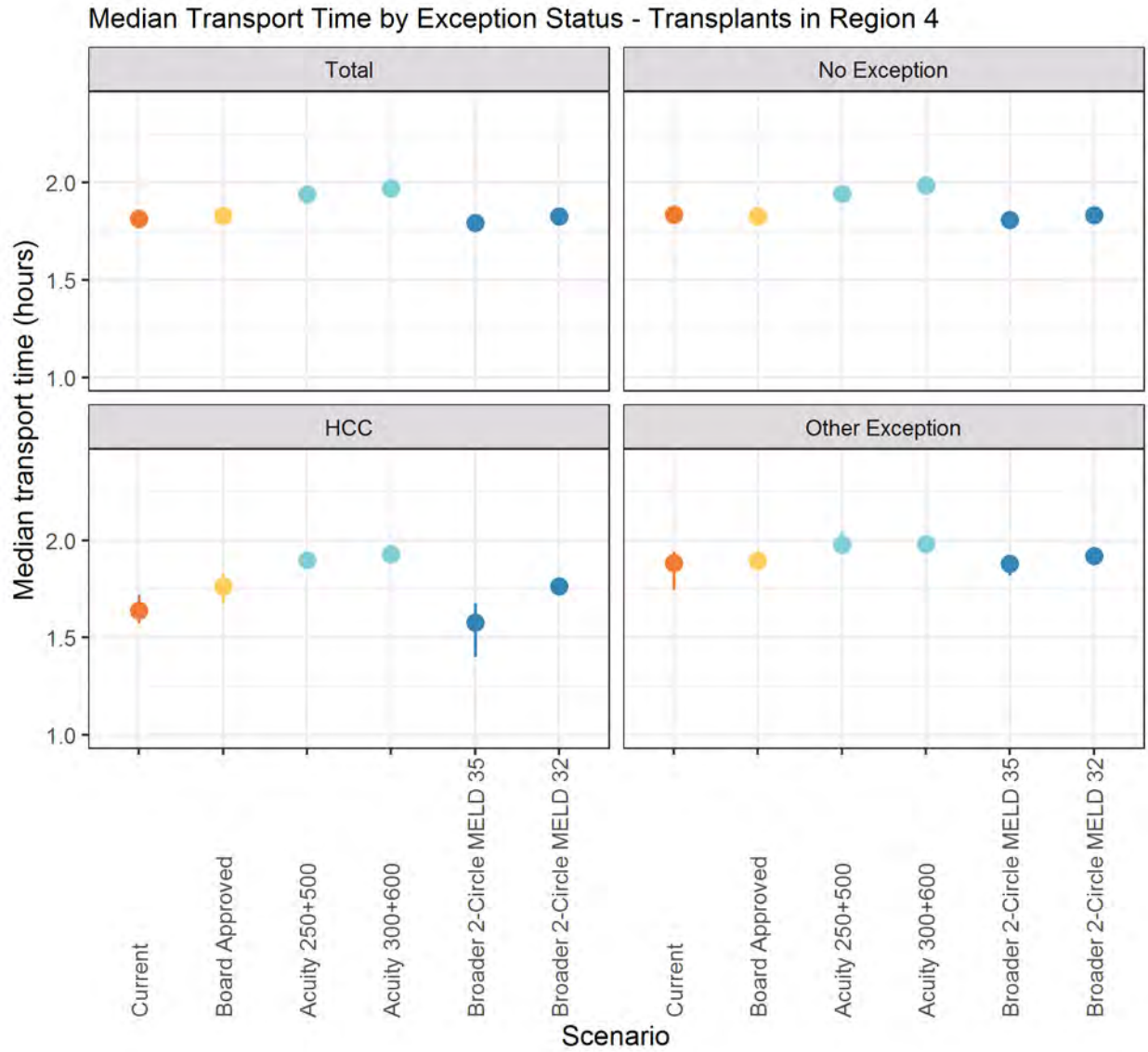


Figure 176 Median Transport Time by Exception Status - Transplants in Region 4

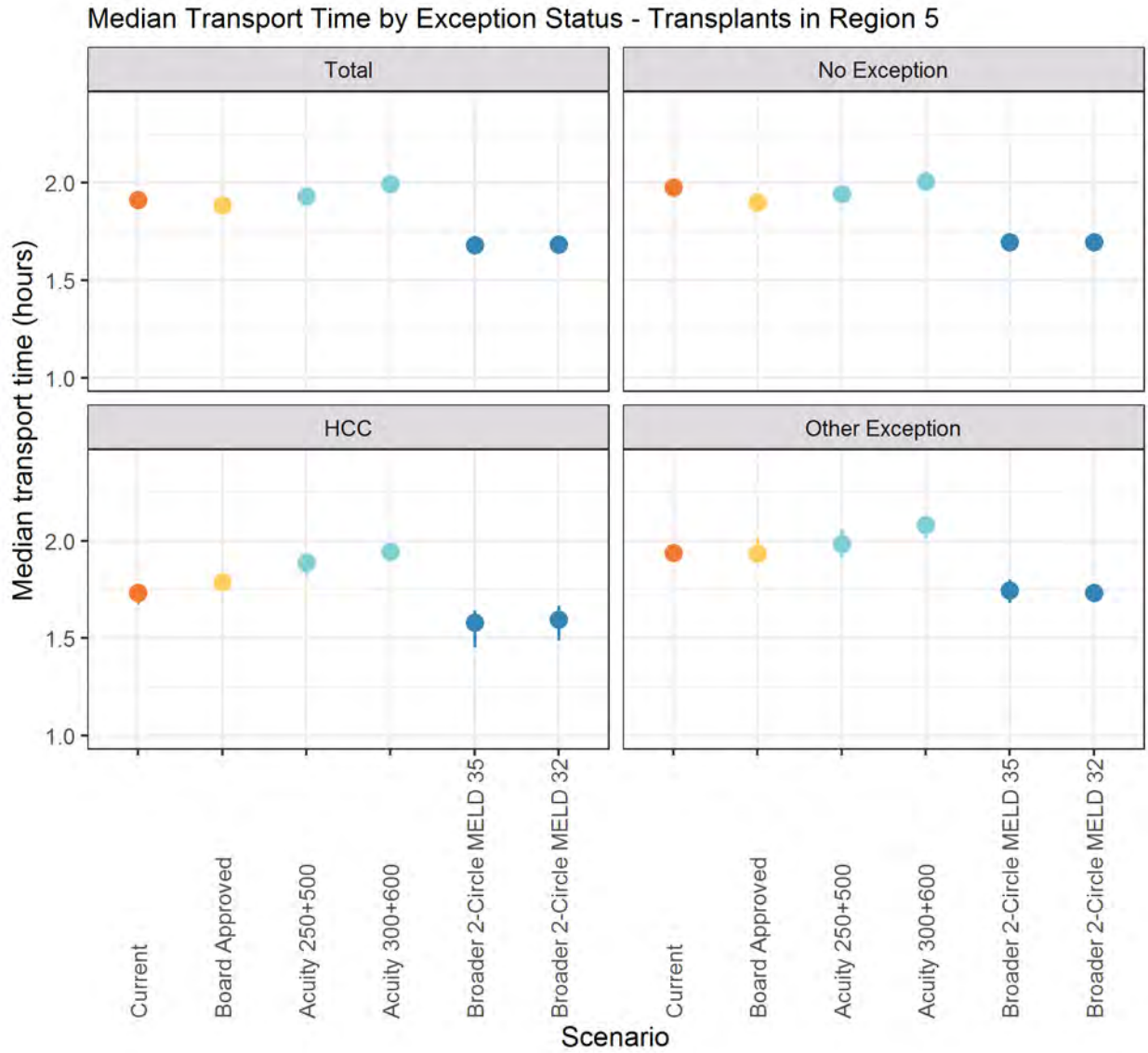


Figure 177 Median Transport Time by Exception Status - Transplants in Region 5

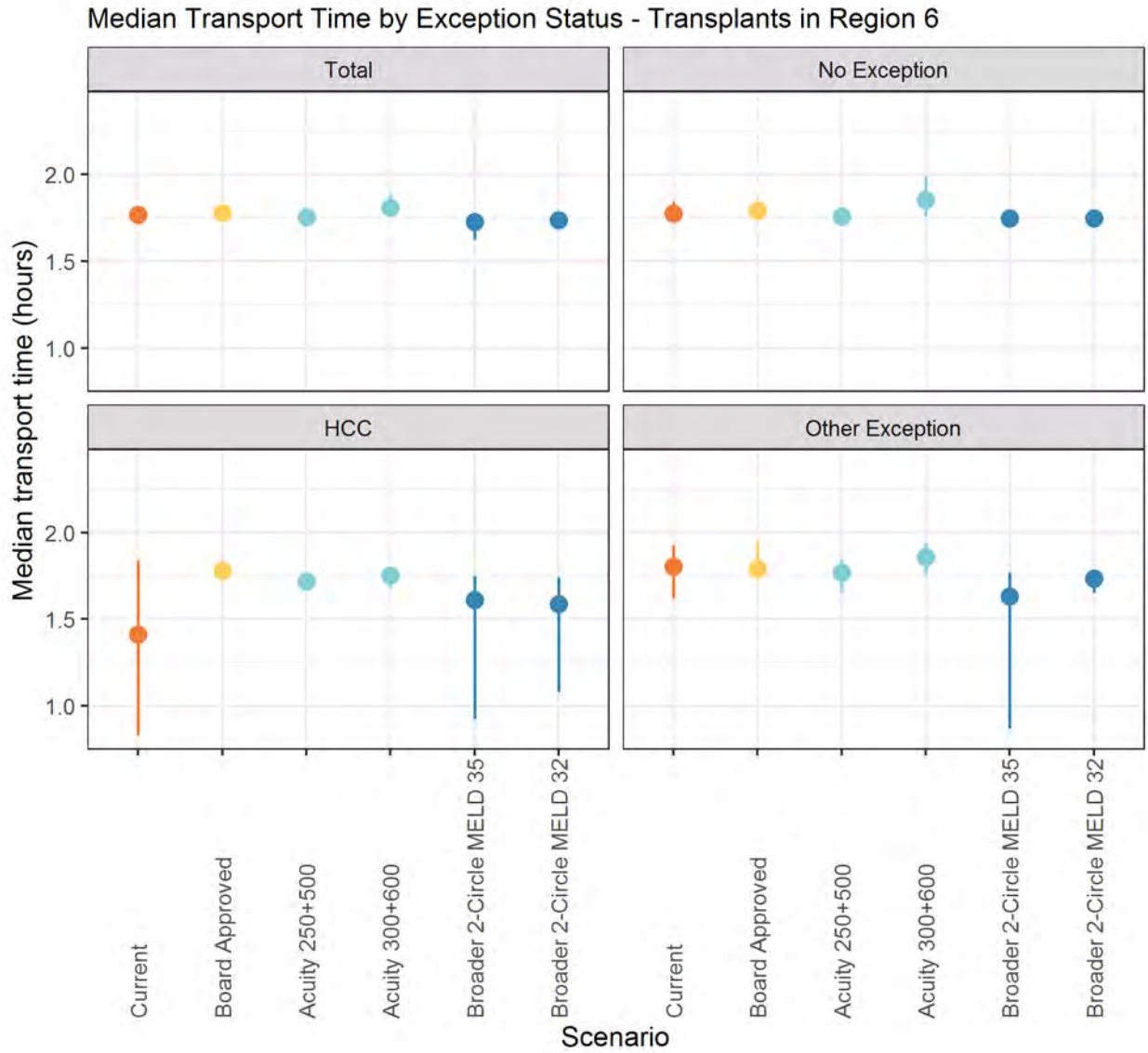


Figure 178 Median Transport Time by Exception Status - Transplants in Region 6

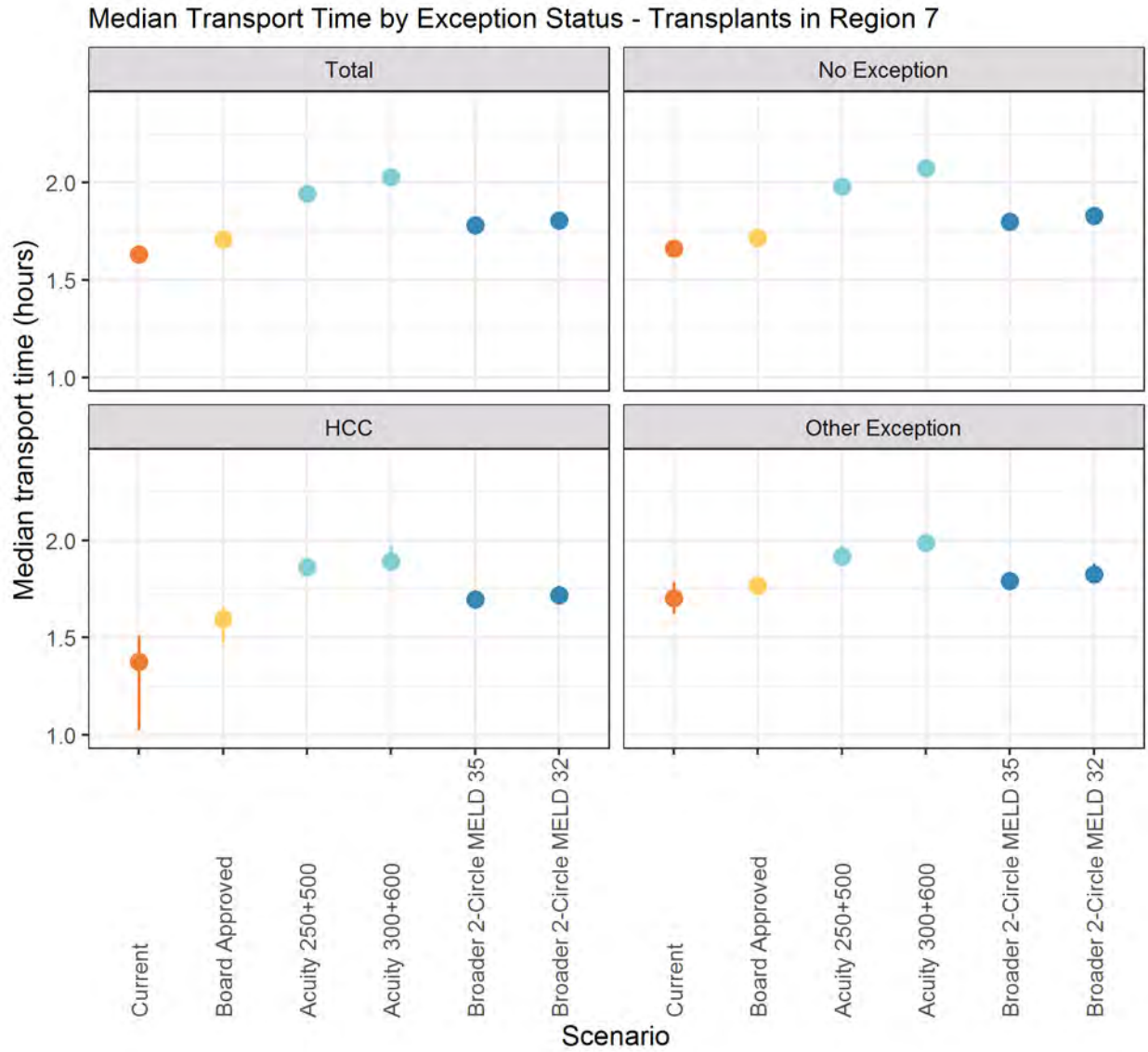


Figure 179 Median Transport Time by Exception Status - Transplants in Region 7

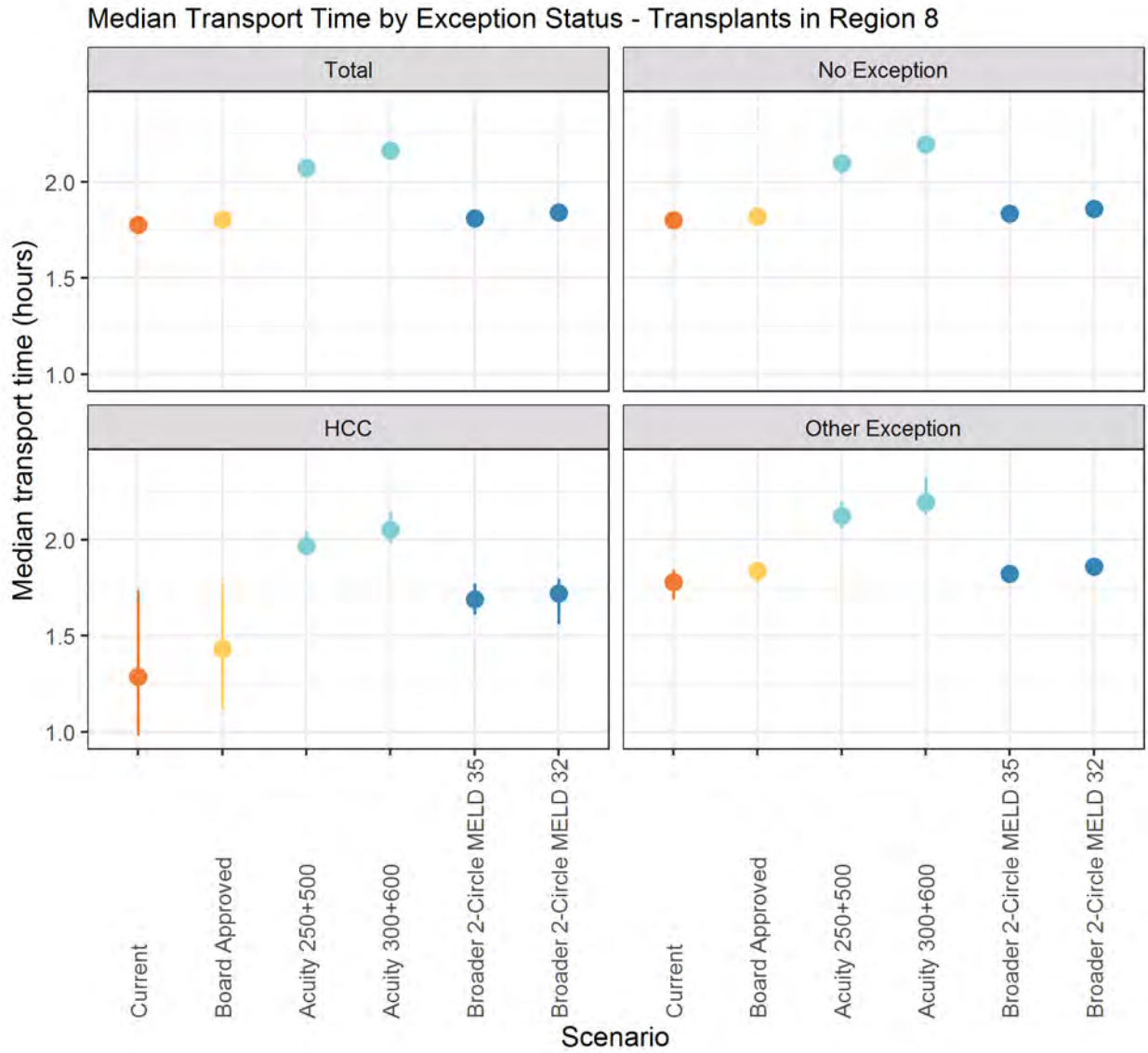


Figure 180 Median Transport Time by Exception Status - Transplants in Region 8

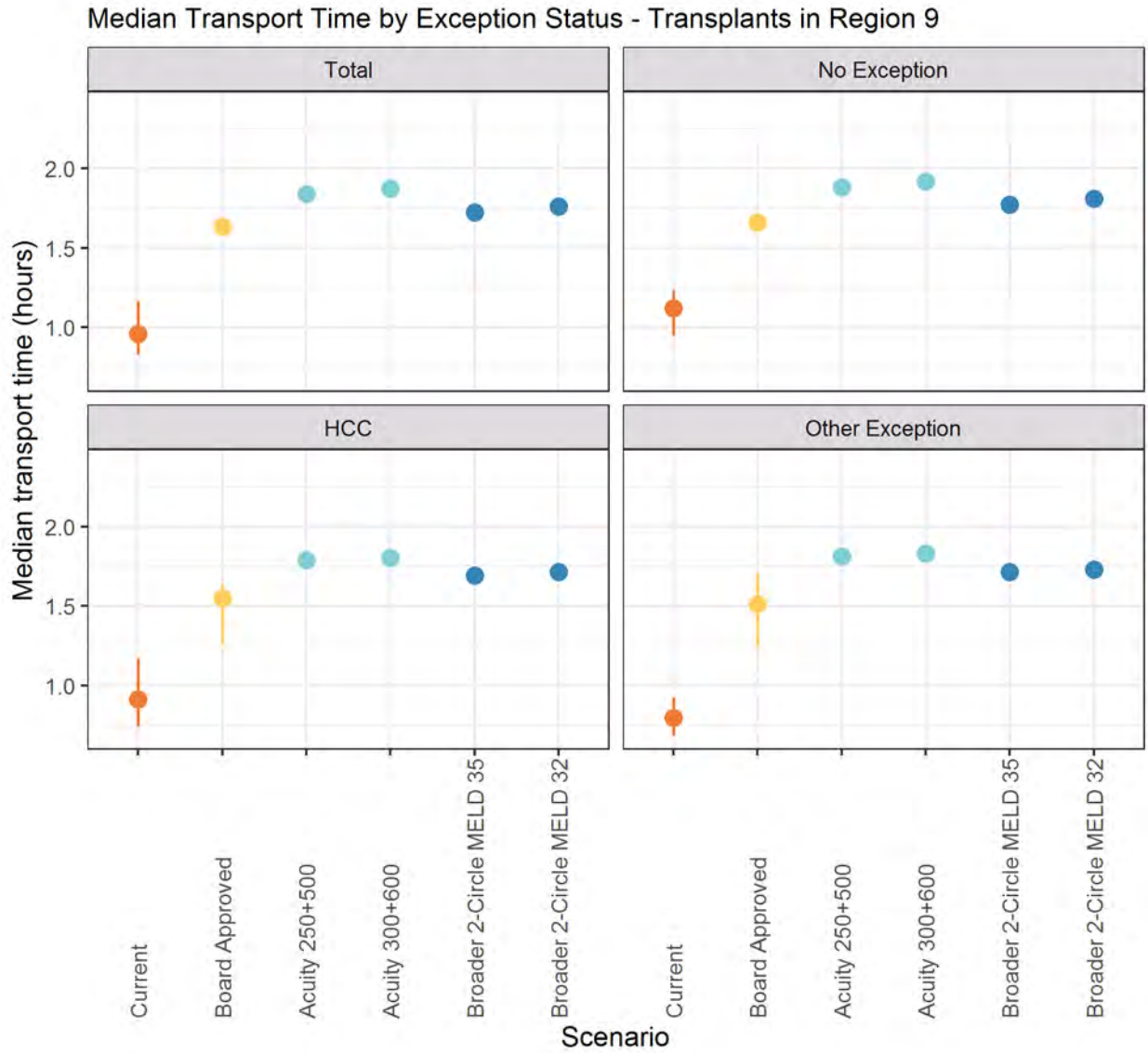


Figure 181 Median Transport Time by Exception Status - Transplants in Region 9

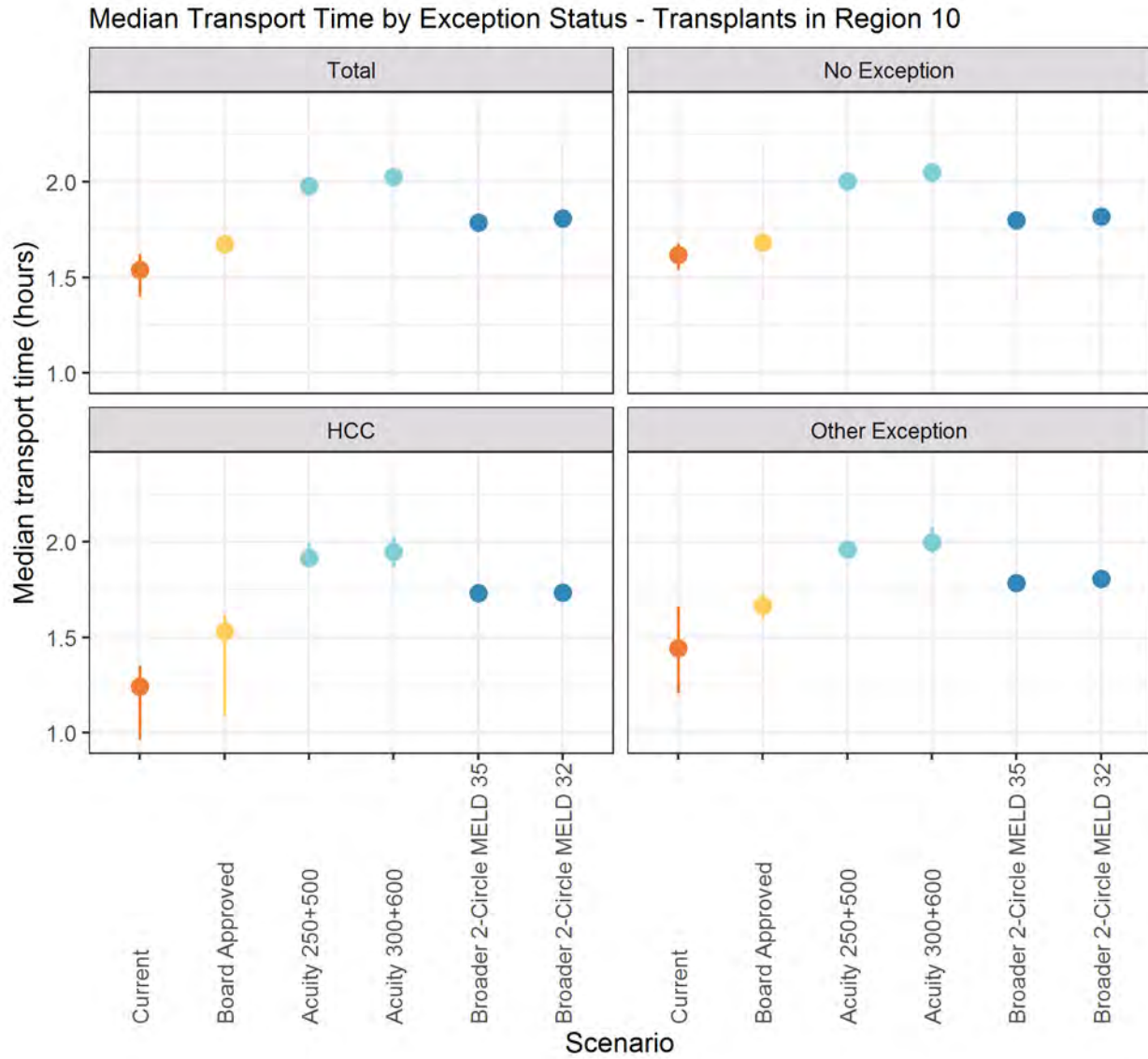


Figure 182 Median Transport Time by Exception Status - Transplants in Region 10

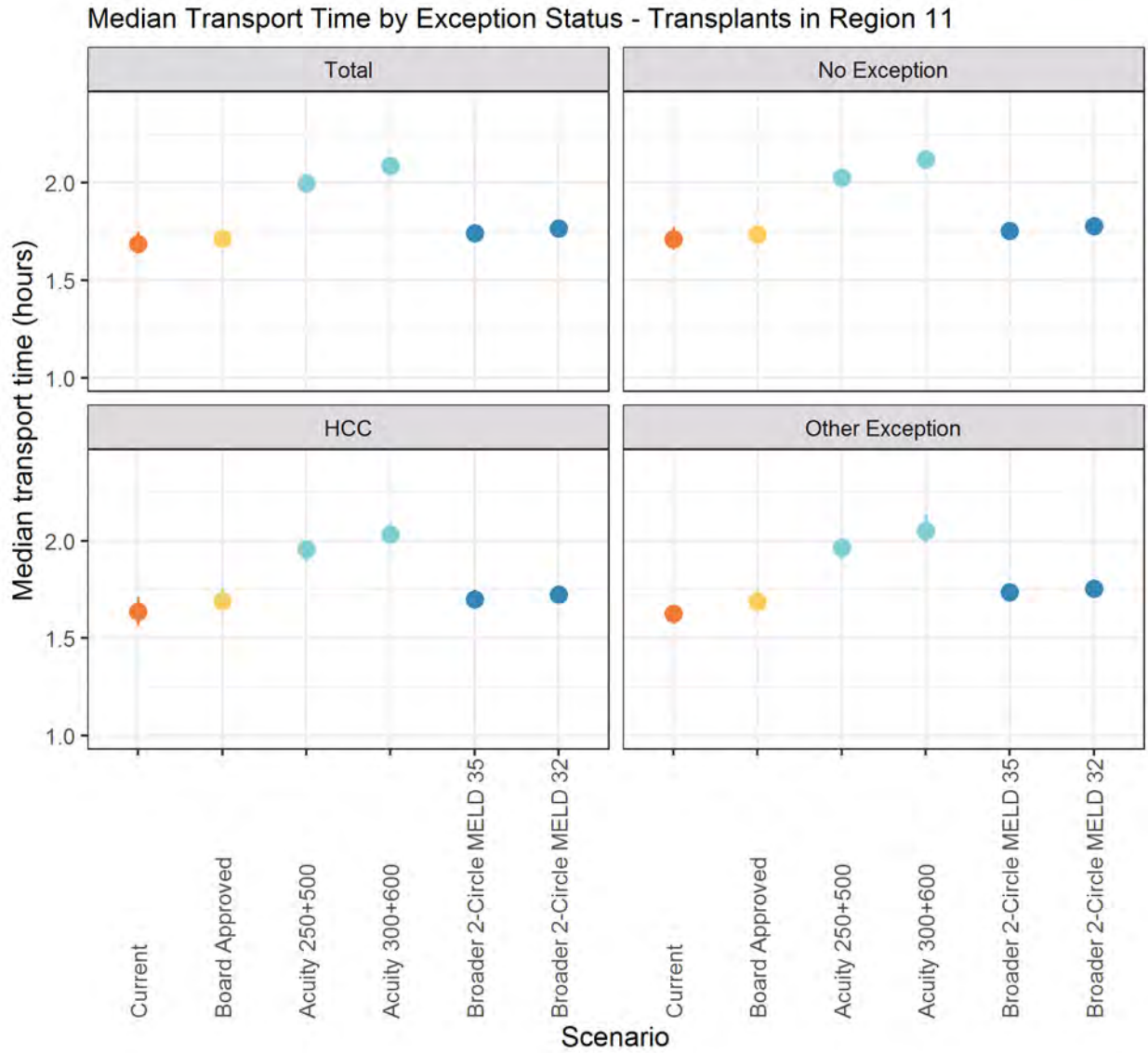


Figure 183 Median Transport Time by Exception Status - Transplants in Region 11

Median Transport Time by Allocation MELD/PELD

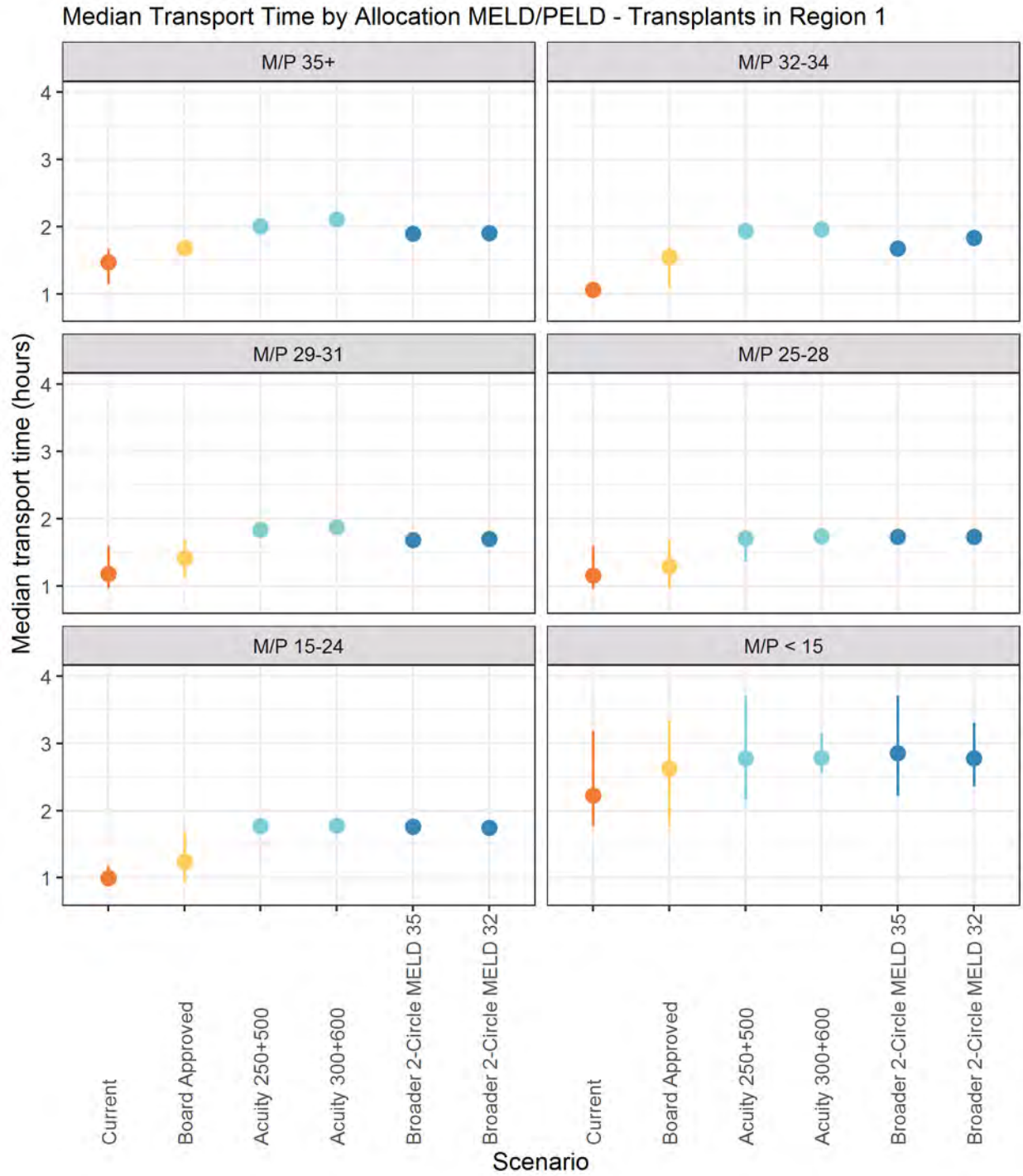


Figure 184 Median Transport Time by Allocation MELD/PELD - Transplants in Region 1

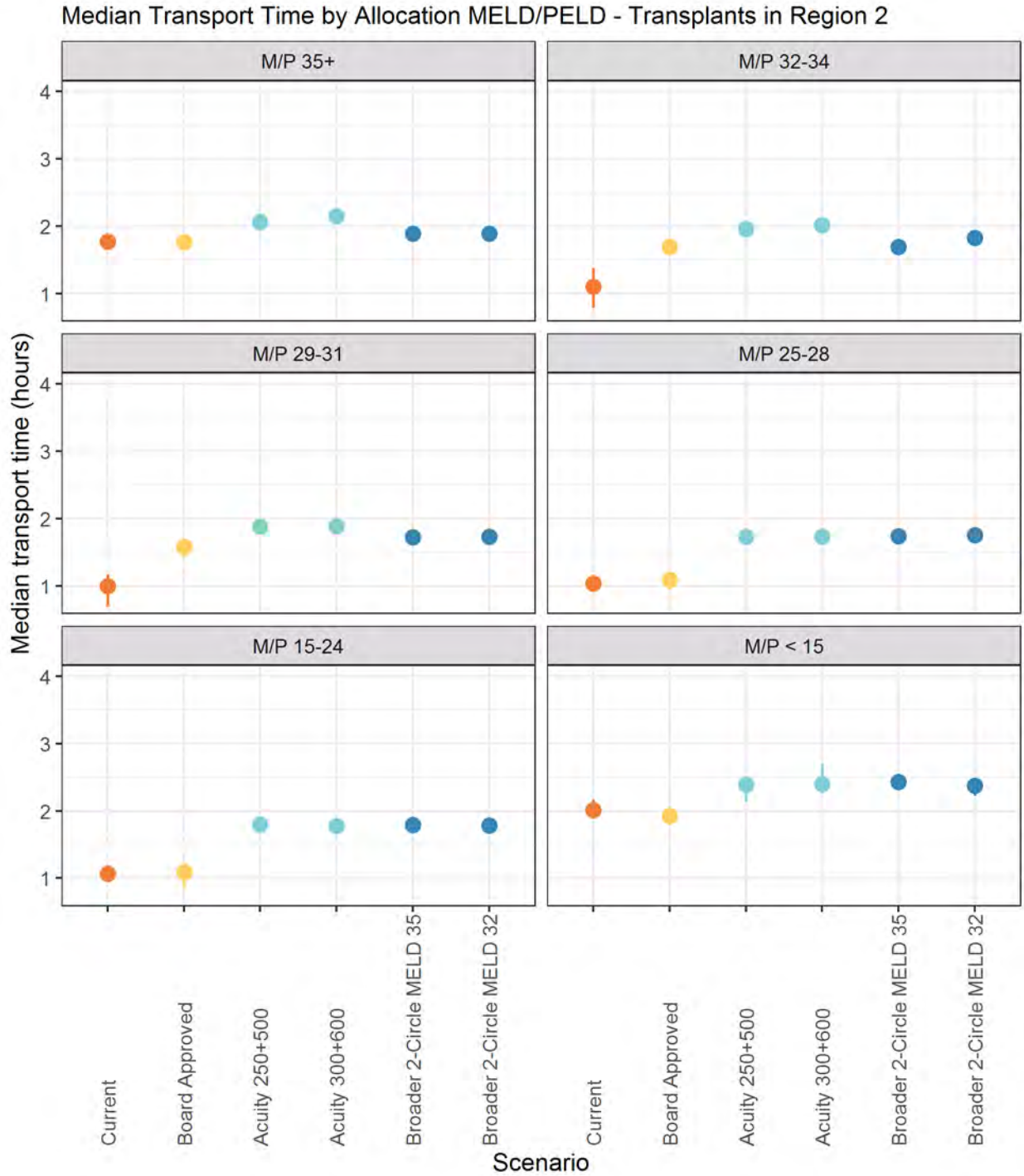


Figure 185 Median Transport Time by Allocation MELD/PELD - Transplants in Region 2

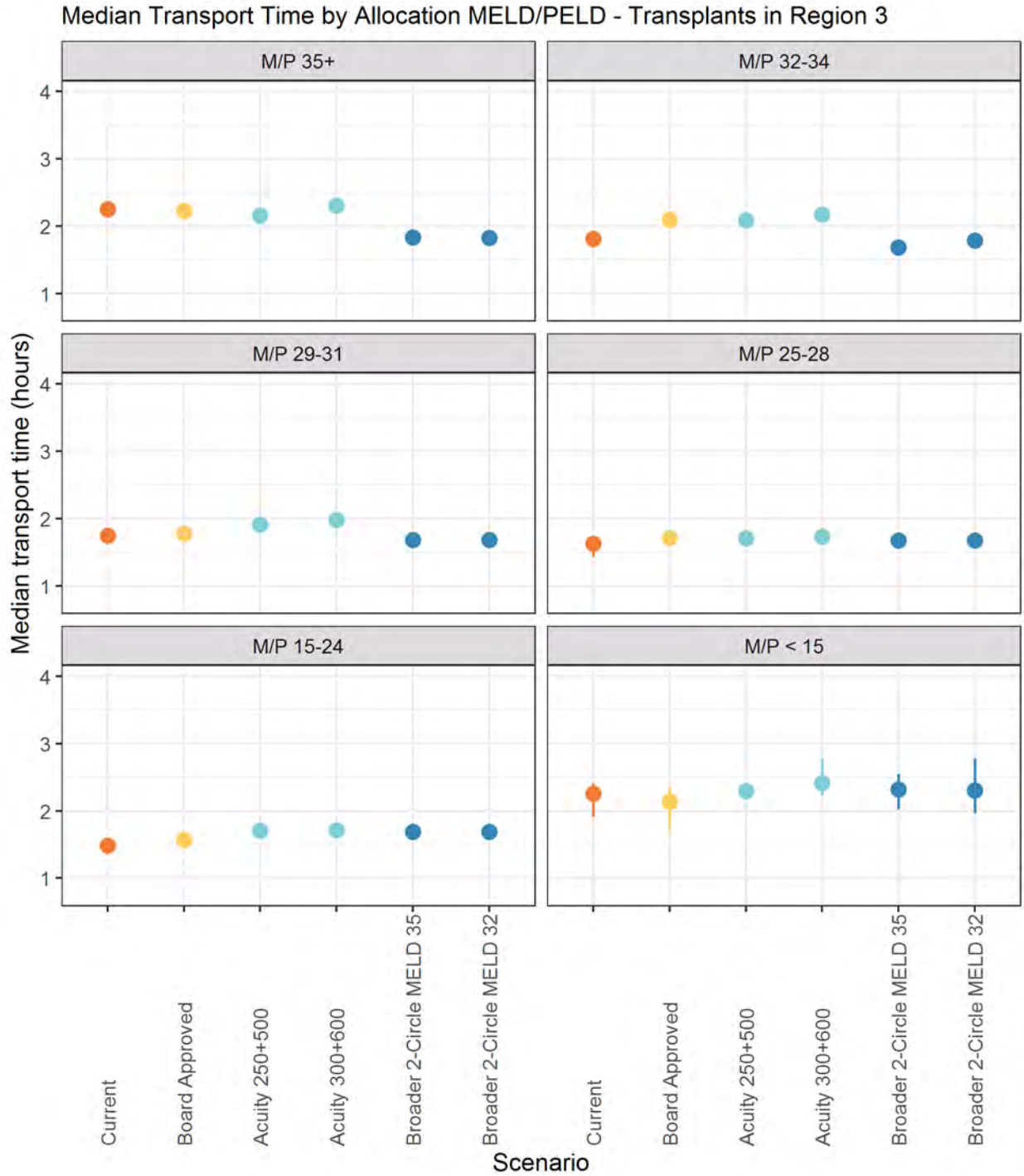


Figure 186 Median Transport Time by Allocation MELD/PELD - Transplants in Region 3

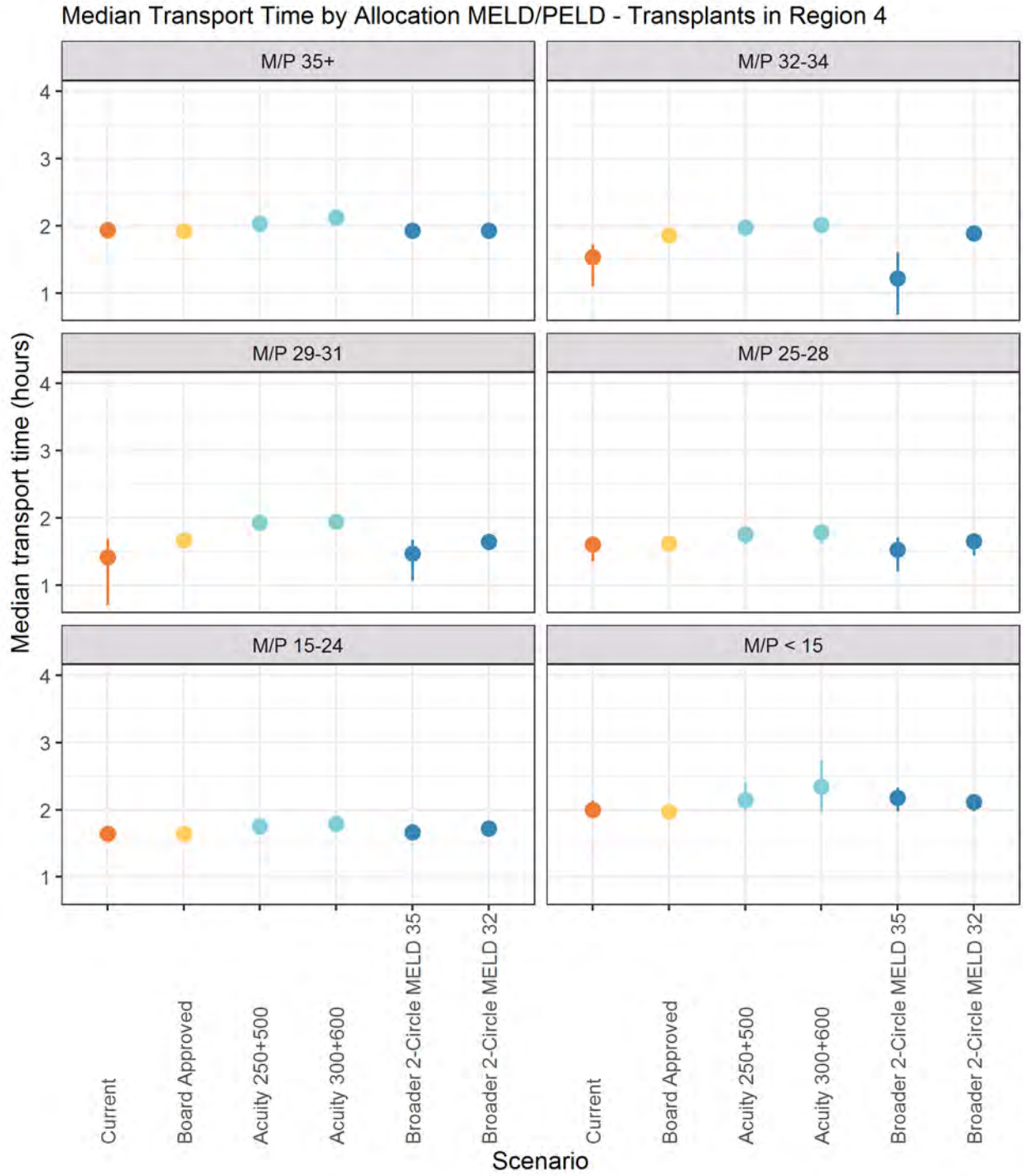


Figure 187 Median Transport Time by Allocation MELD/PELD - Transplants in Region 4

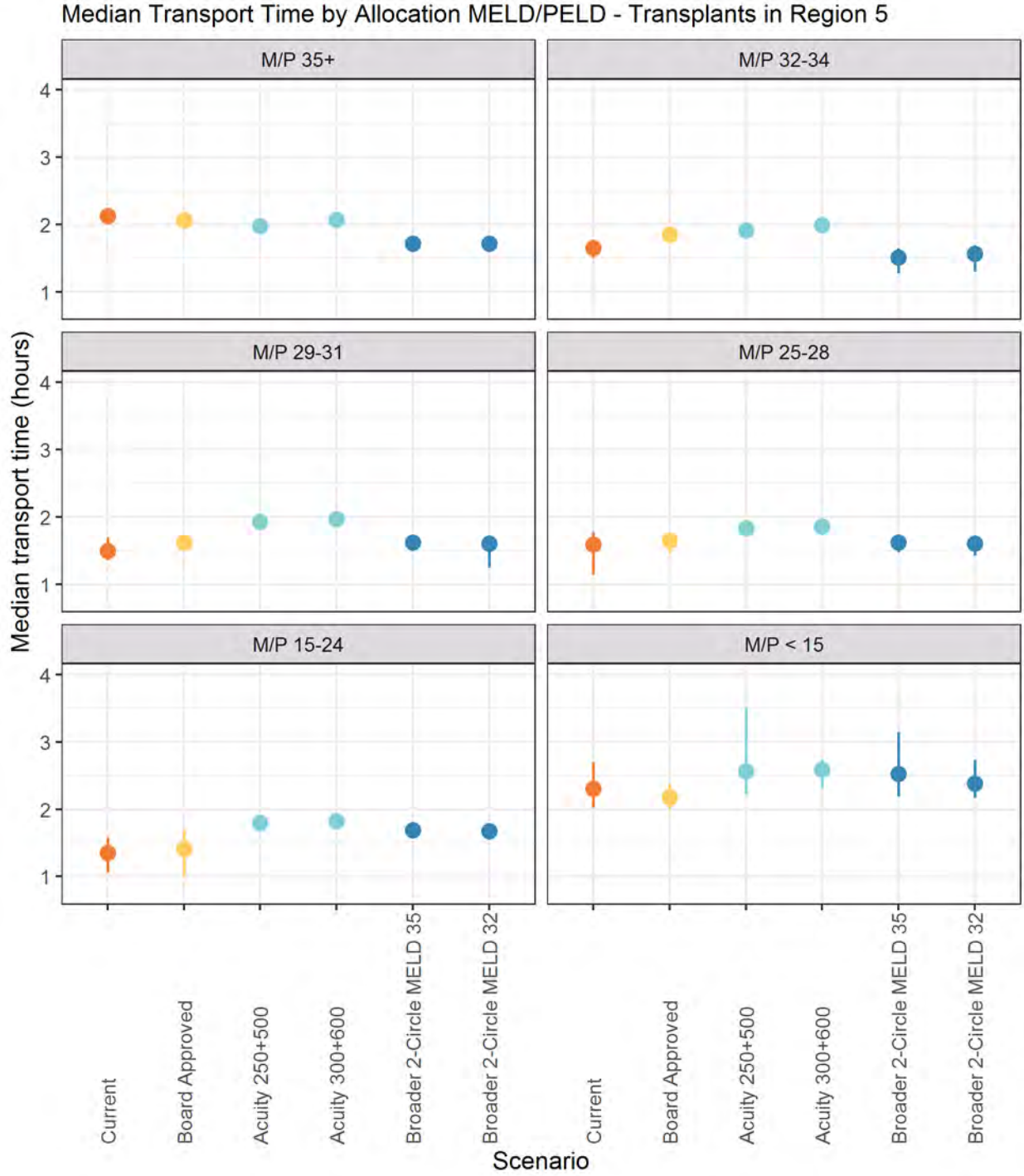


Figure 188 Median Transport Time by Allocation MELD/PELD - Transplants in Region 5

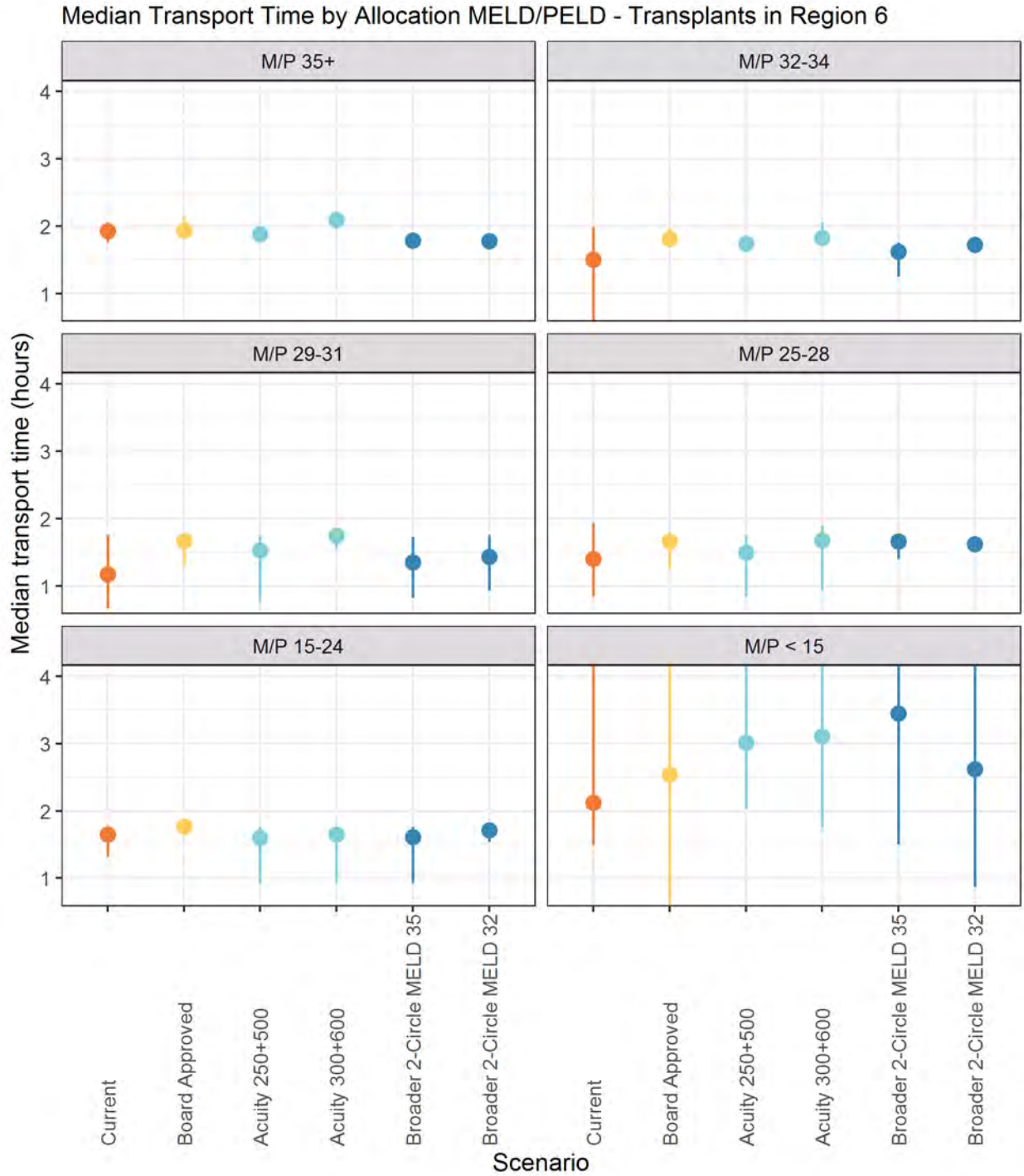


Figure 189 Median Transport Time by Allocation MELD/PELD - Transplants in Region 6

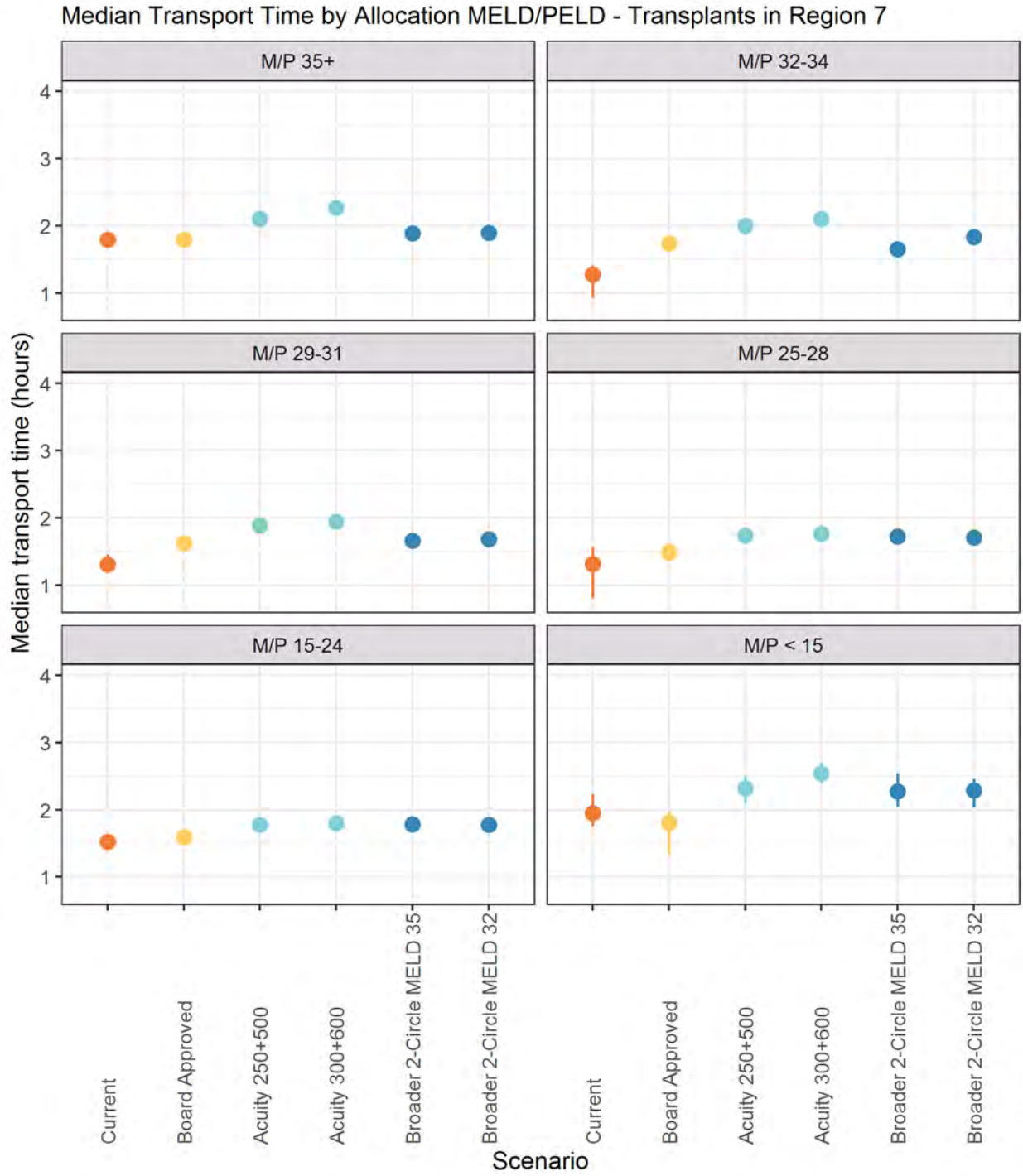


Figure 190 Median Transport Time by Allocation MELD/PELD - Transplants in Region 7

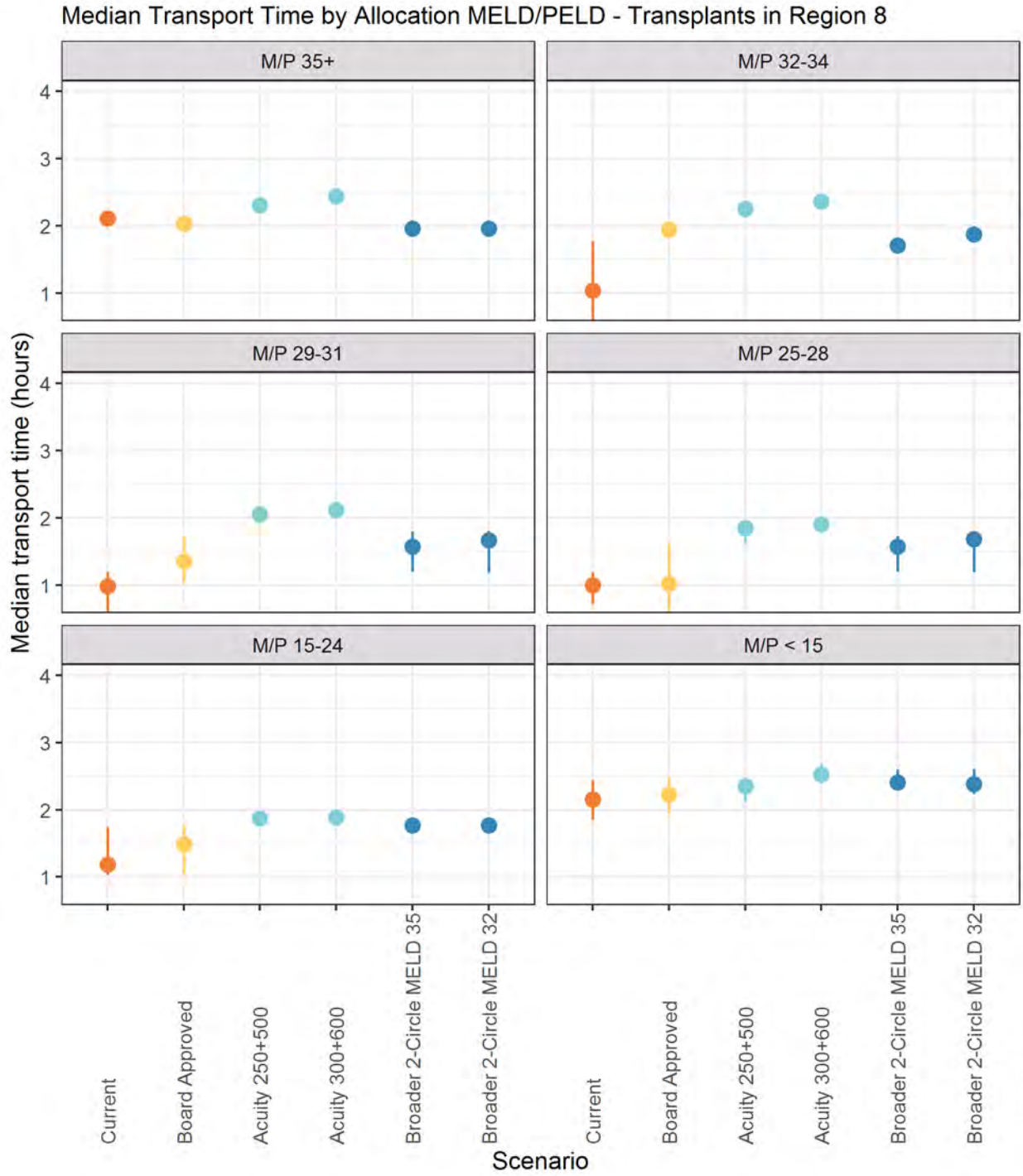


Figure 191 Median Transport Time by Allocation MELD/PELD - Transplants in Region 8

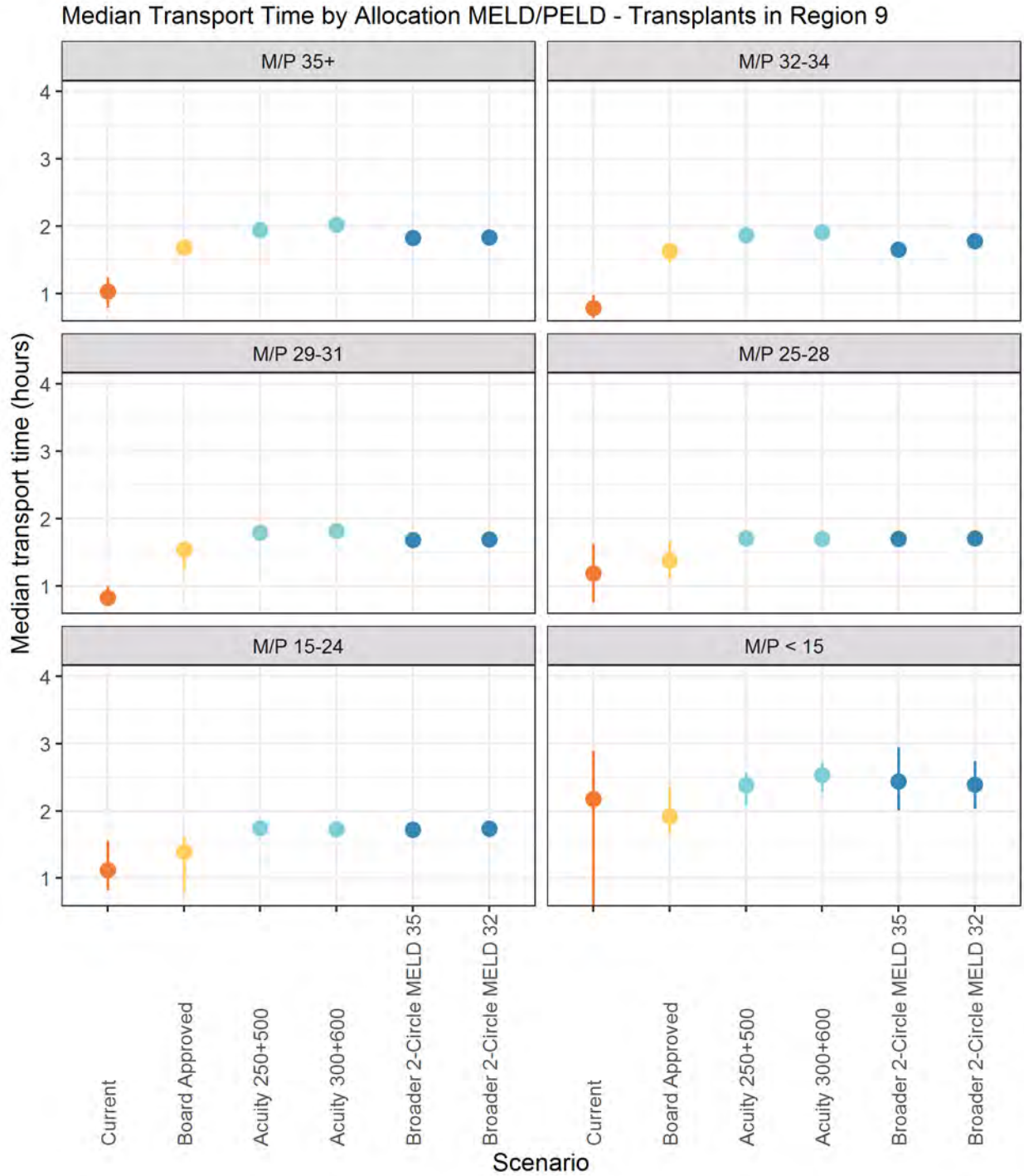


Figure 192 Median Transport Time by Allocation MELD/PELD - Transplants in Region 9

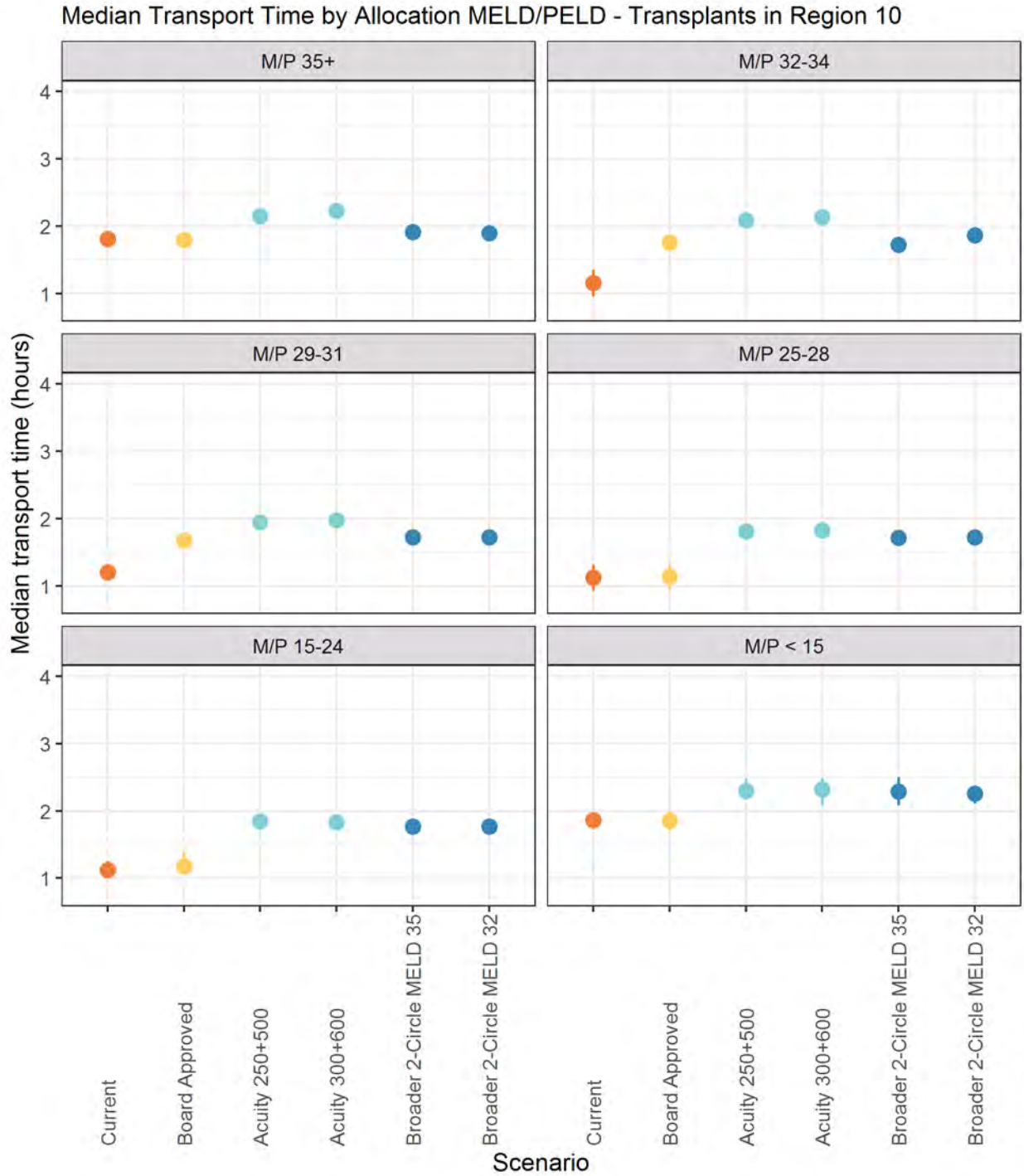


Figure 193 Median Transport Time by Allocation MELD/PELD - Transplants in Region 10

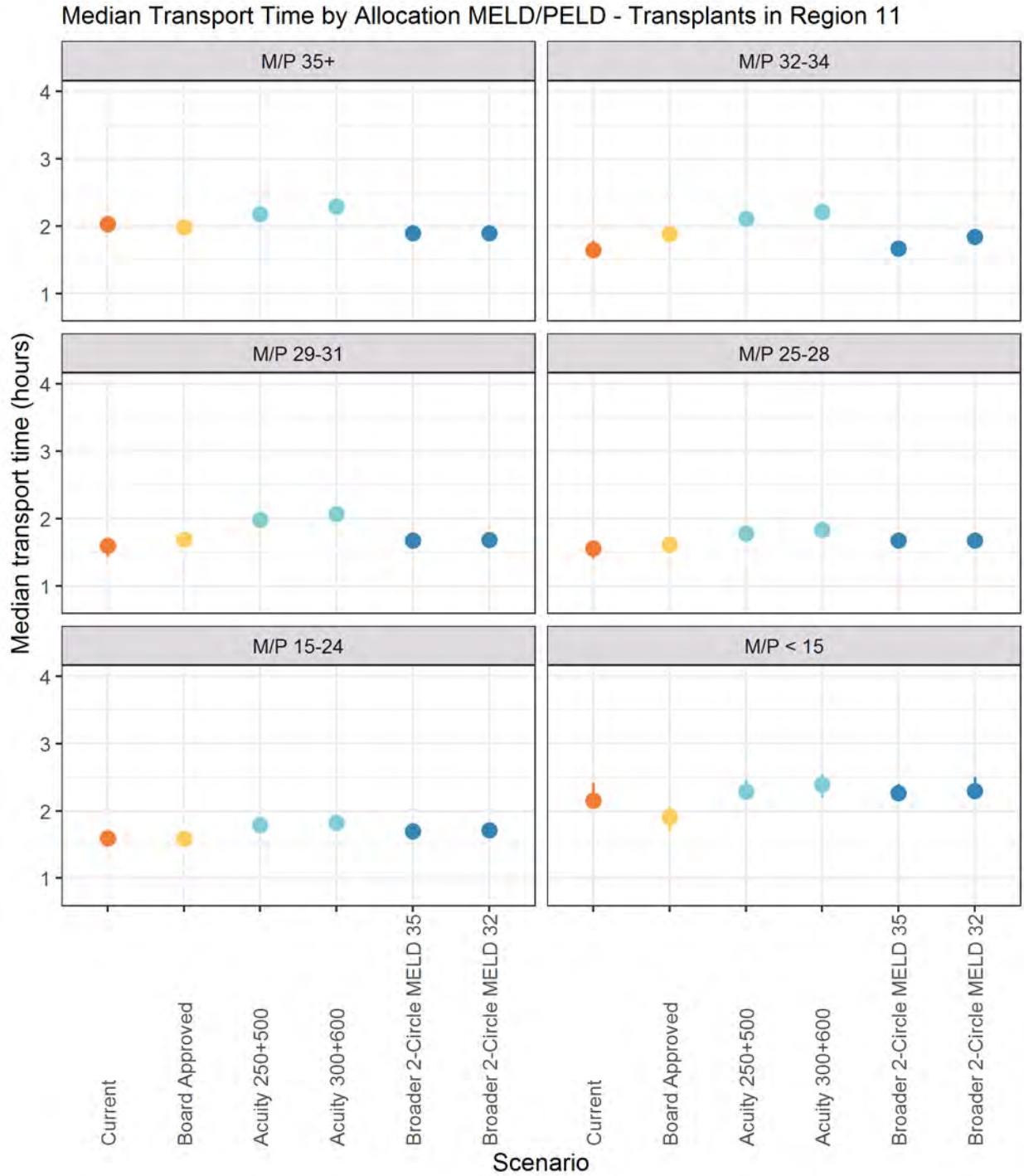


Figure 194 Median Transport Time by Allocation MELD/PELD - Transplants in Region 11

Median Transport Distance by Exception Status

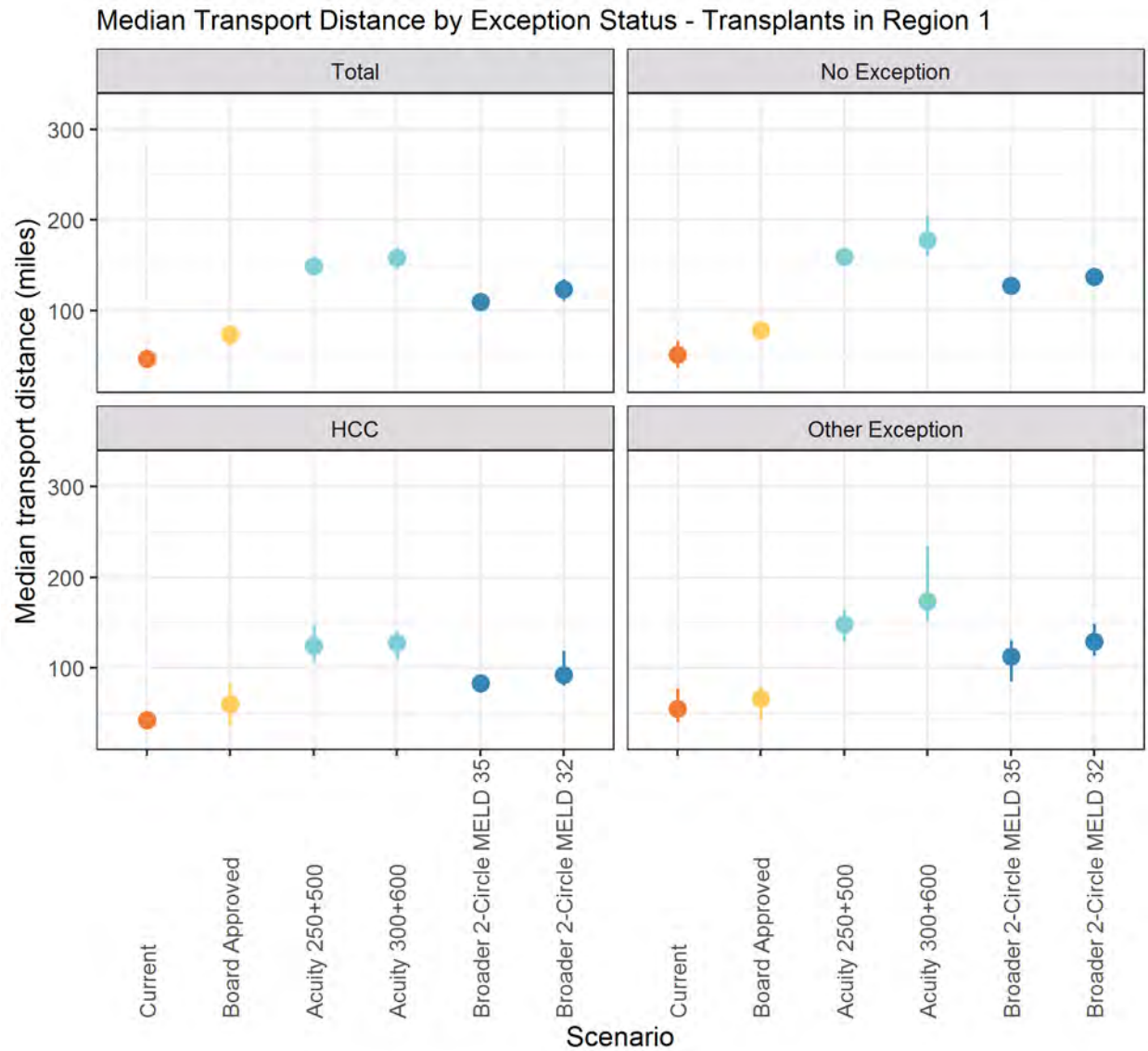


Figure 195 Median Transport Distance by Exception Status - Transplants in Region 1

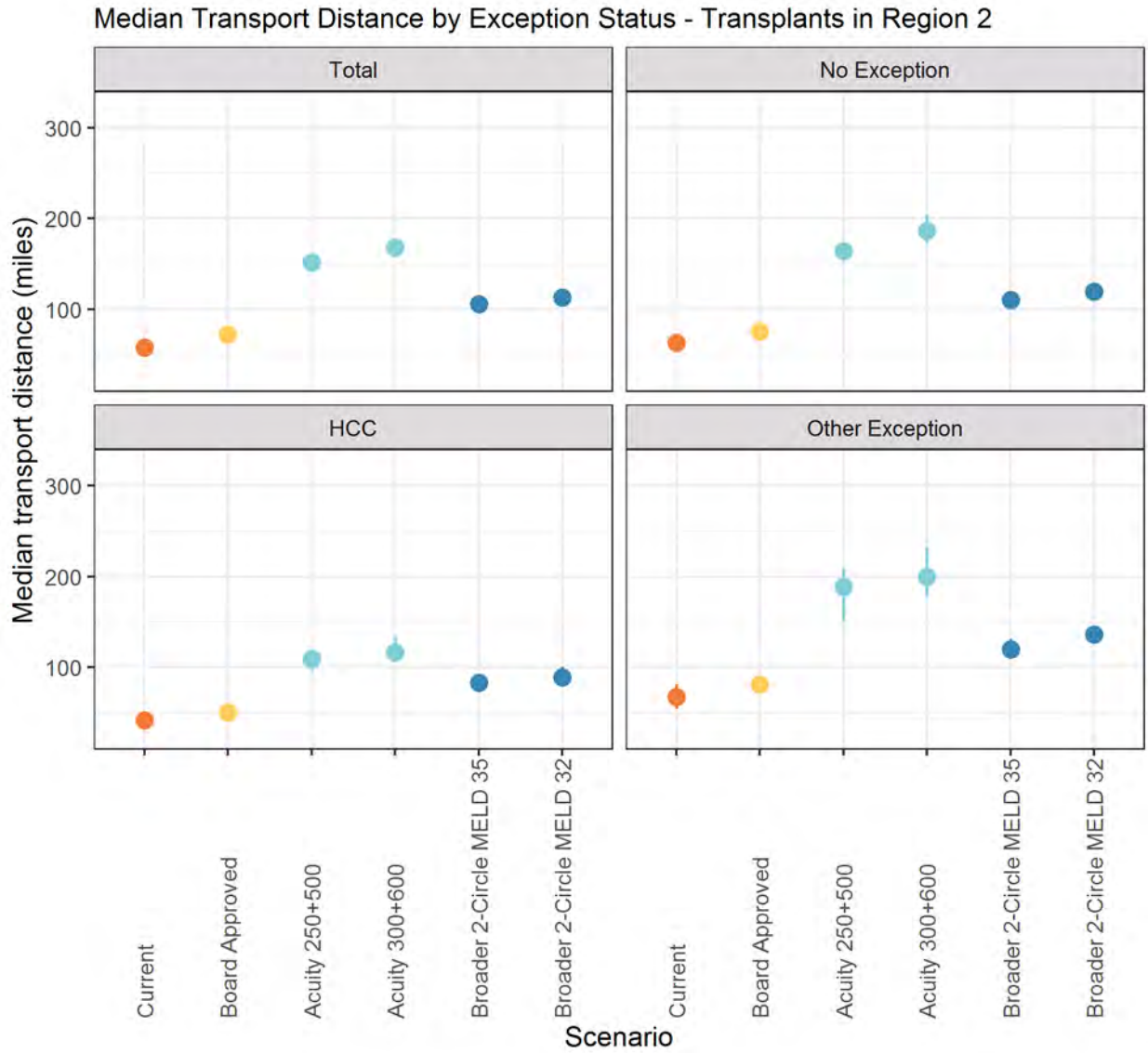


Figure 196 Median Transport Distance by Exception Status - Transplants in Region 2

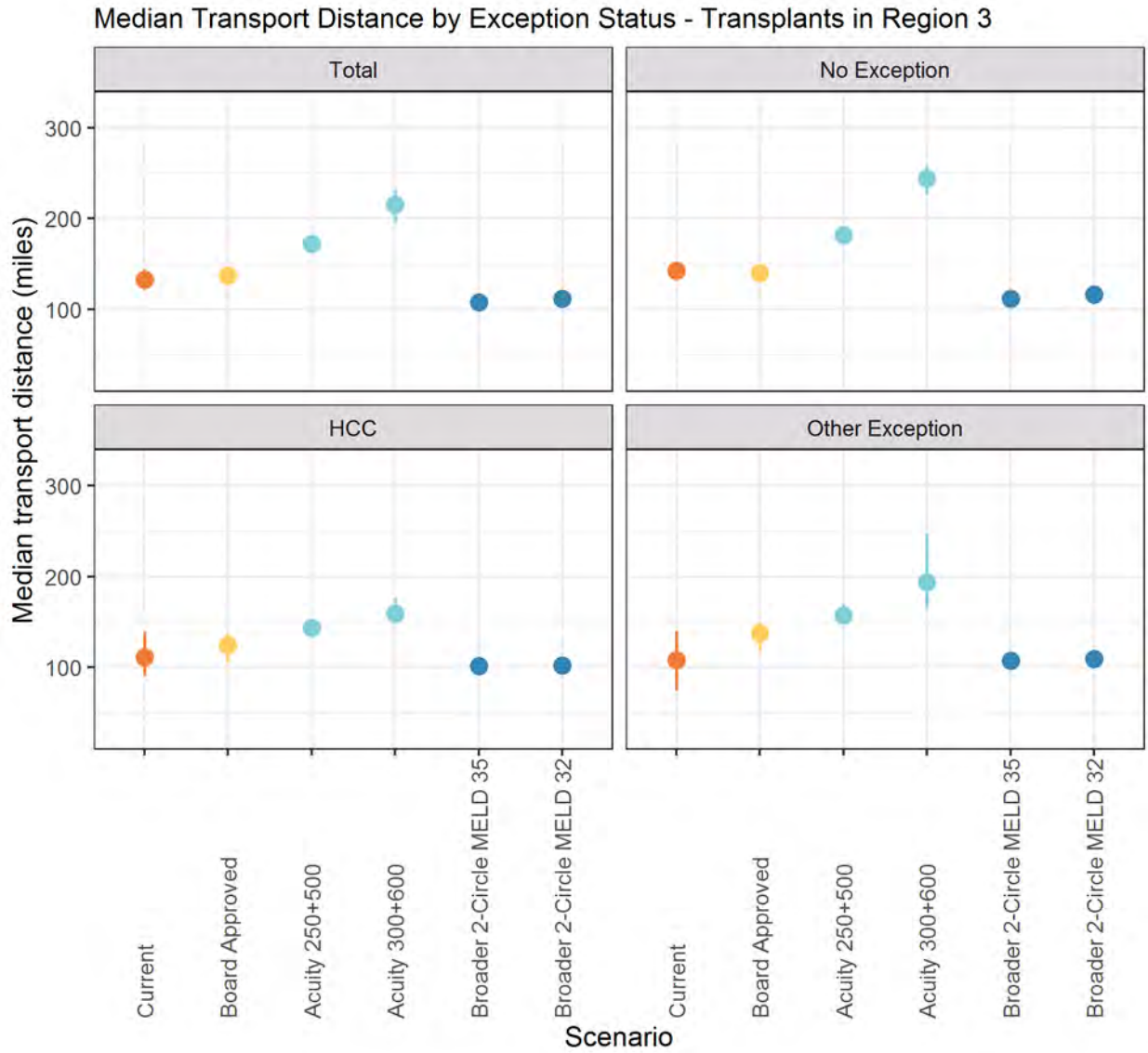


Figure 197 Median Transport Distance by Exception Status - Transplants in Region 3

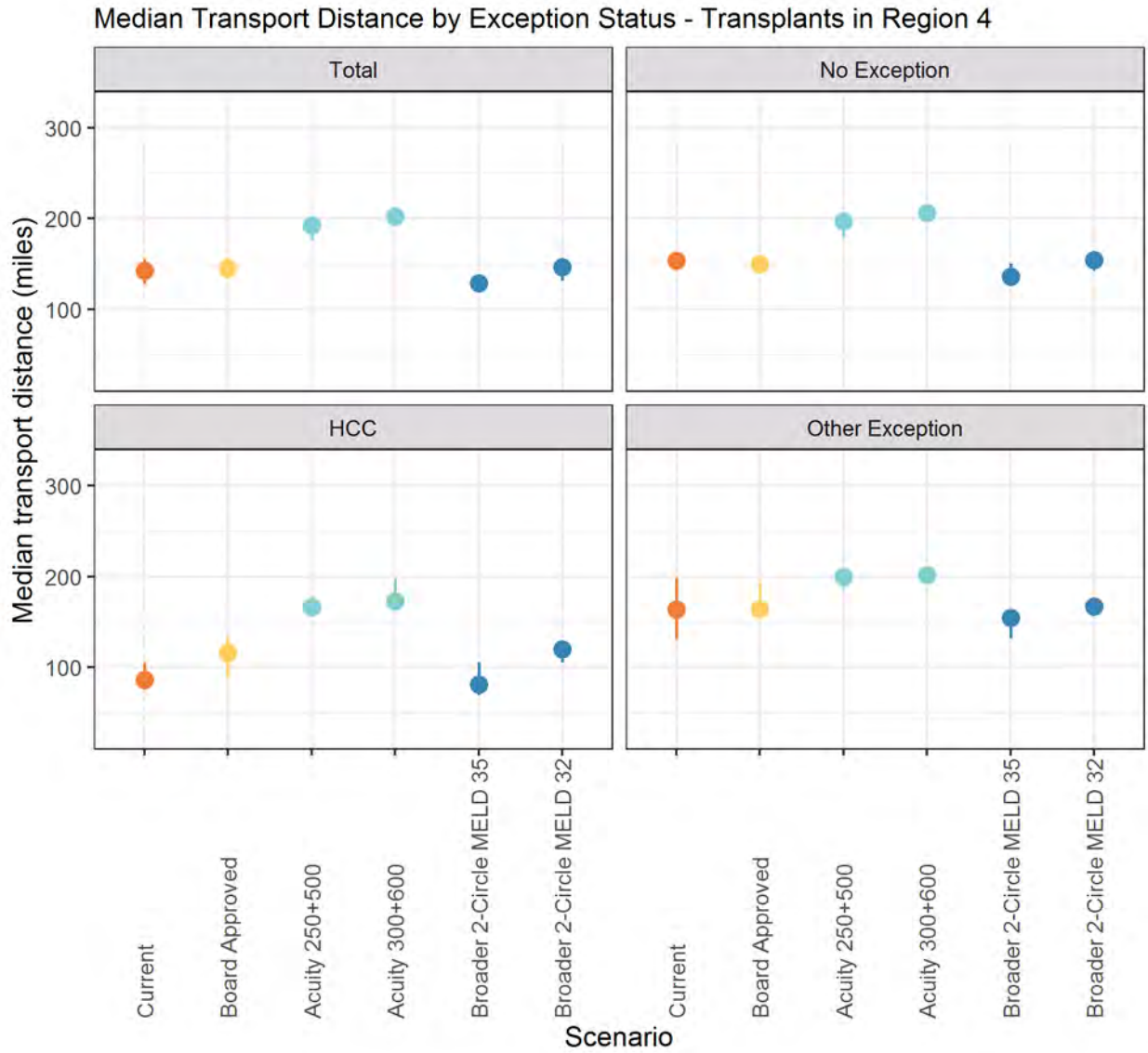


Figure 198 Median Transport Distance by Exception Status - Transplants in Region 4

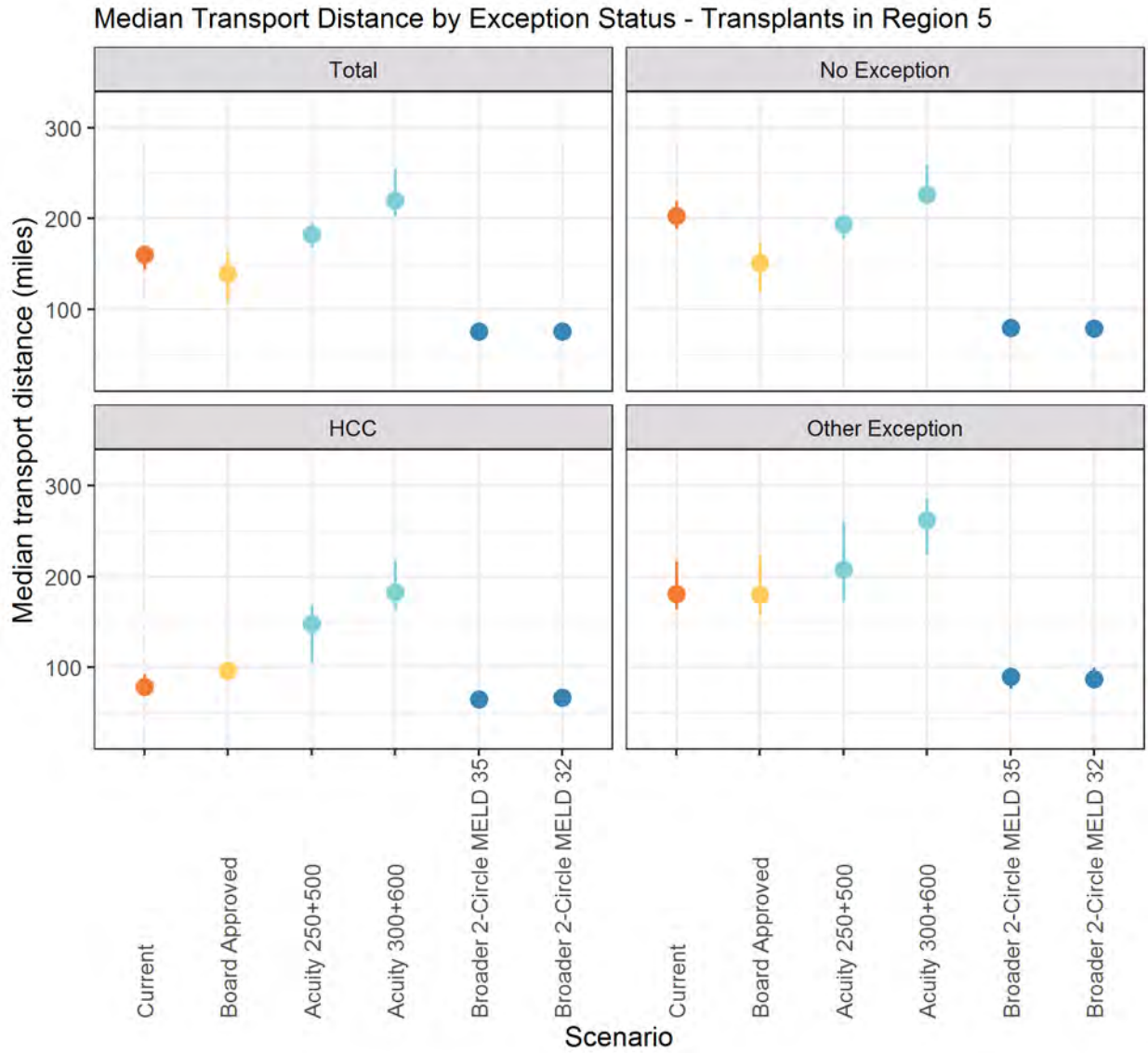


Figure 199 Median Transport Distance by Exception Status - Transplants in Region 5

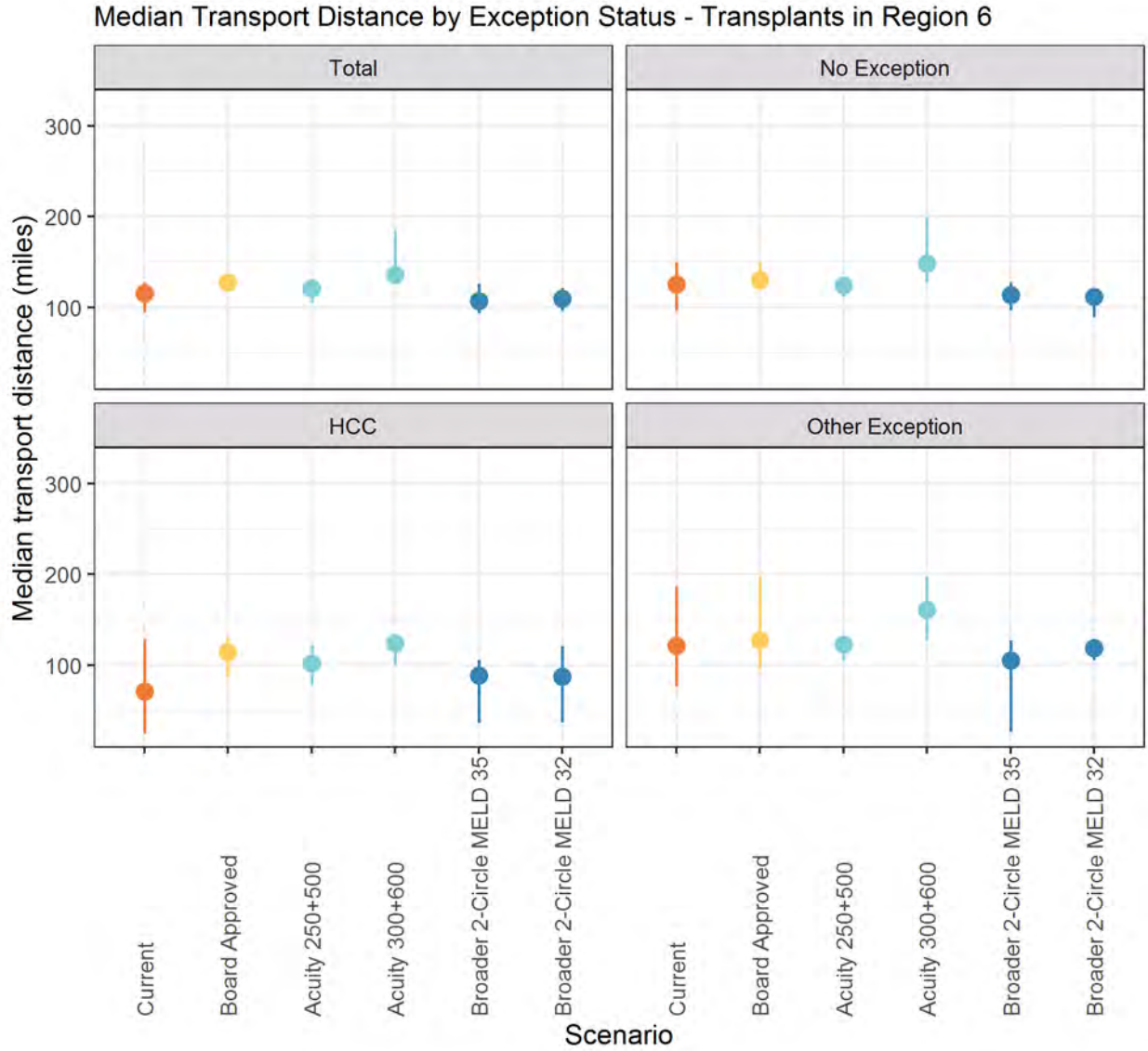


Figure 200 Median Transport Distance by Exception Status - Transplants in Region 6

Median Transport Distance by Exception Status - Transplants in Region 7

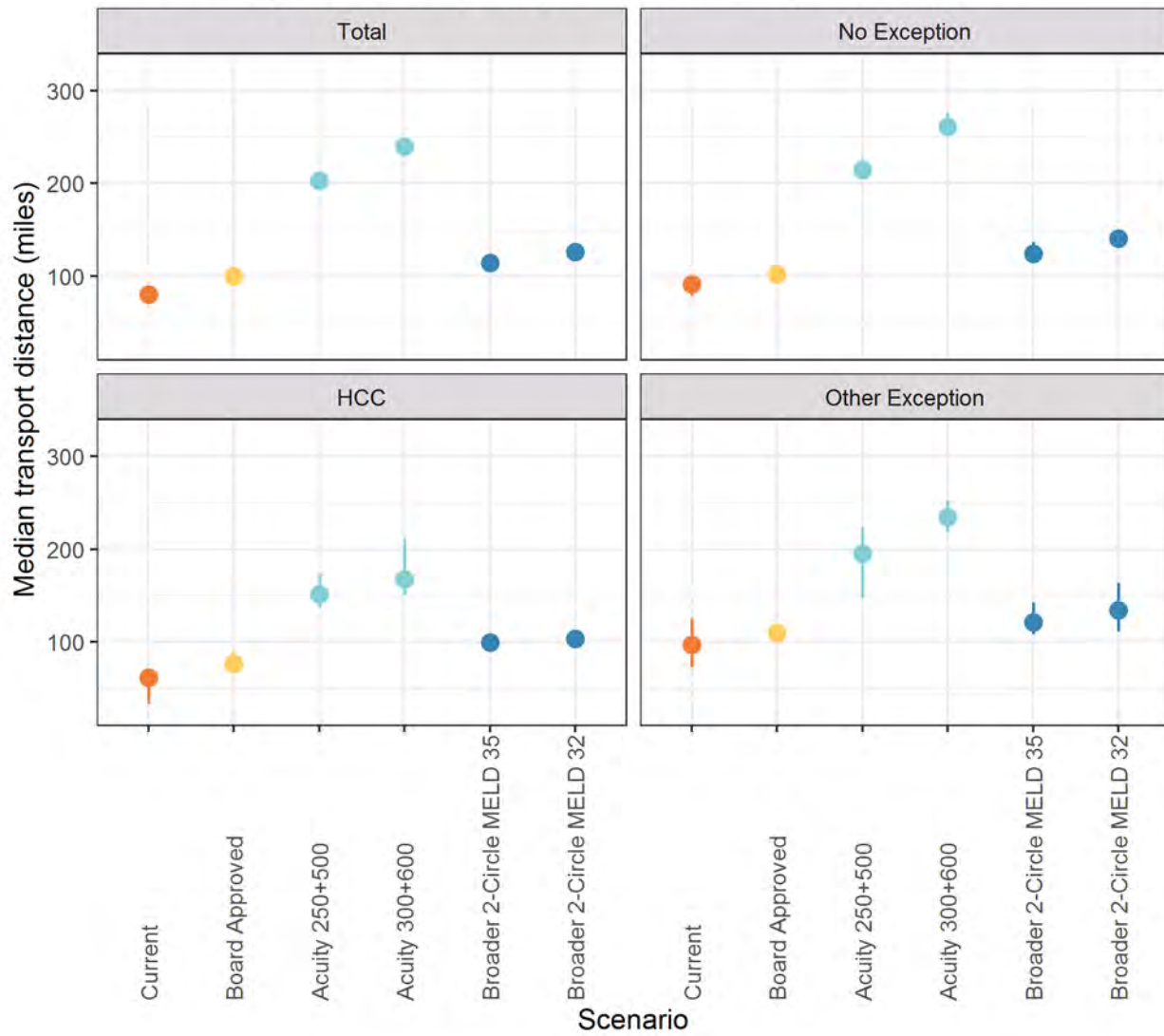


Figure 201 Median Transport Distance by Exception Status - Transplants in Region 7

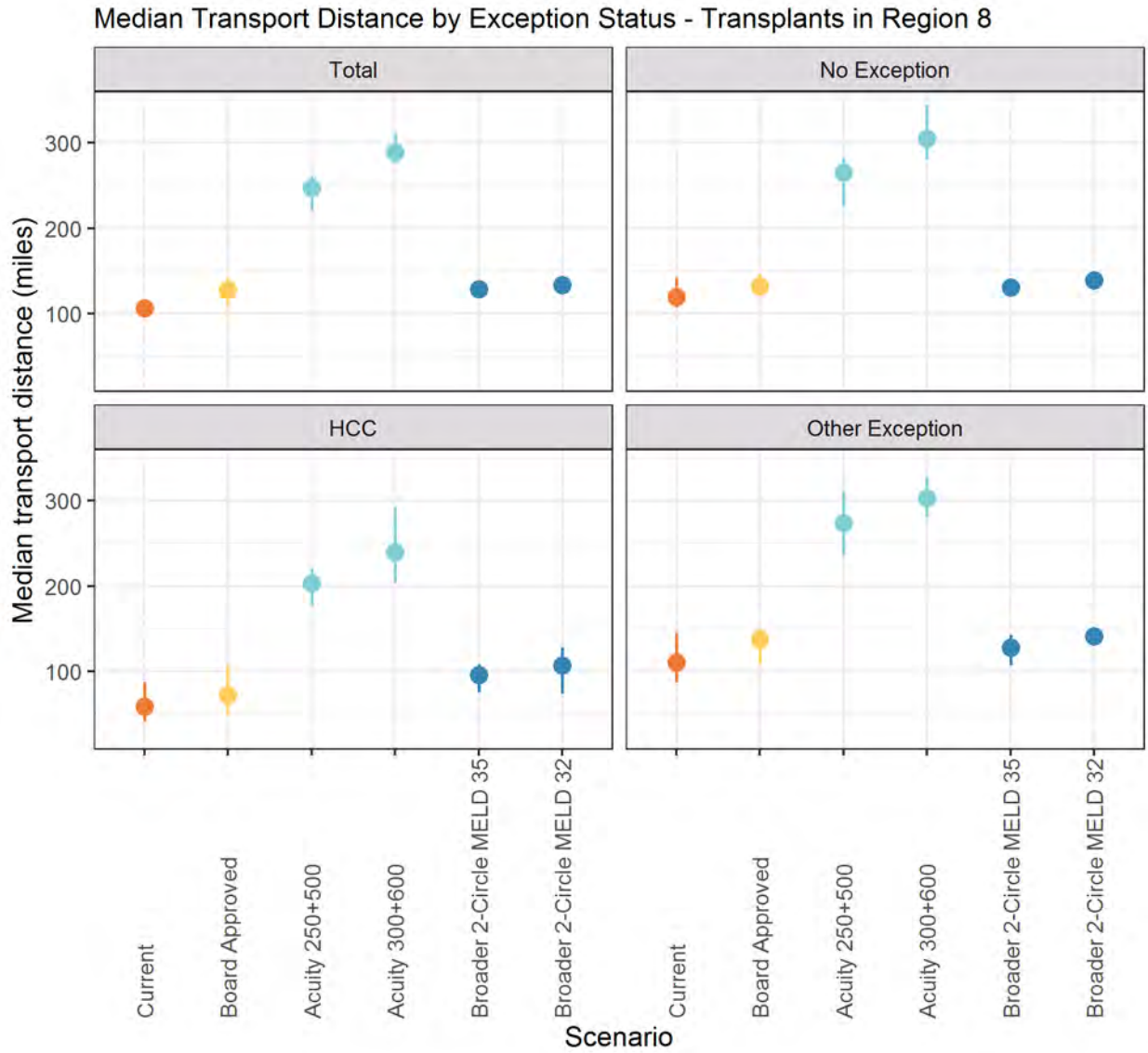


Figure 202 Median Transport Distance by Exception Status - Transplants in Region 8

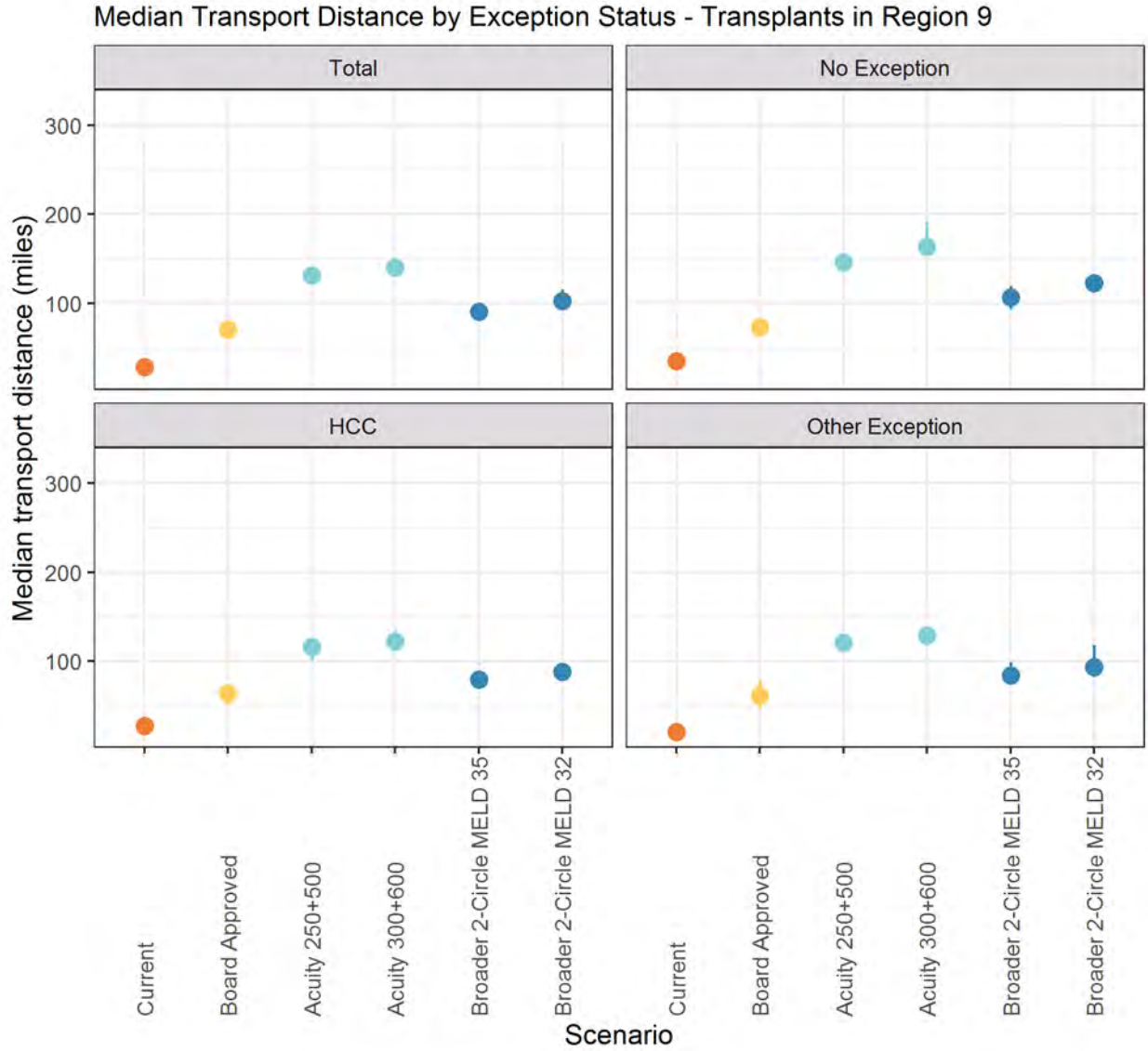


Figure 203 Median Transport Distance by Exception Status - Transplants in Region 9

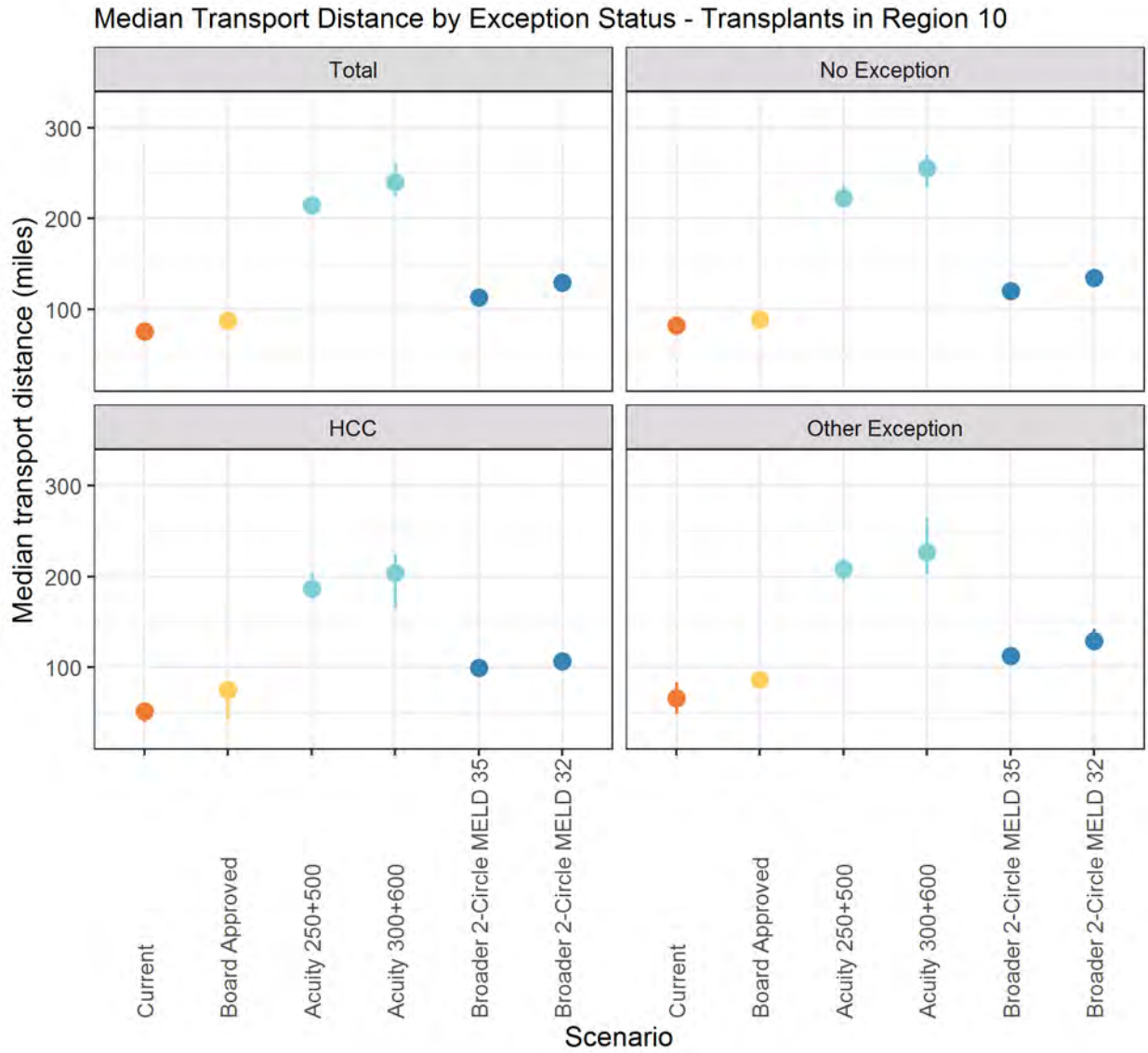


Figure 204 Median Transport Distance by Exception Status - Transplants in Region 10

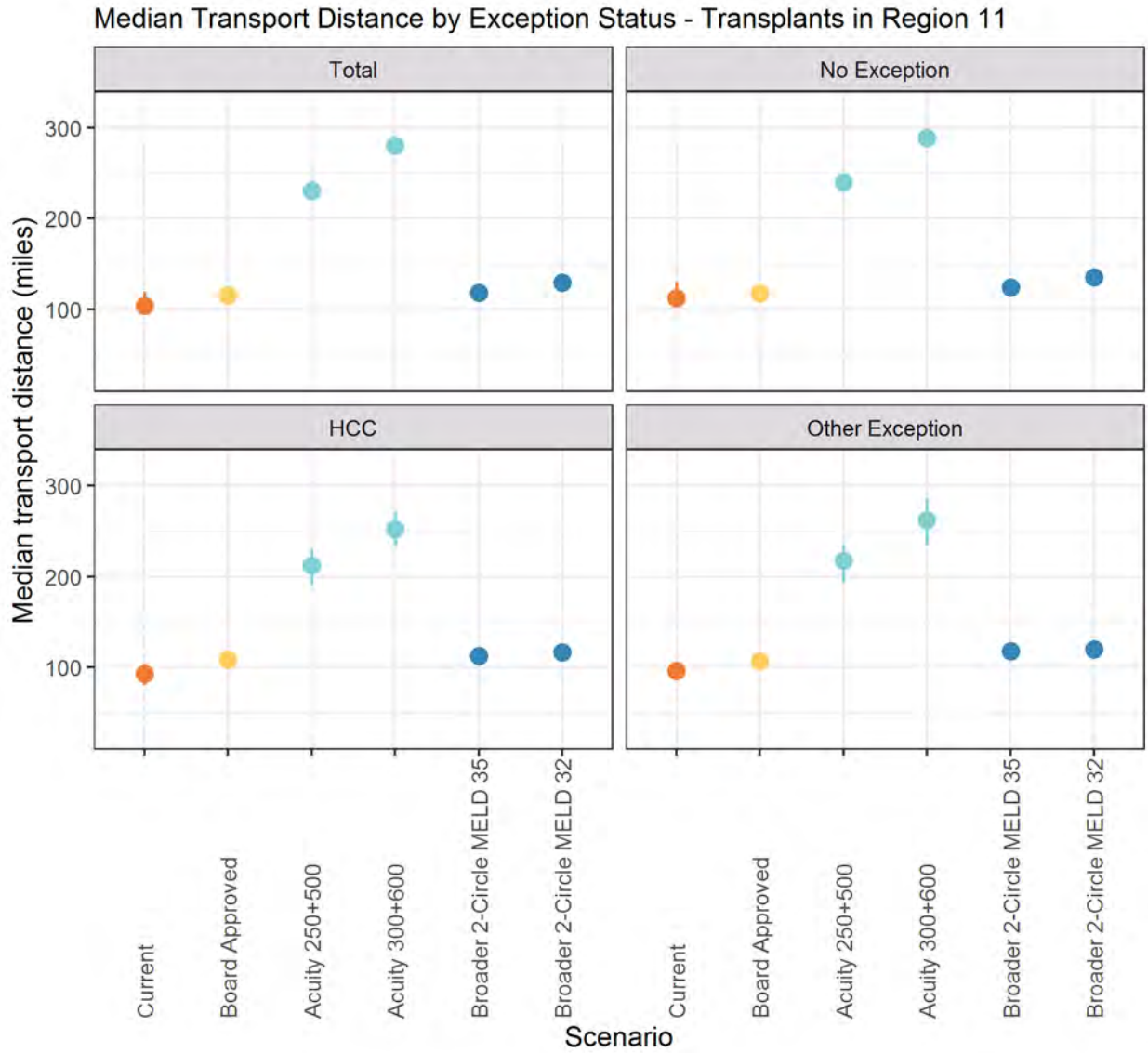


Figure 205 Median Transport Distance by Exception Status - Transplants in Region 11

Median Transport Distance by Allocation MELD/PELD

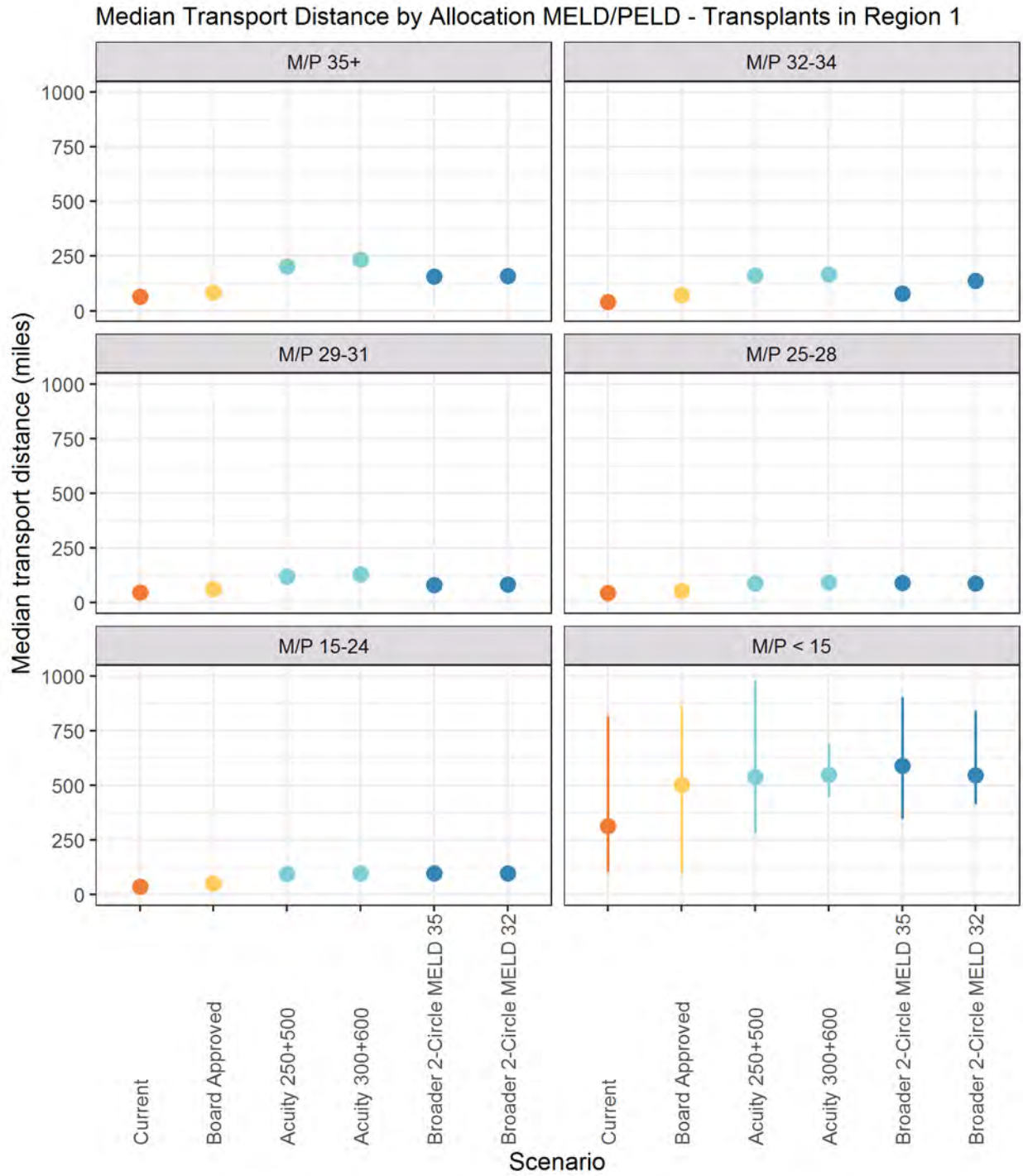


Figure 206 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 1

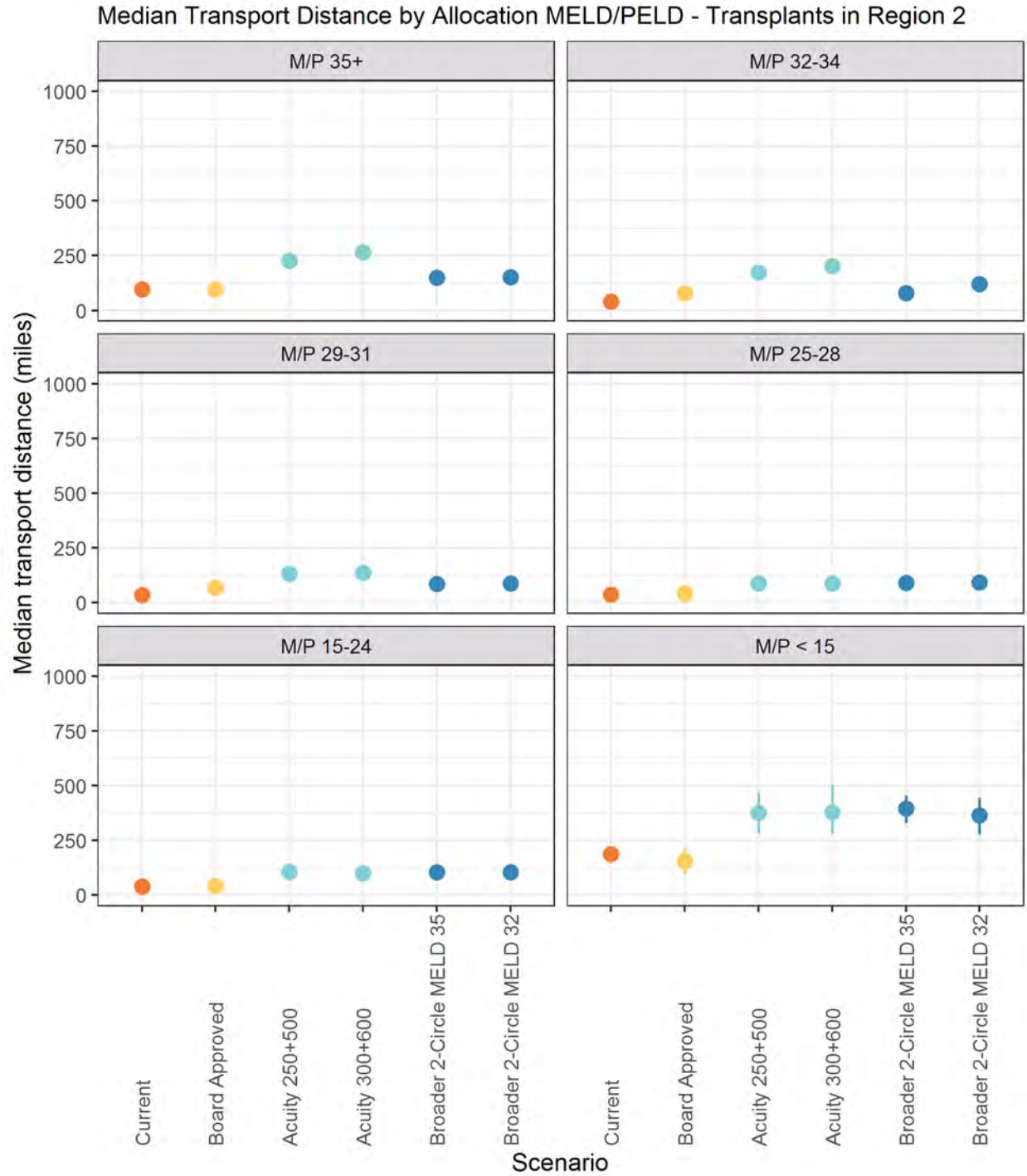


Figure 207 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 2

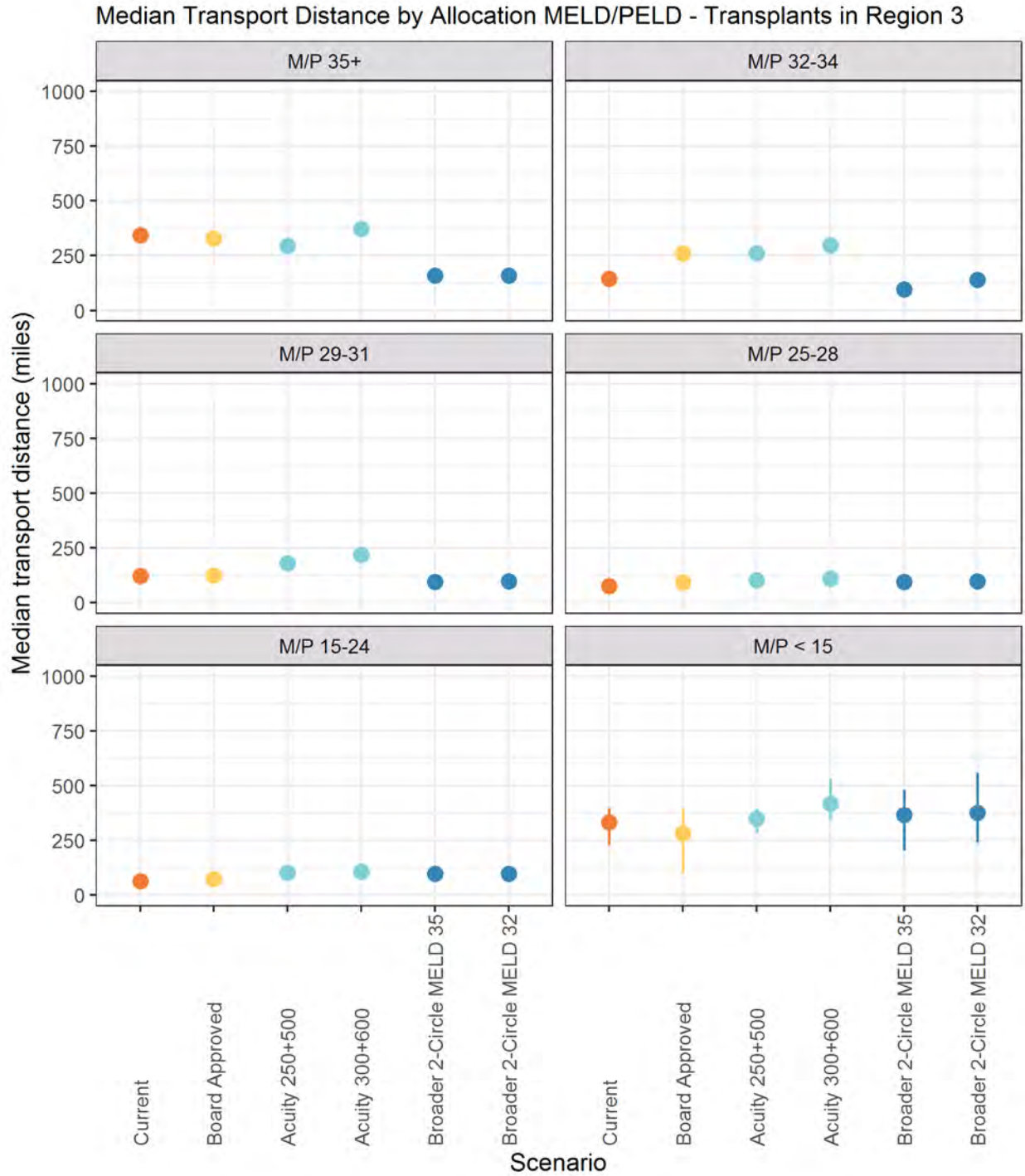


Figure 208 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 3

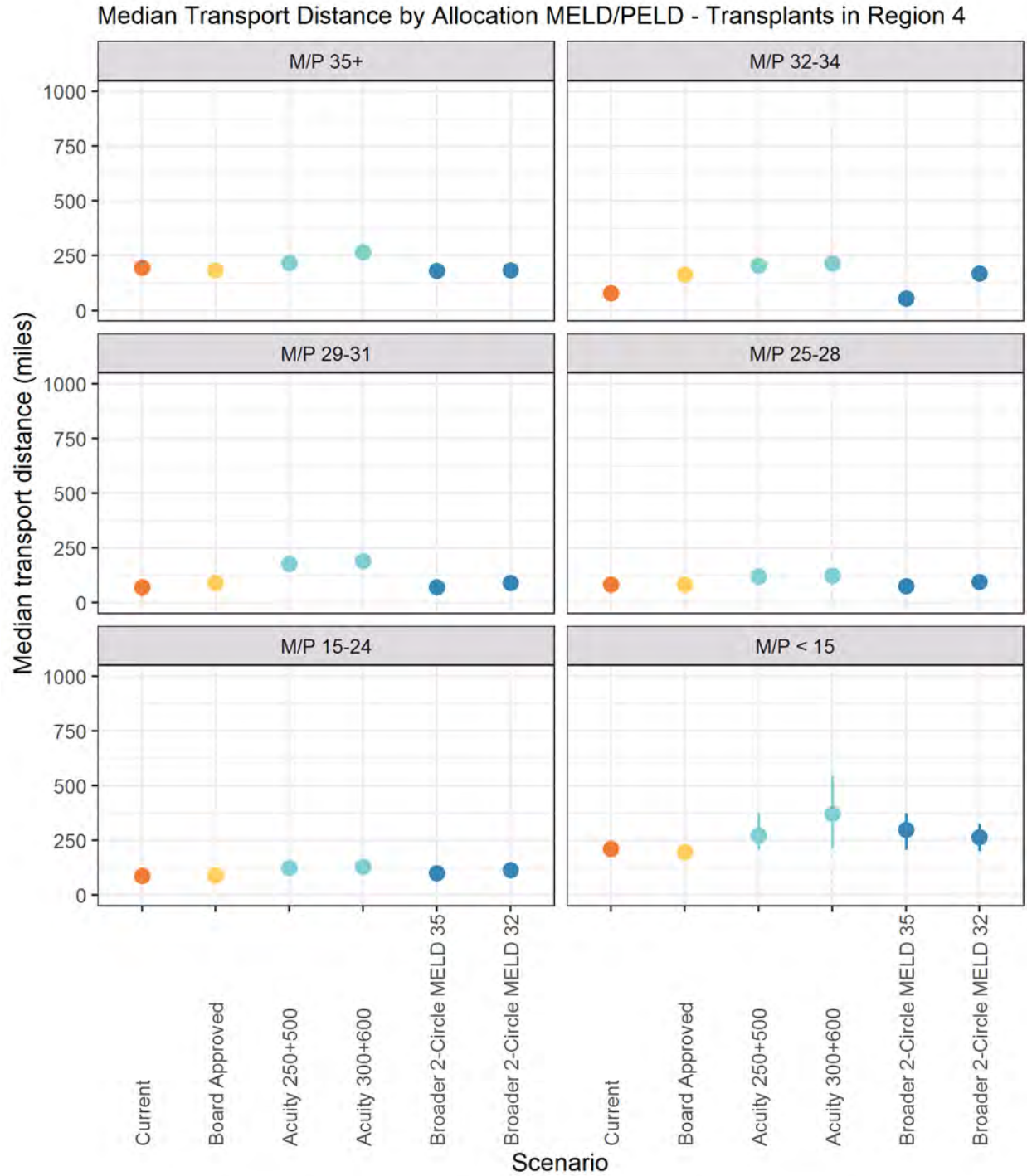


Figure 209 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 4

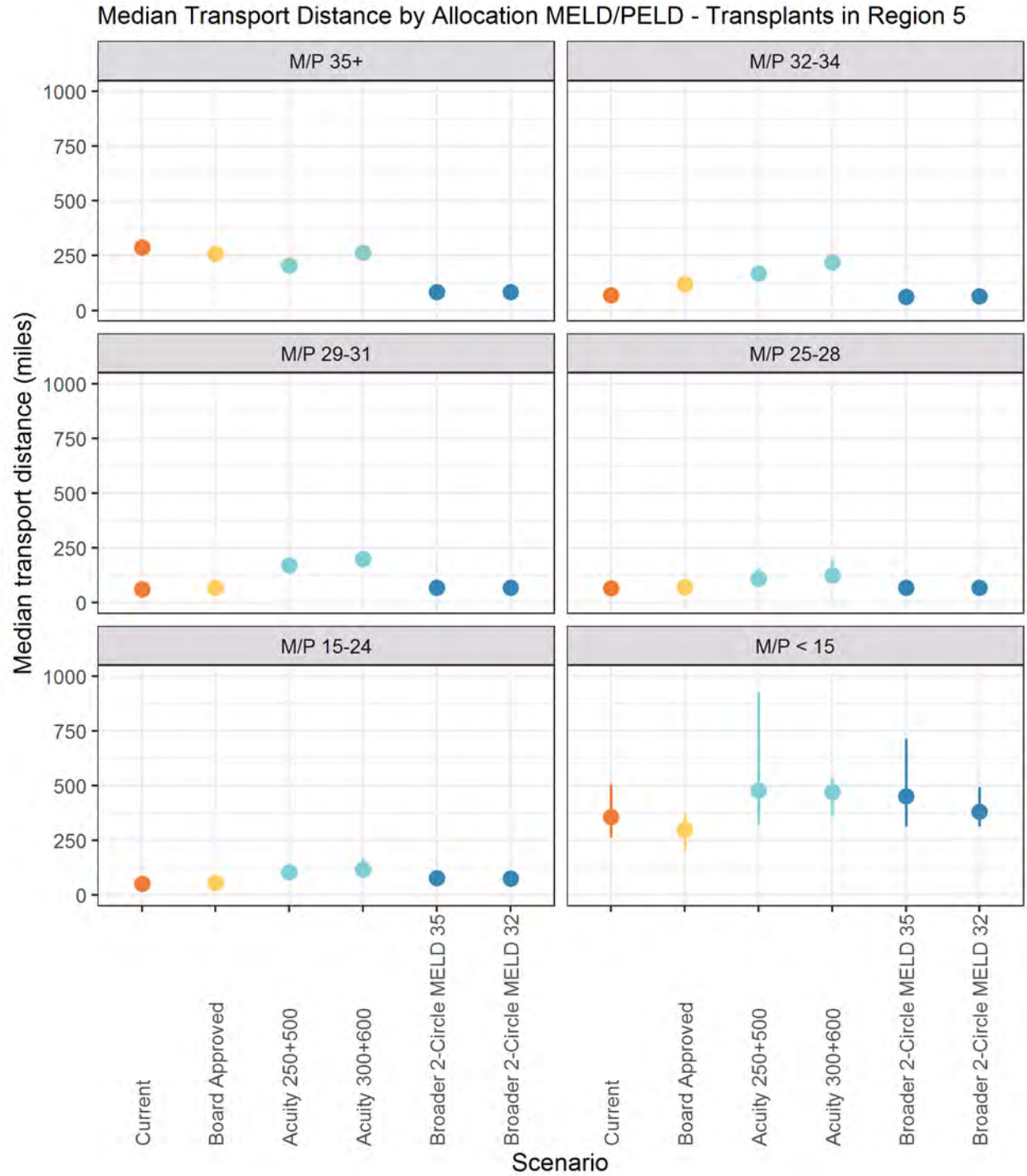


Figure 210 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 5

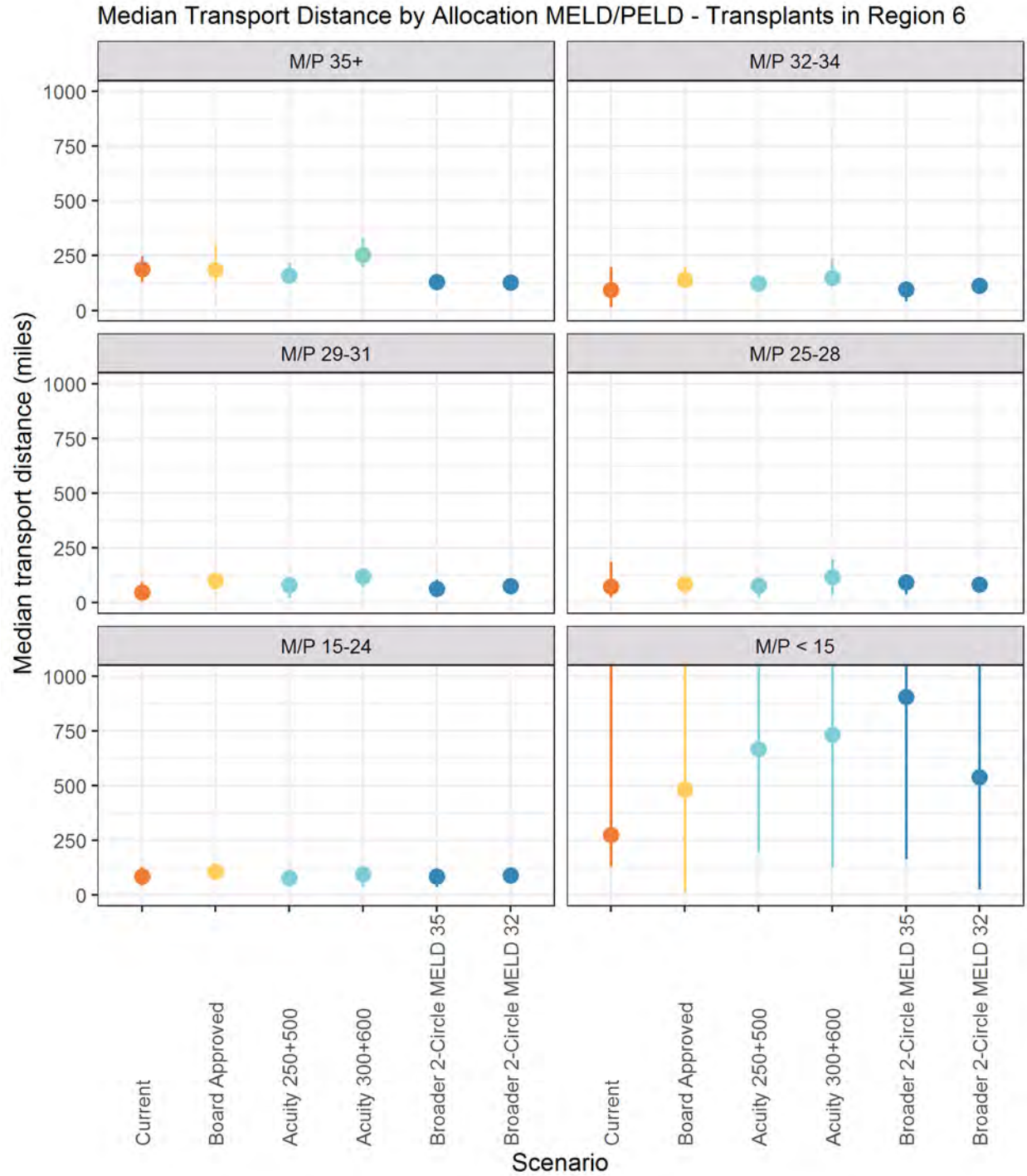


Figure 211 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 6

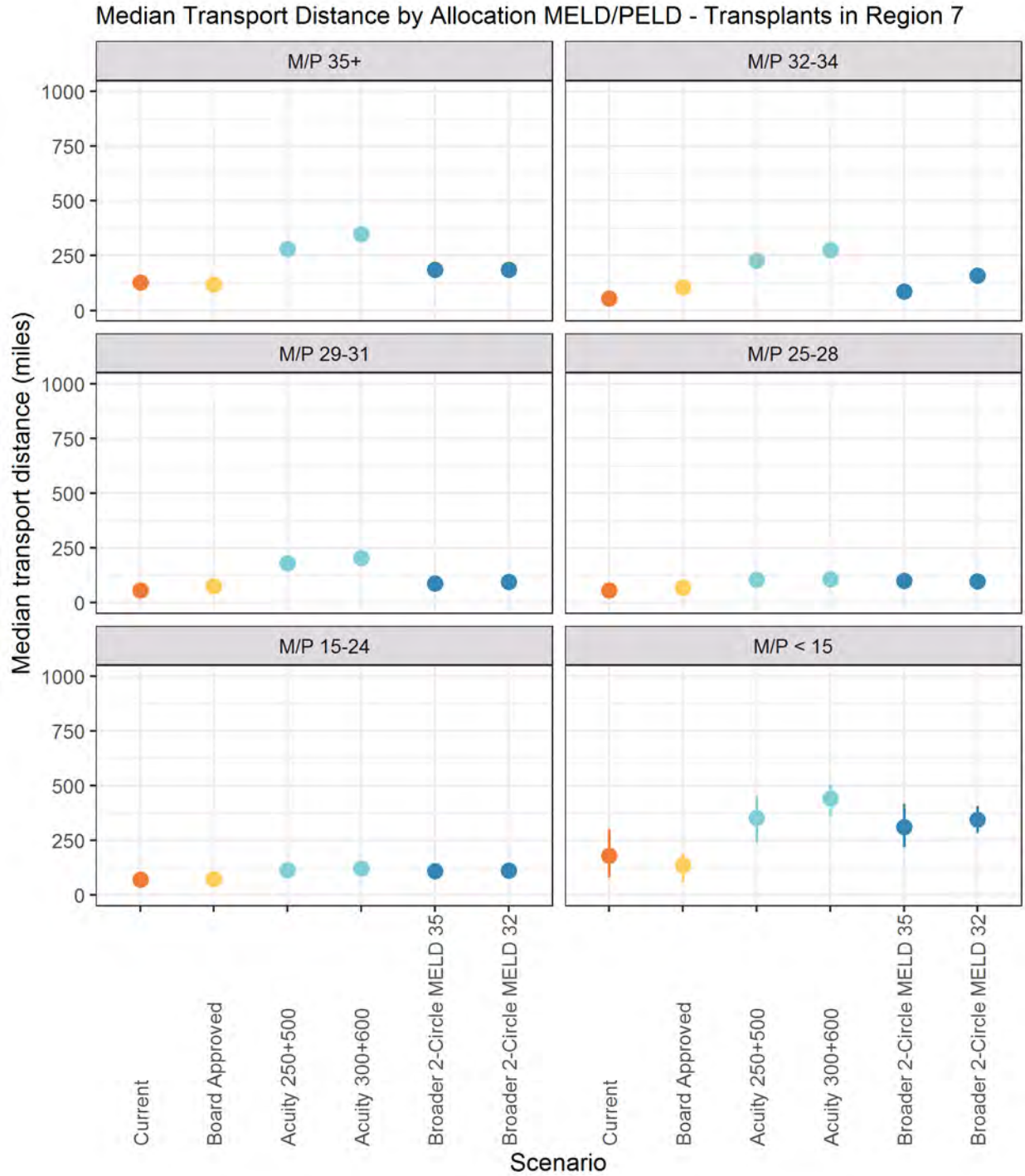


Figure 212 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 7

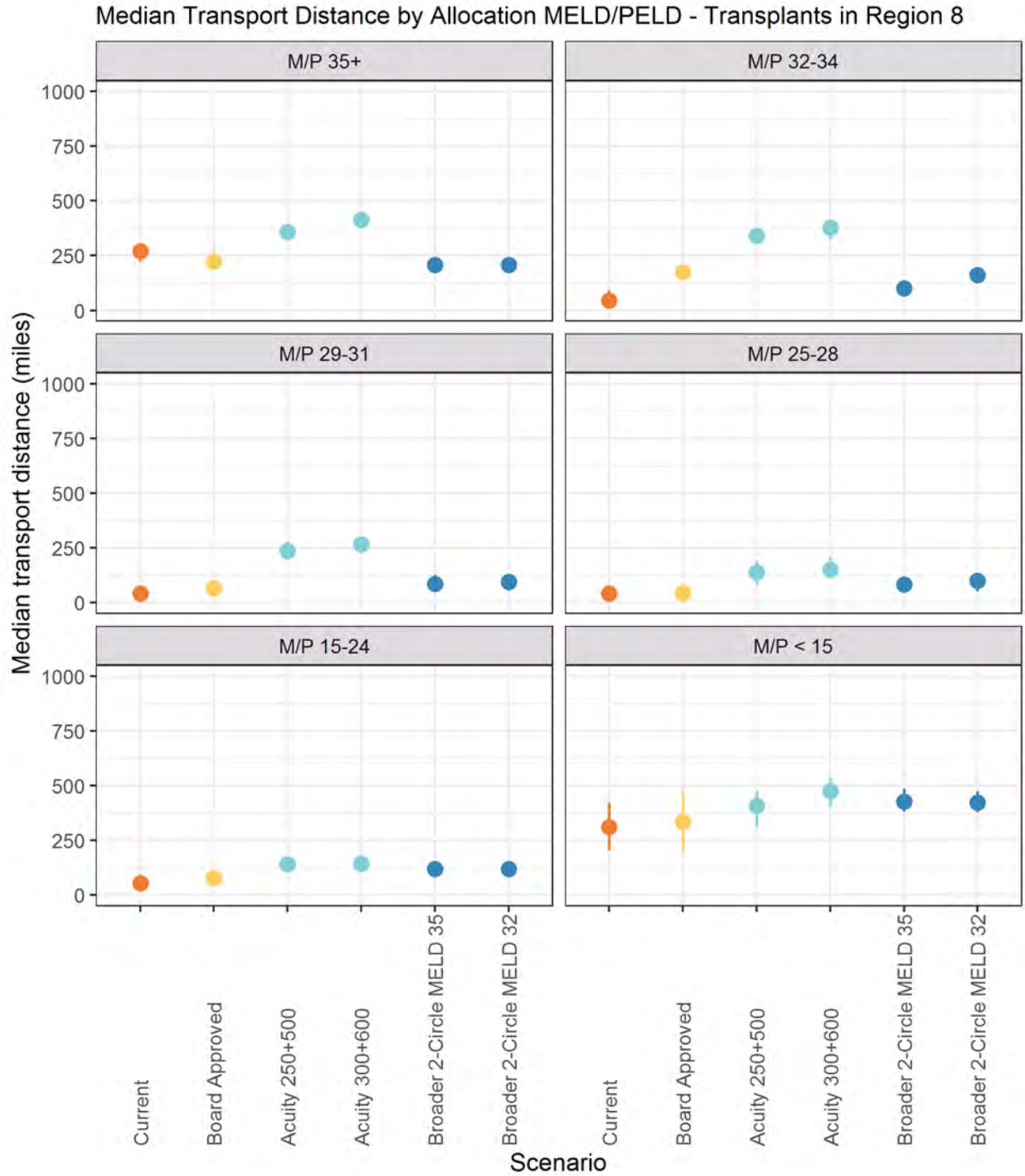


Figure 213 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 8

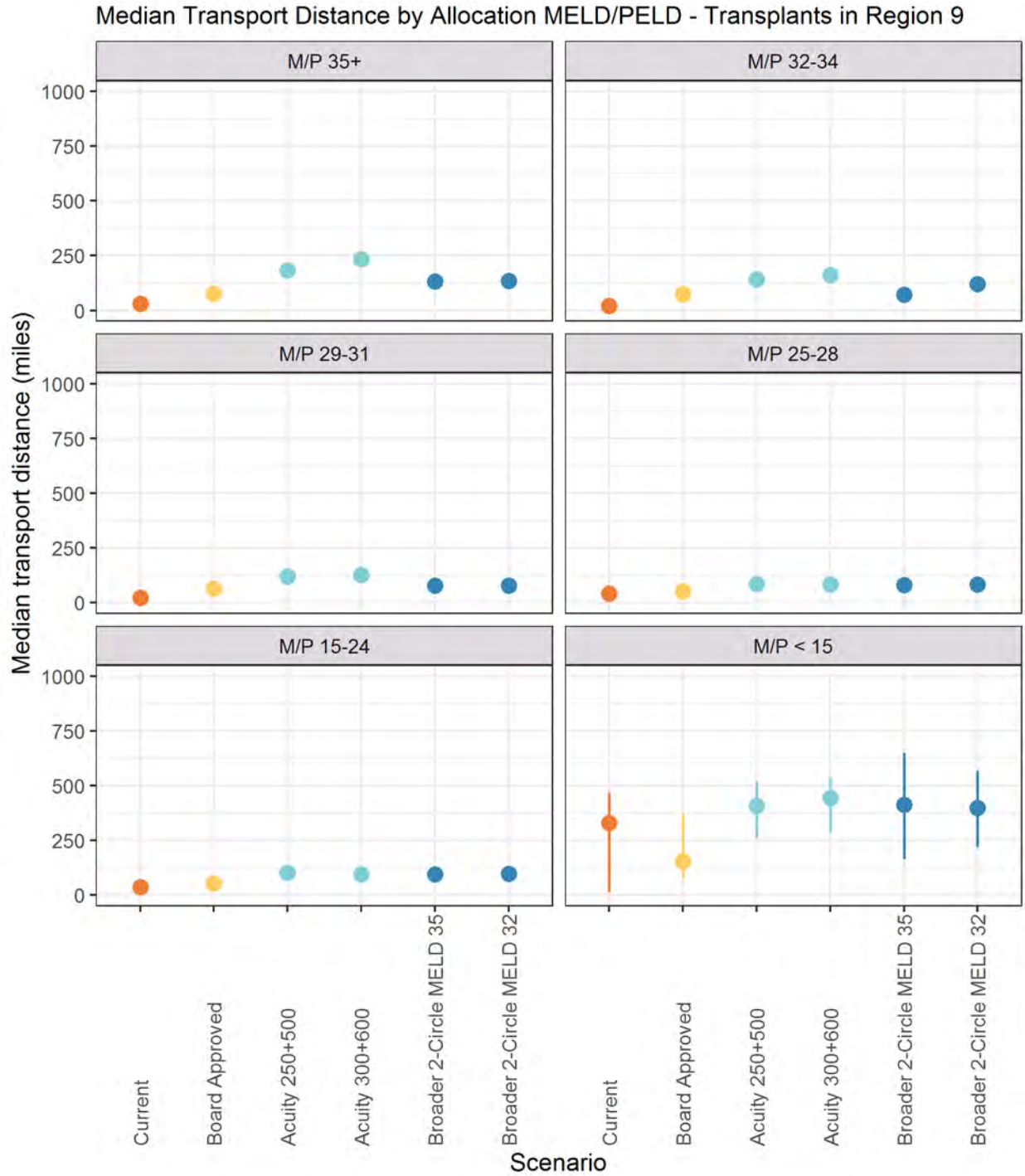


Figure 214 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 9

Median Transport Distance by Allocation MELD/PELD - Transplants in Region 10

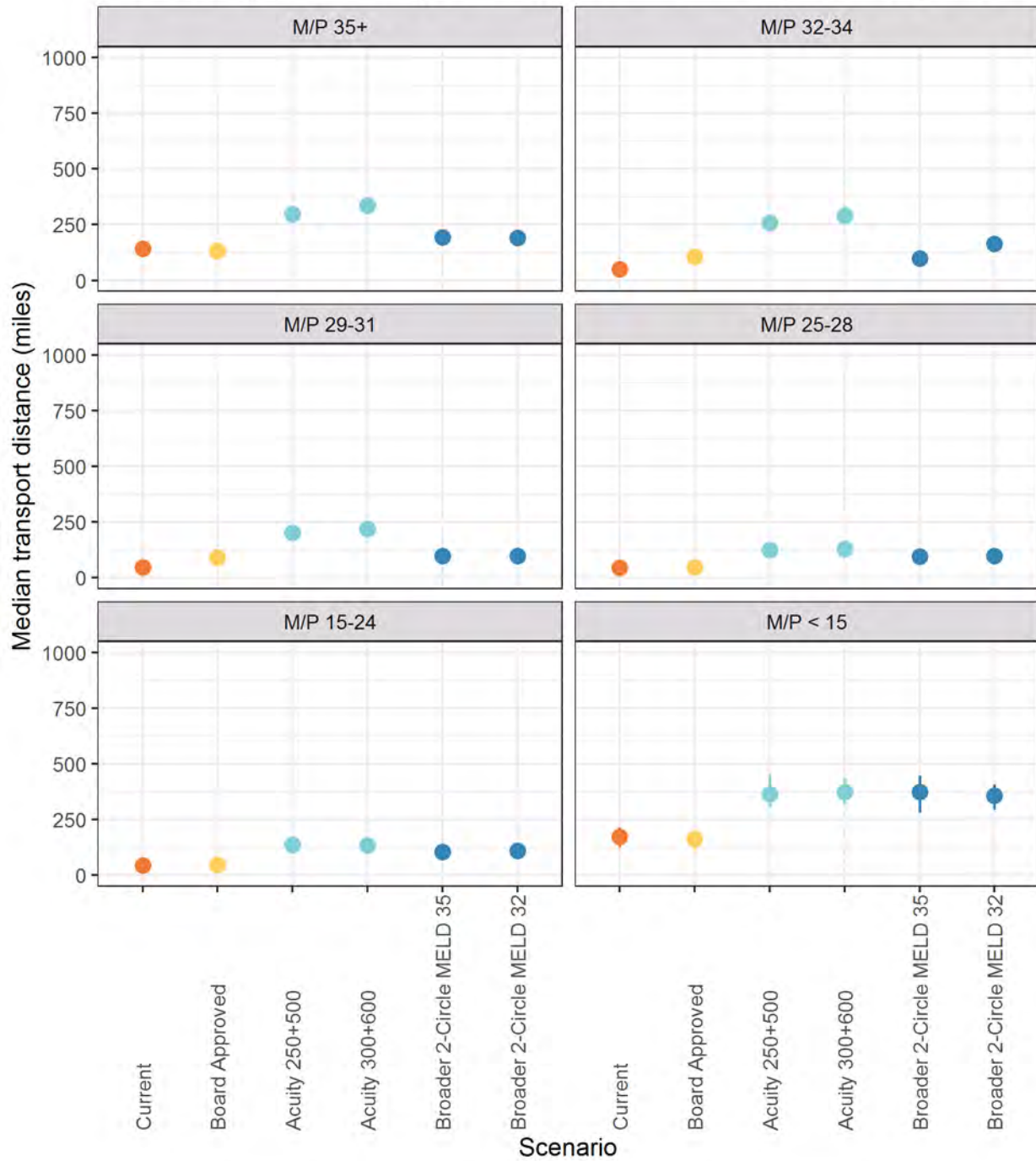


Figure 215 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 10

Median Transport Distance by Allocation MELD/PELD - Transplants in Region 11

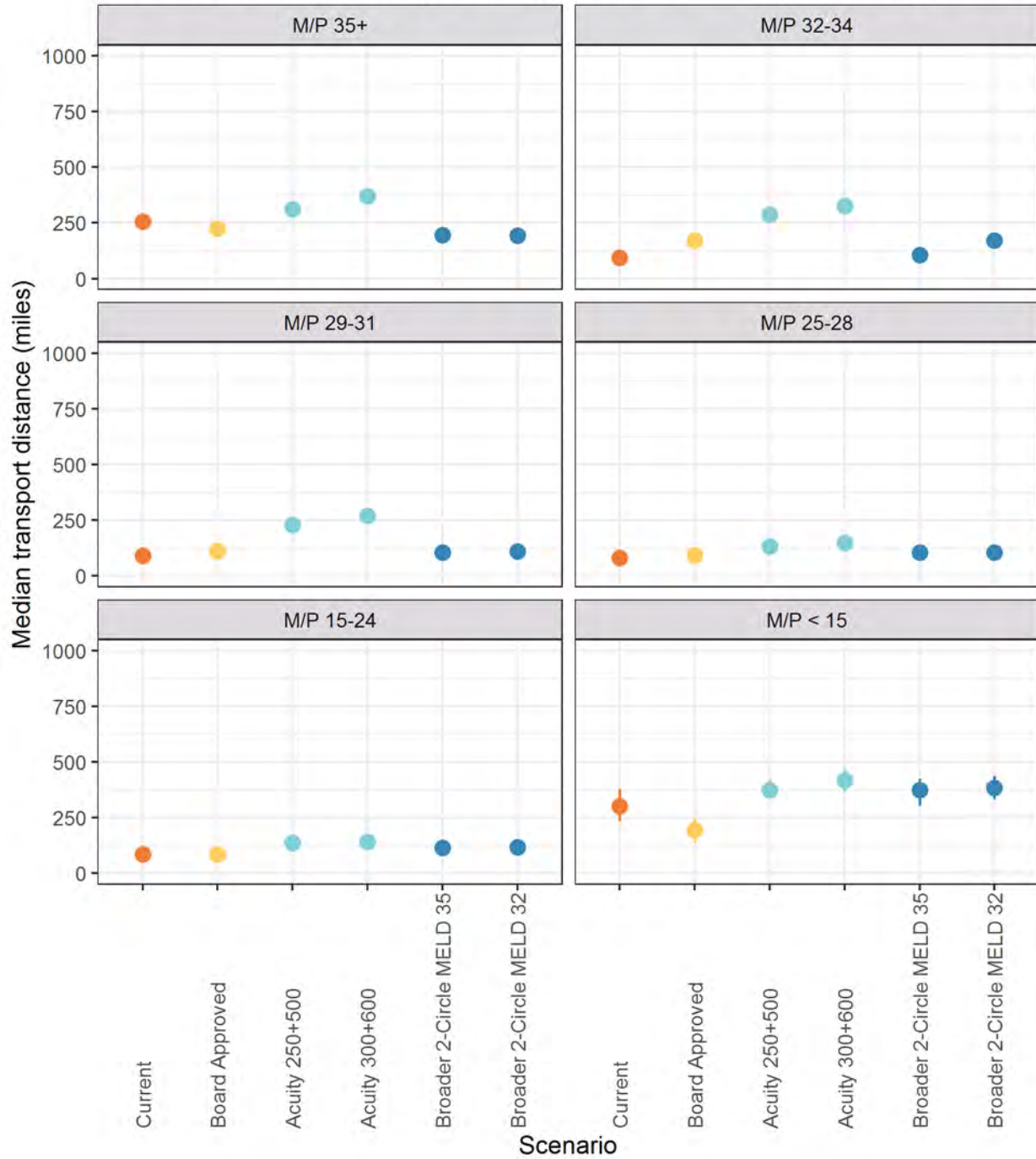


Figure 216 Median Transport Distance by Allocation MELD/PELD - Transplants in Region 11

Percentage of Organs Flown by Exception Status

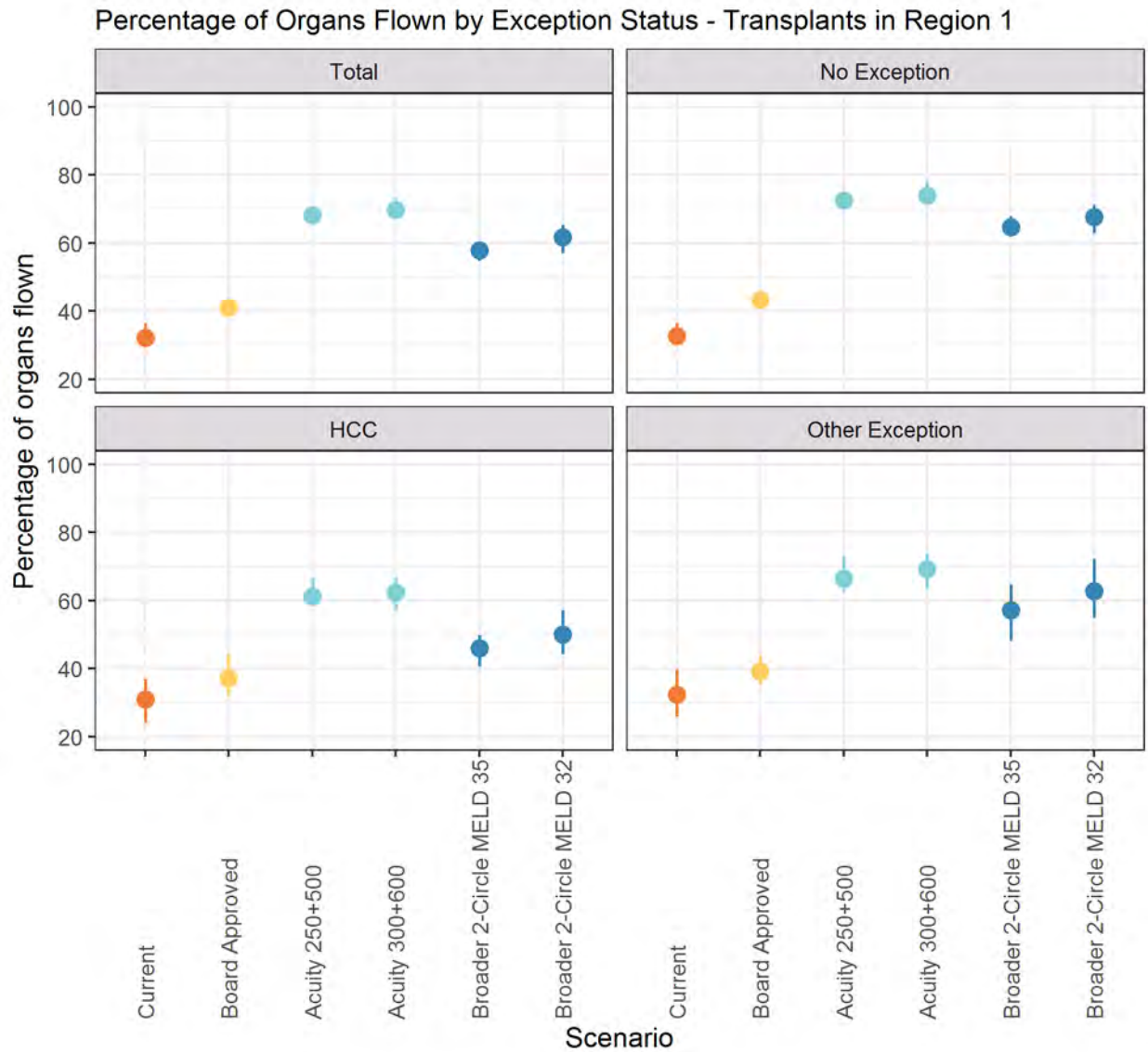


Figure 217 Percentage of Organs Flown by Exception Status - Transplants in Region 1

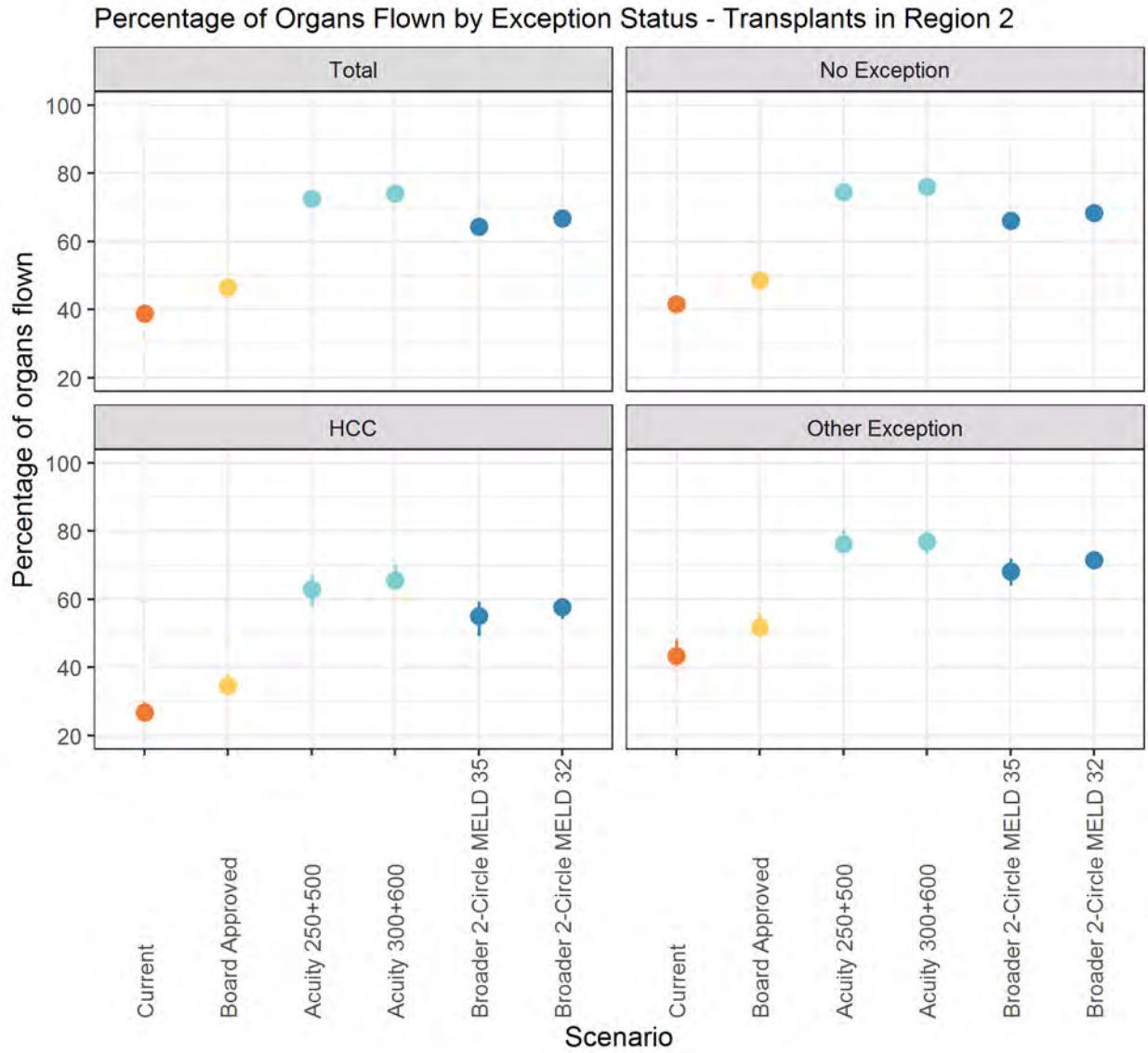


Figure 218 Percentage of Organs Flown by Exception Status - Transplants in Region 2

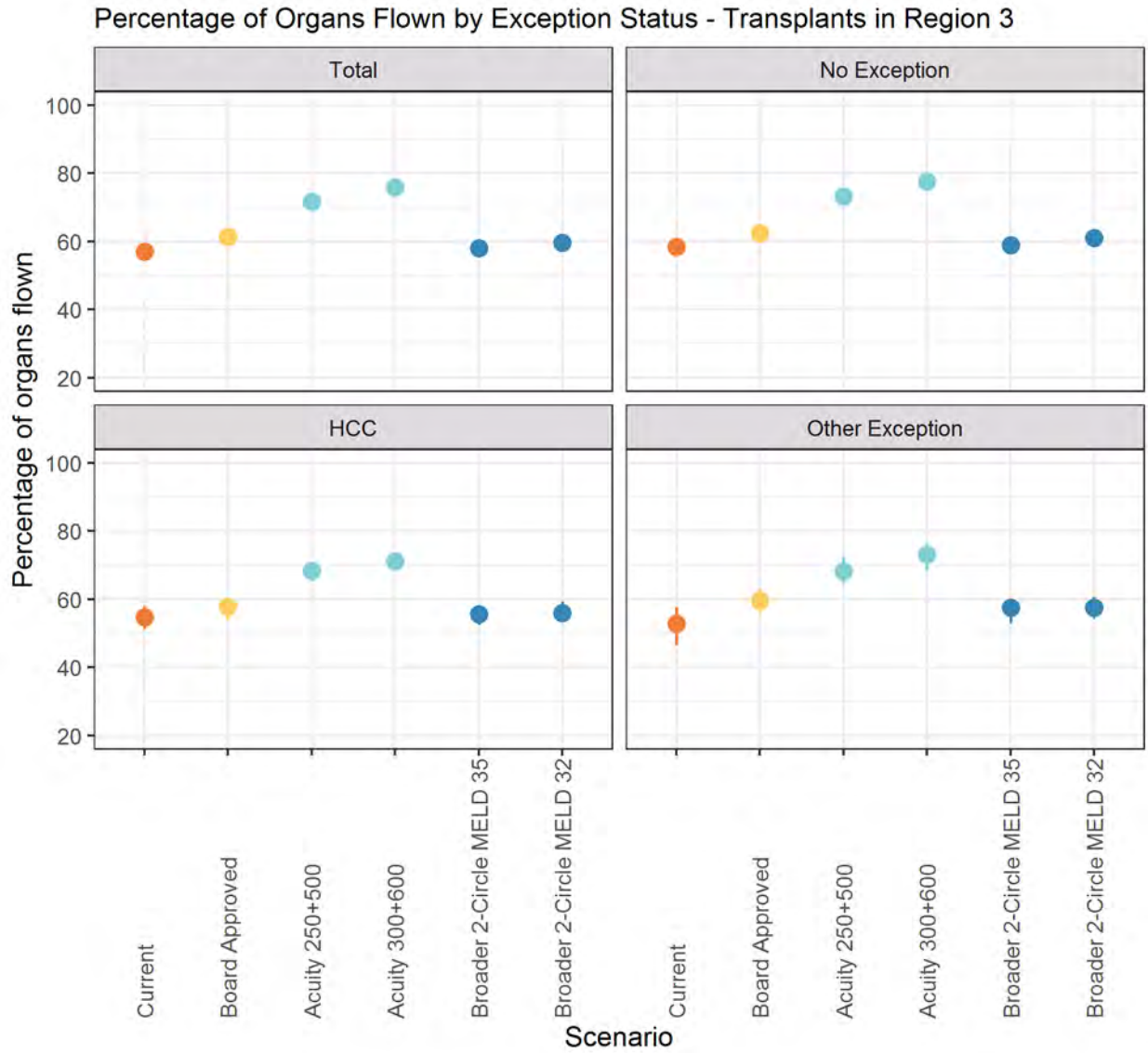


Figure 219 Percentage of Organs Flown by Exception Status - Transplants in Region 3

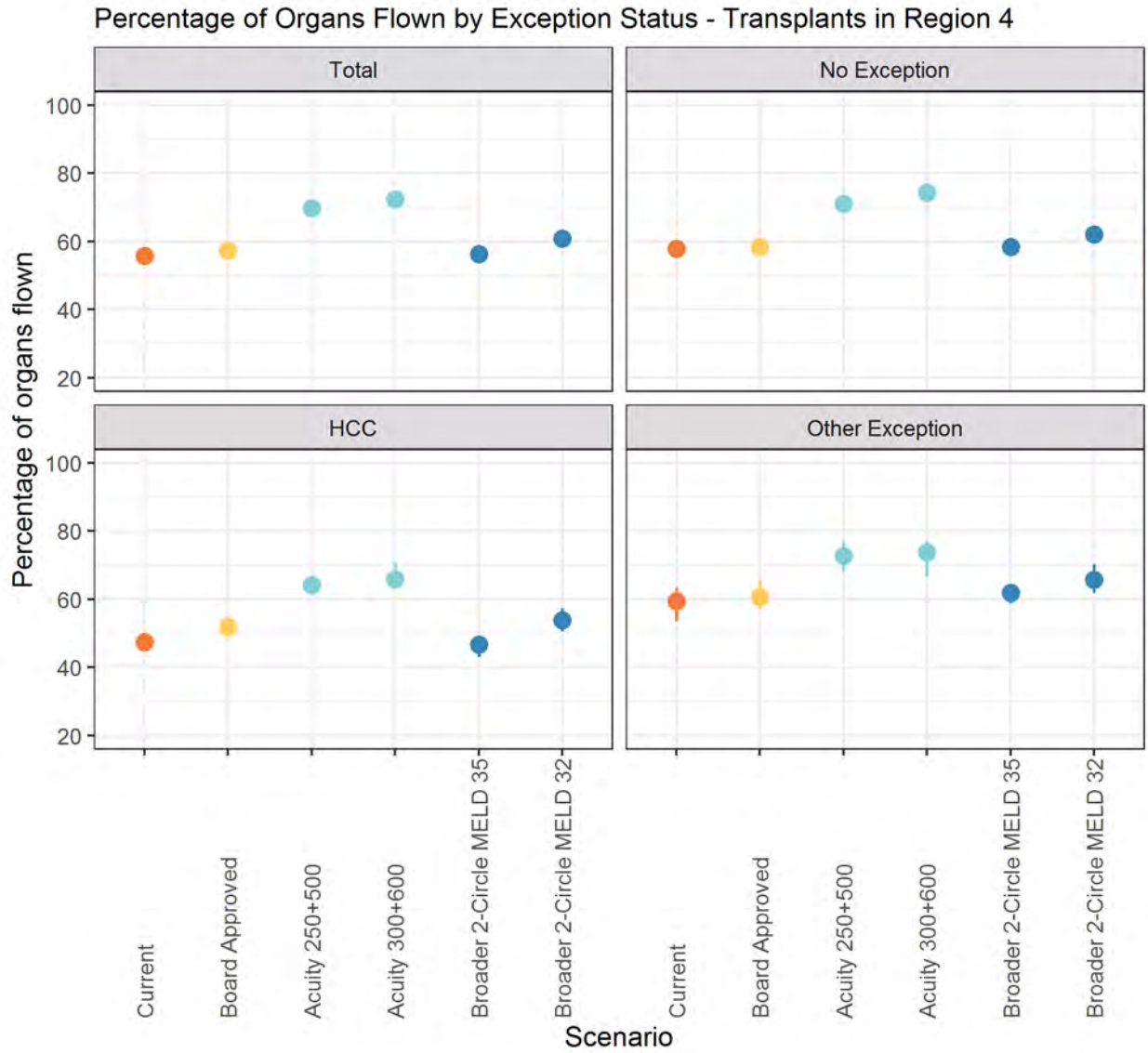


Figure 220 Percentage of Organs Flown by Exception Status - Transplants in Region 4

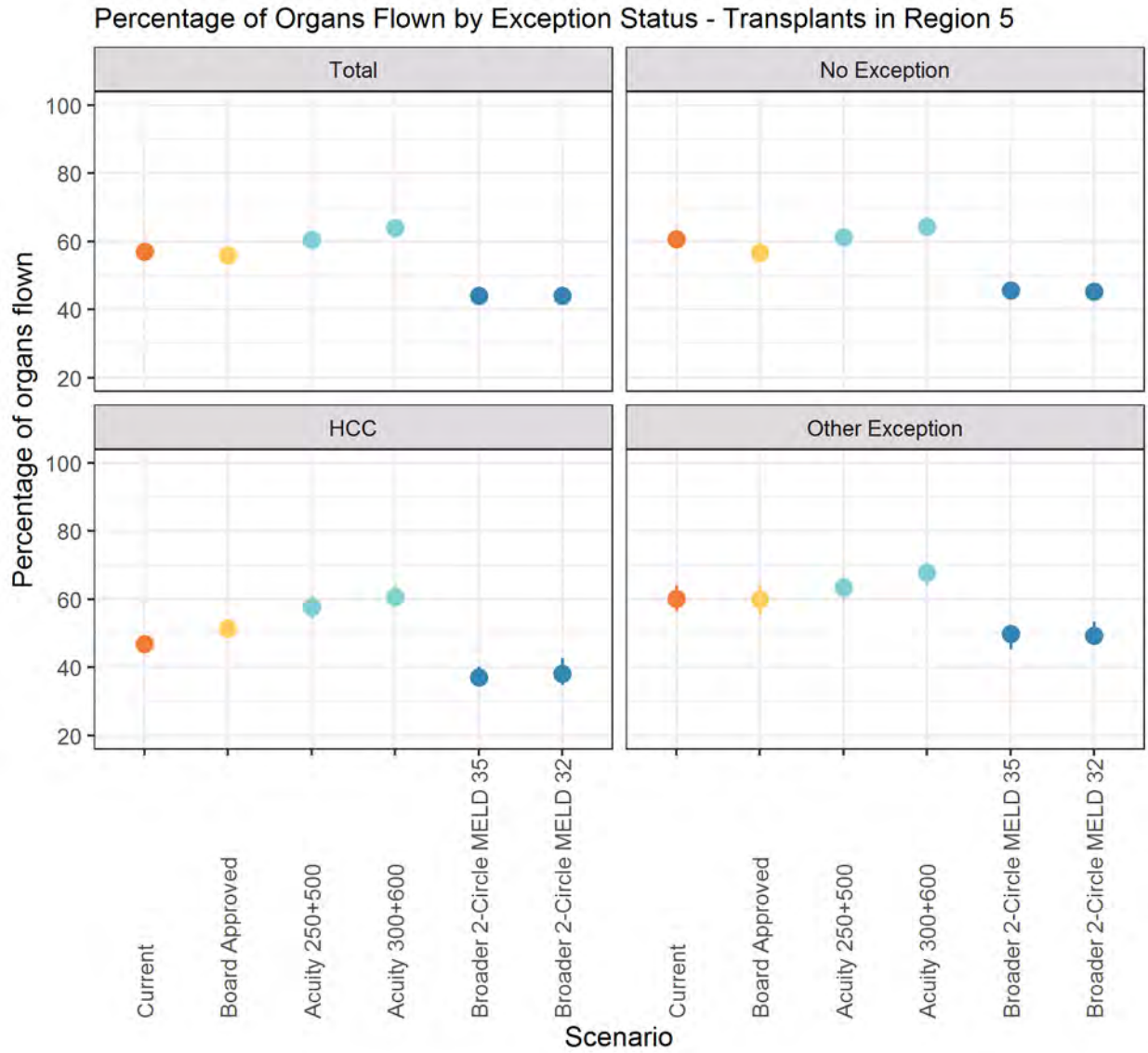


Figure 221 Percentage of Organs Flown by Exception Status - Transplants in Region 5

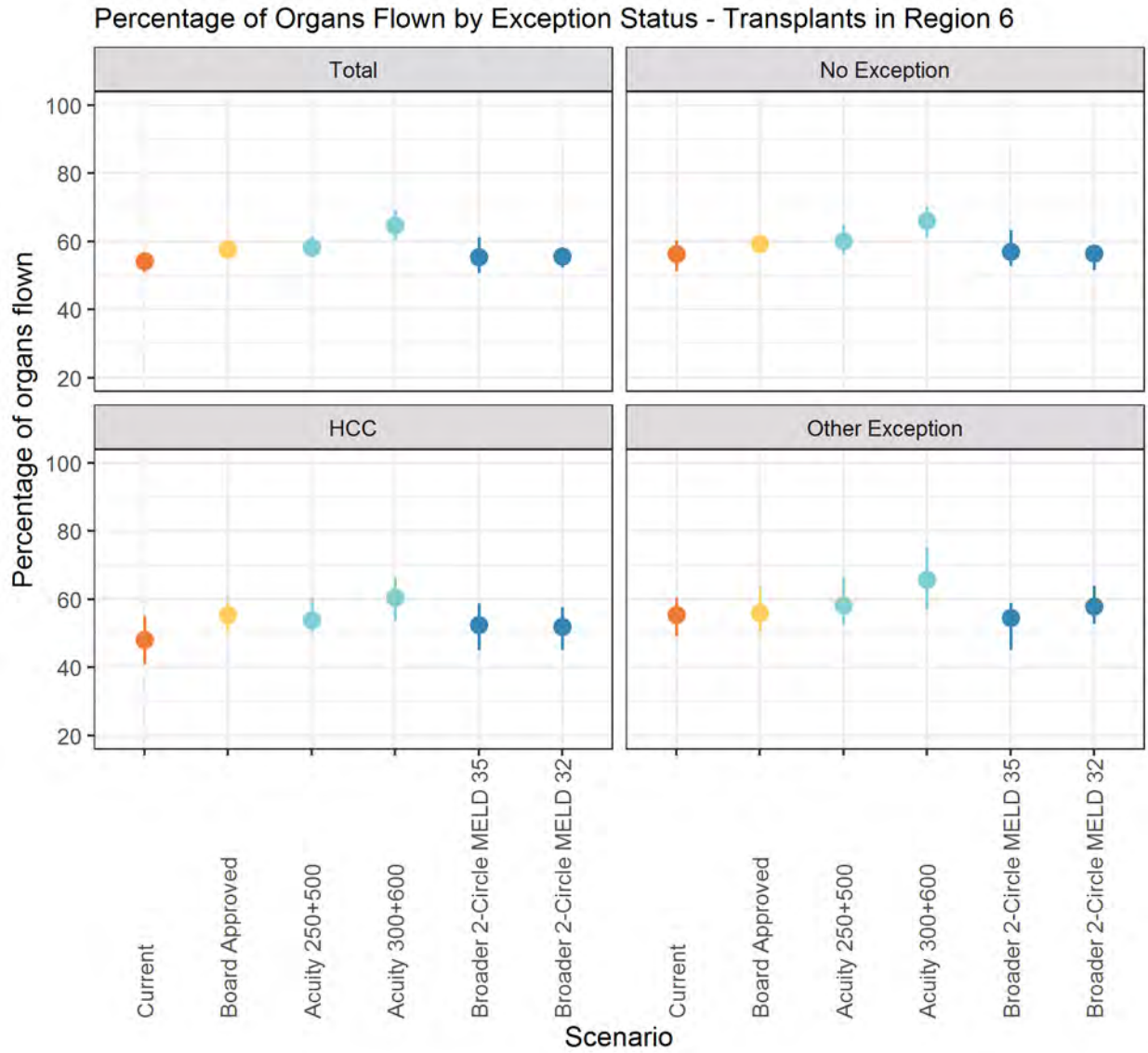


Figure 222 Percentage of Organs Flown by Exception Status - Transplants in Region 6

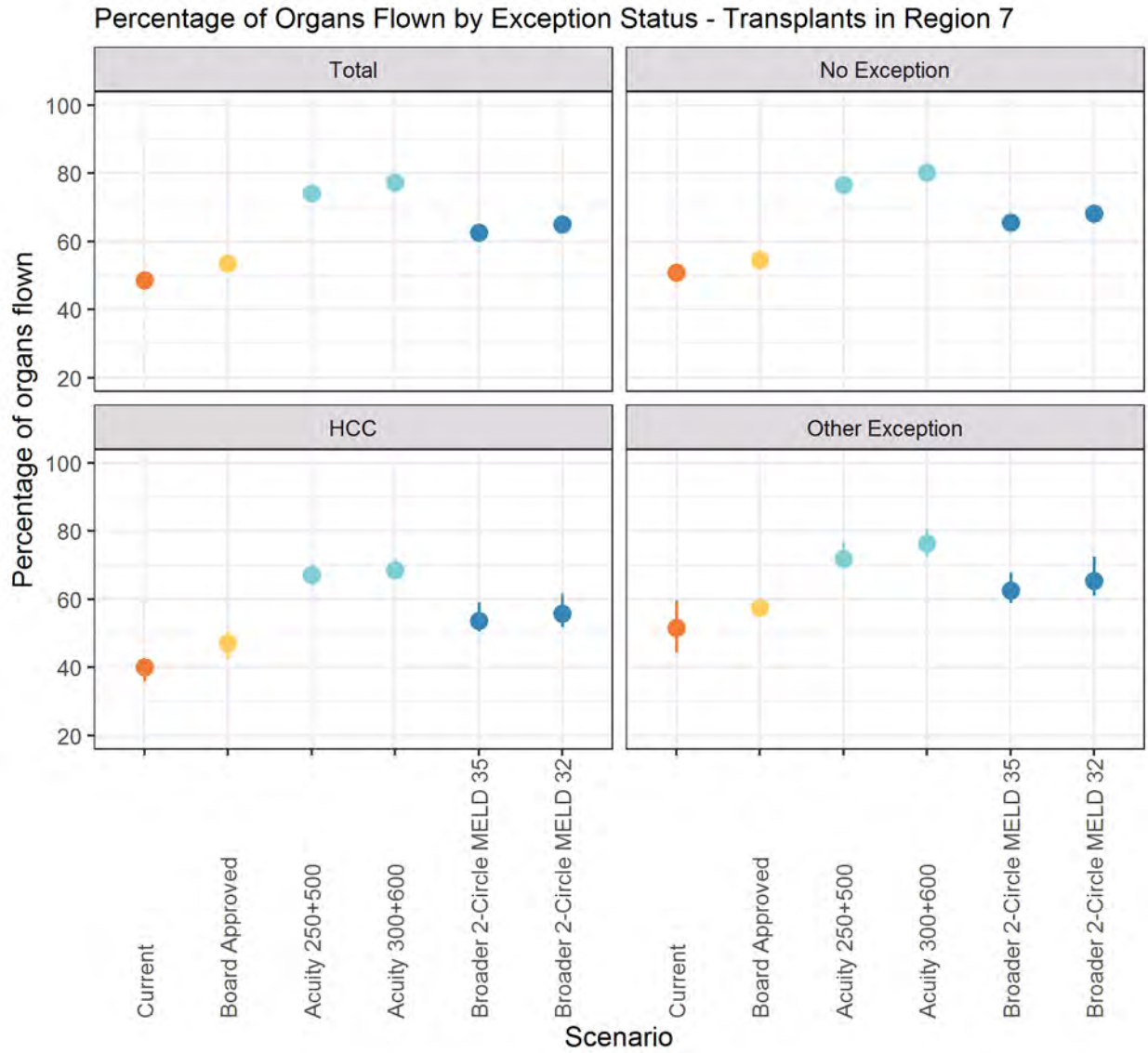


Figure 223 Percentage of Organs Flown by Exception Status - Transplants in Region 7

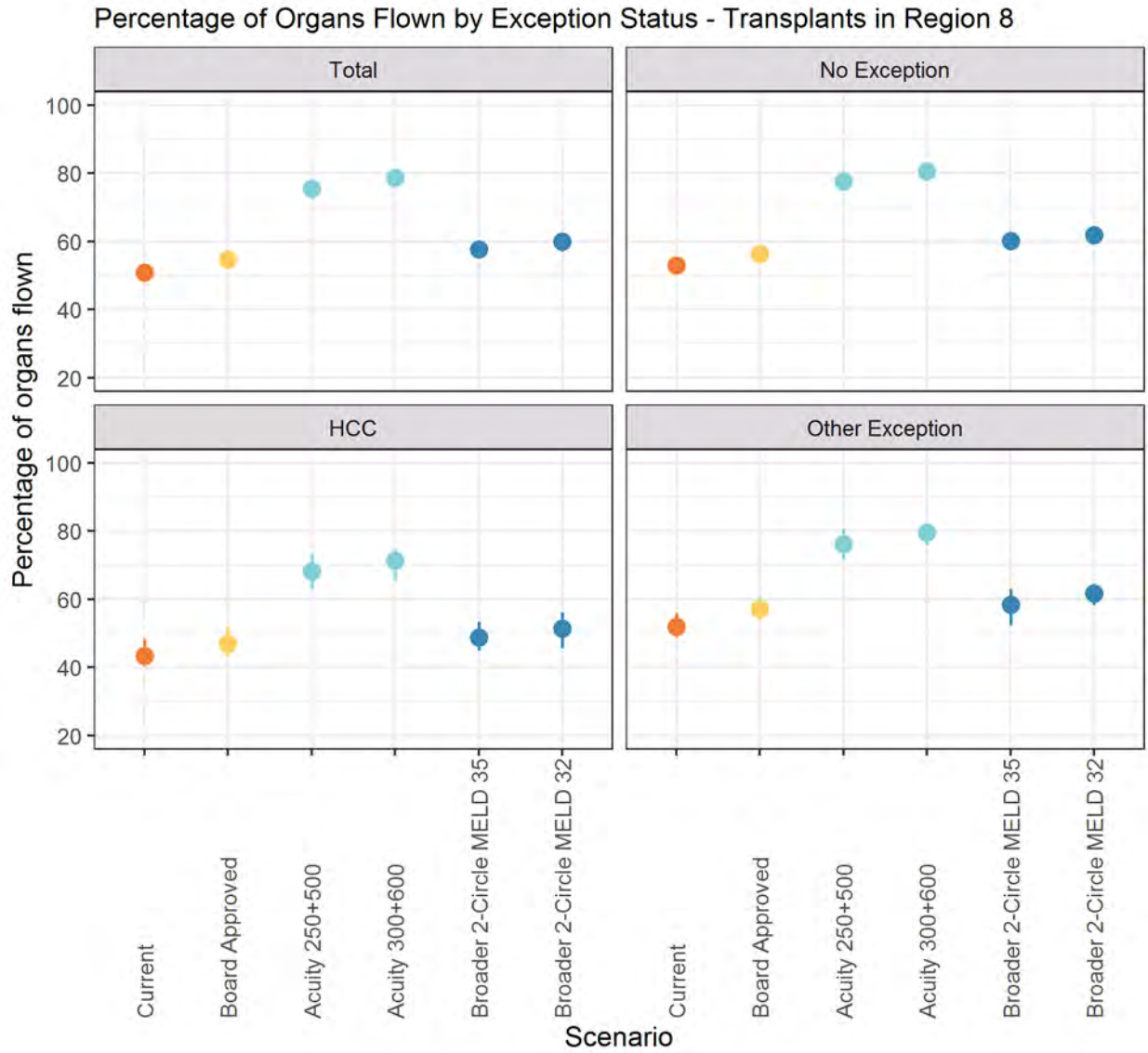


Figure 224 Percentage of Organs Flown by Exception Status - Transplants in Region 8

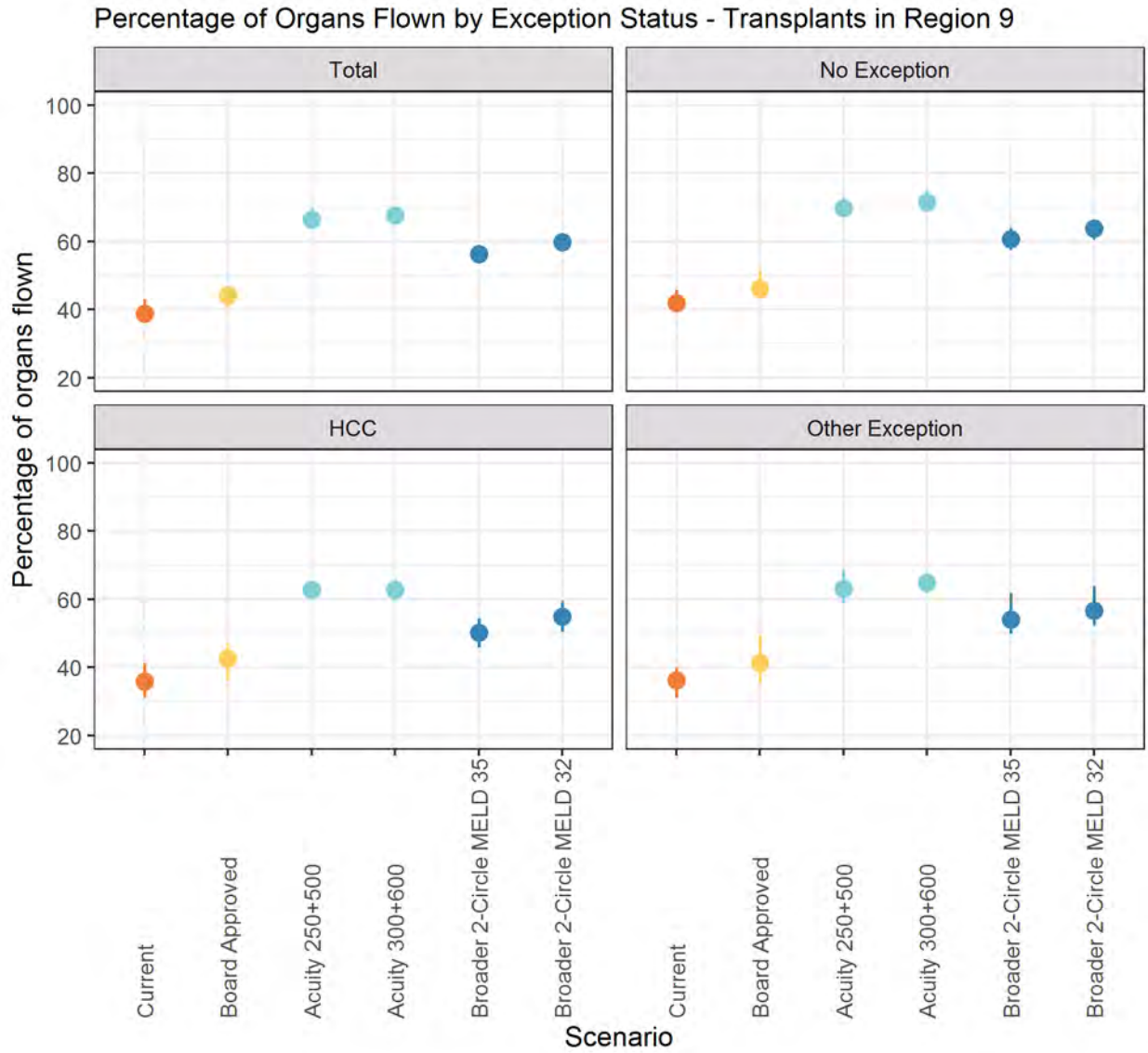


Figure 225 Percentage of Organs Flowed by Exception Status - Transplants in Region 9

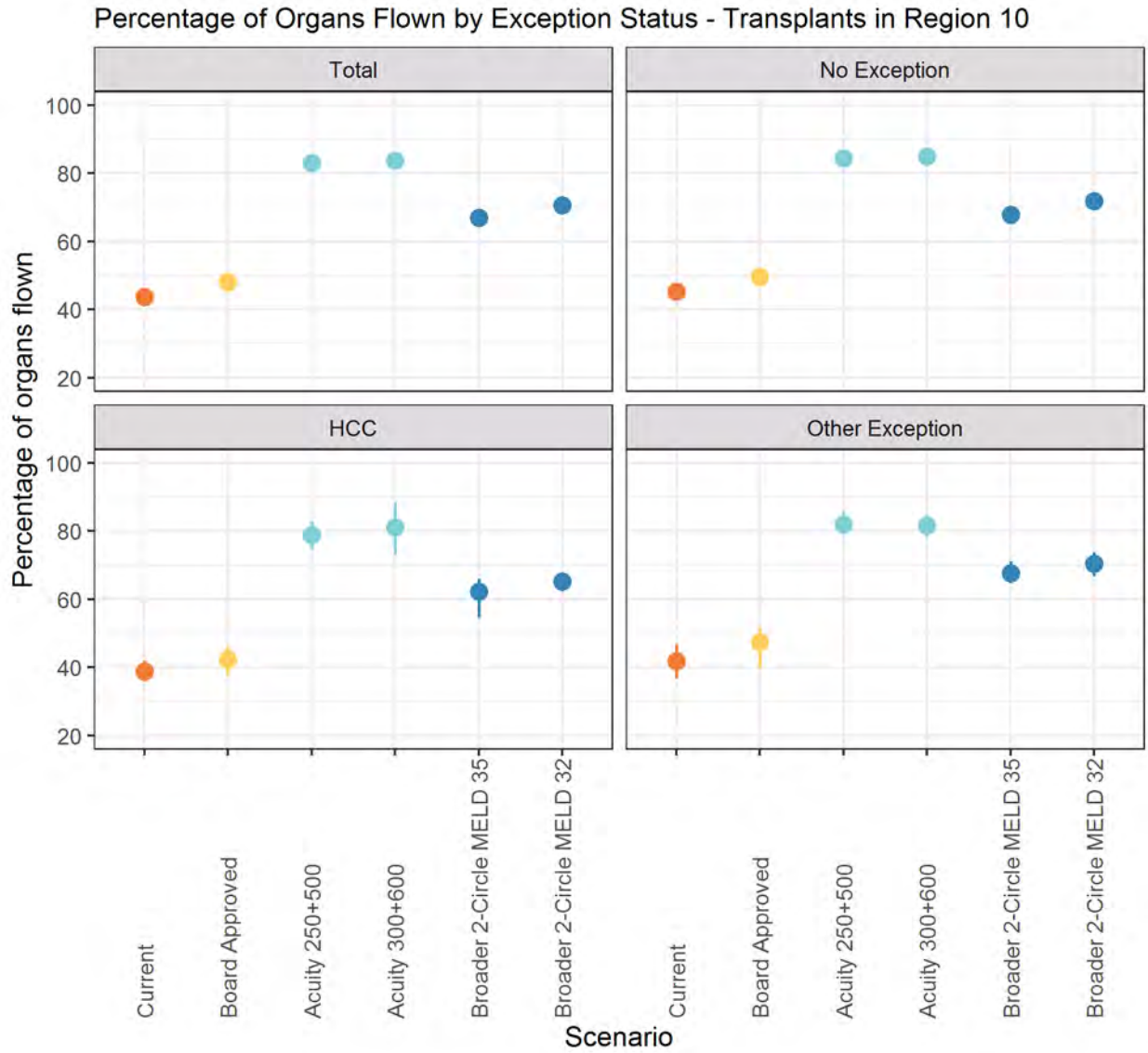


Figure 226 Percentage of Organs Flown by Exception Status - Transplants in Region 10

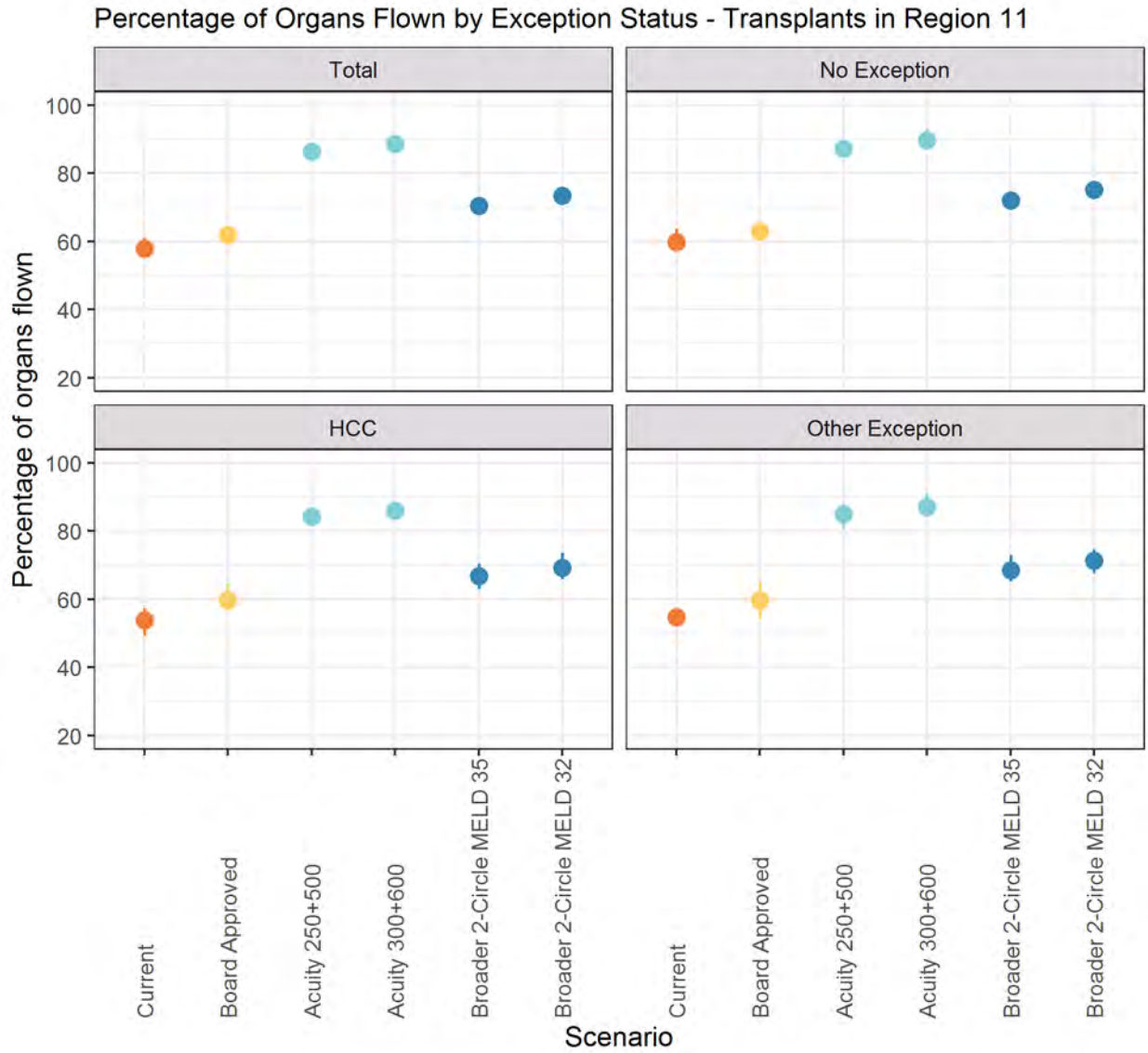


Figure 227 Percentage of Organs Flown by Exception Status - Transplants in Region 11

Percentage of Organs Flown by Allocation MELD/PELD

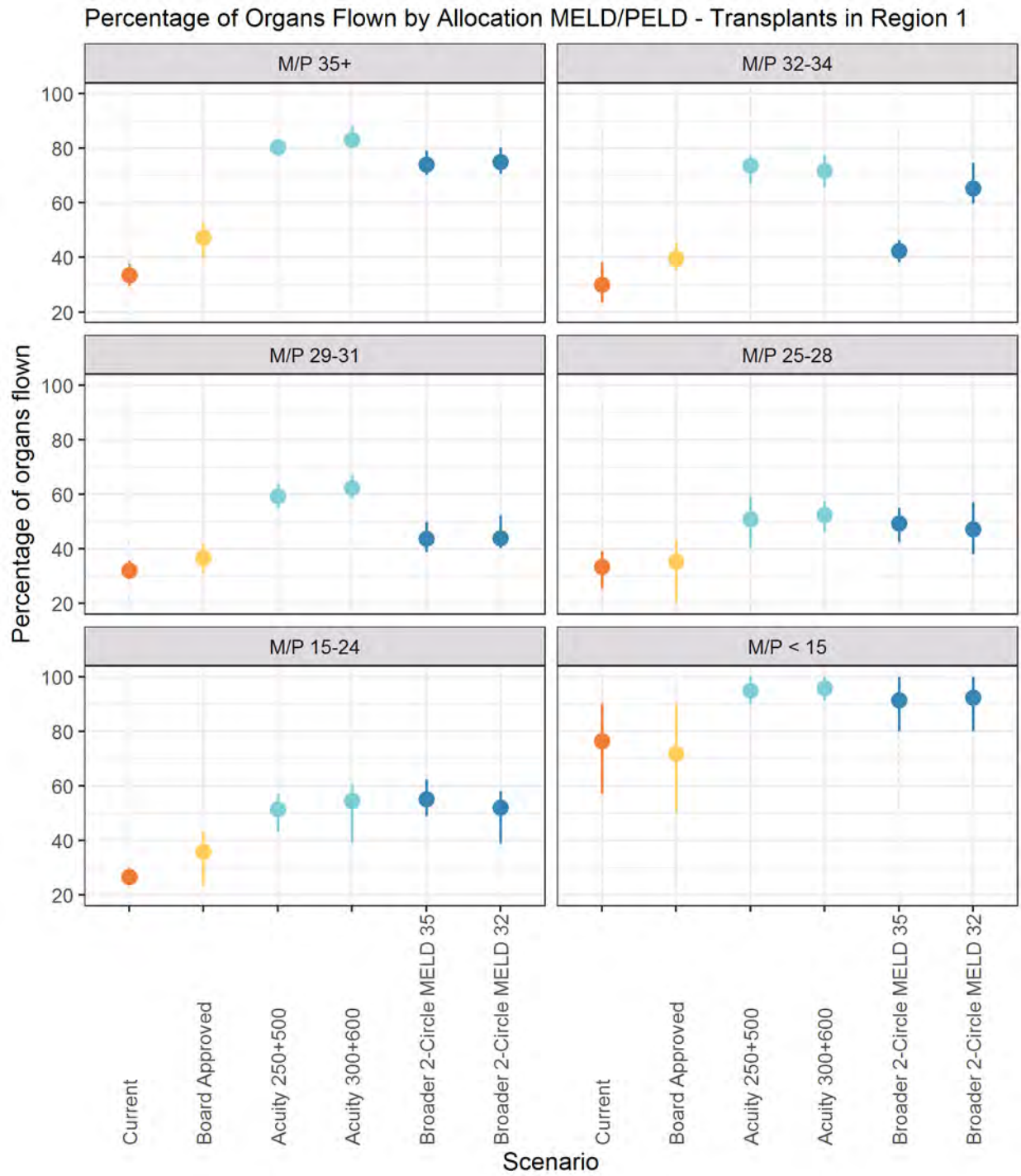


Figure 228 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 1

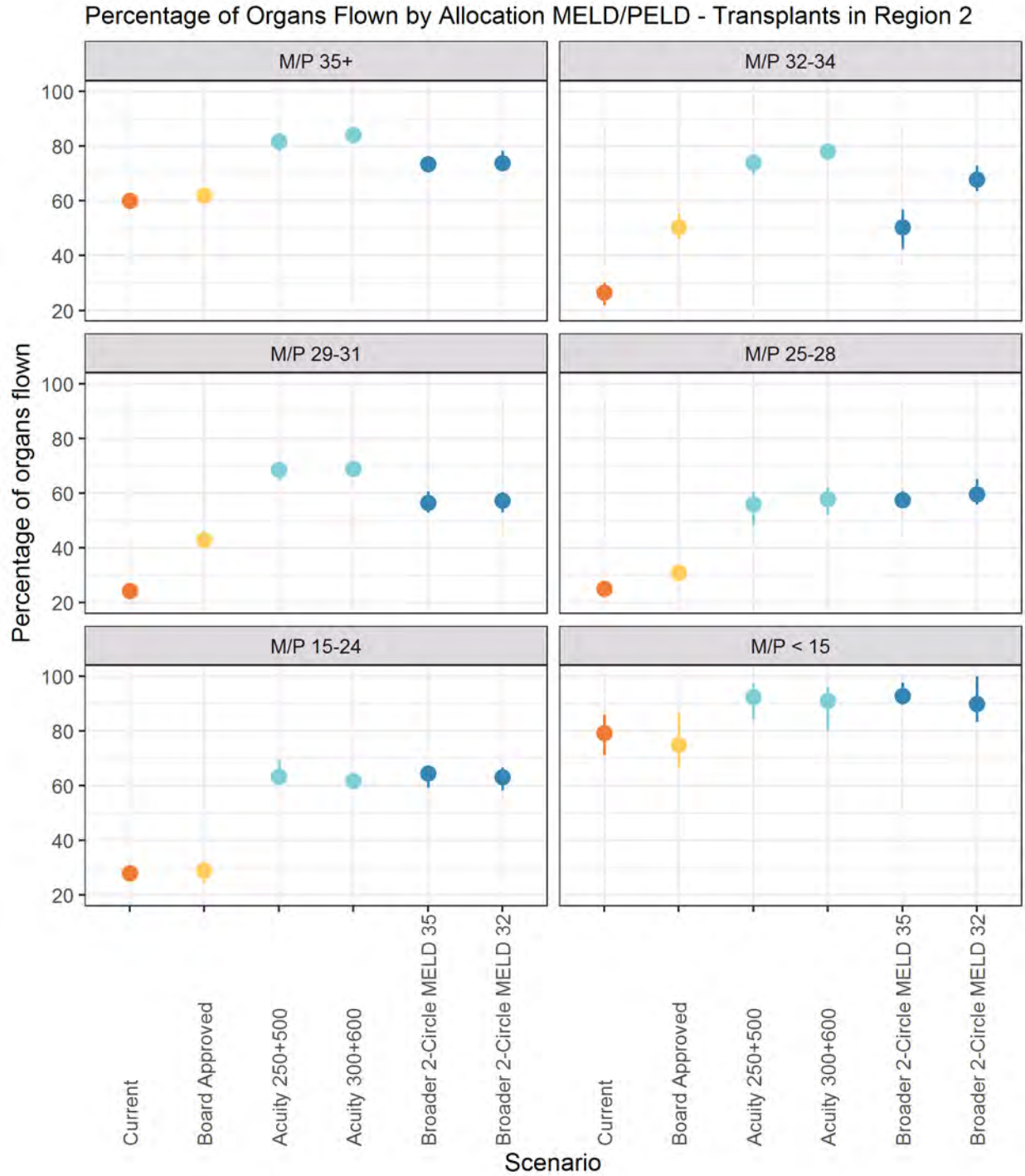


Figure 229 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 2

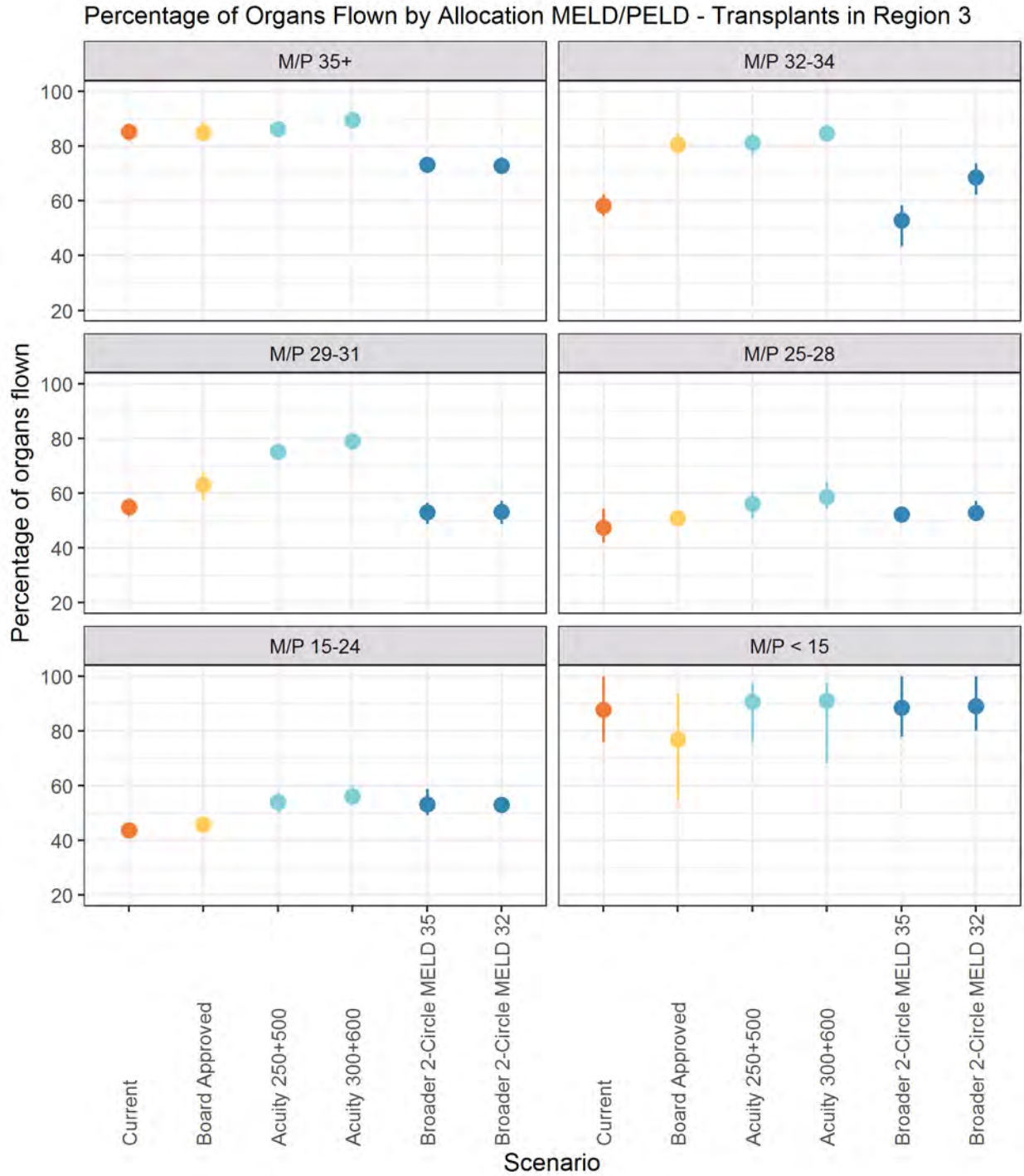


Figure 230 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 3

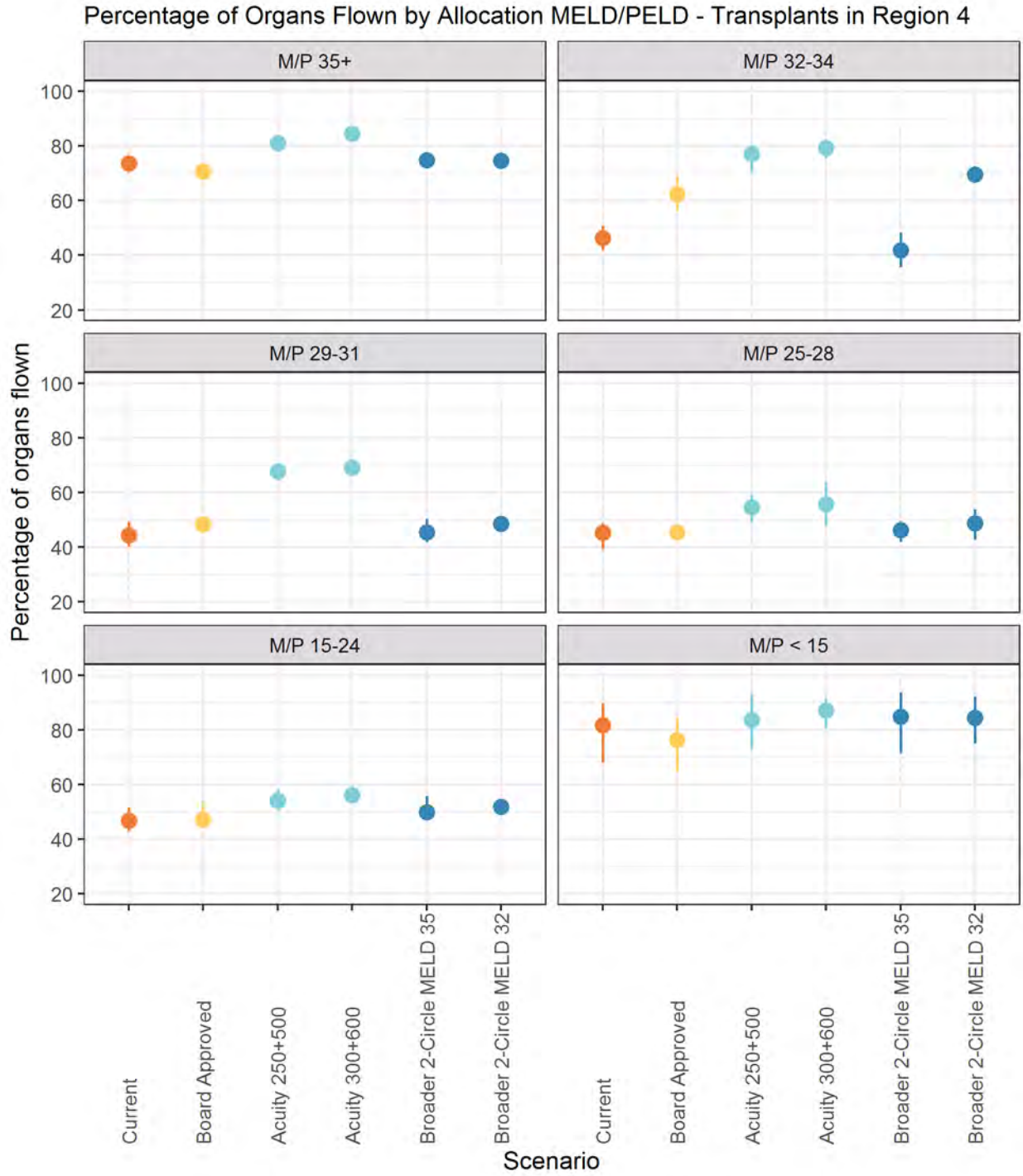


Figure 231 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 4

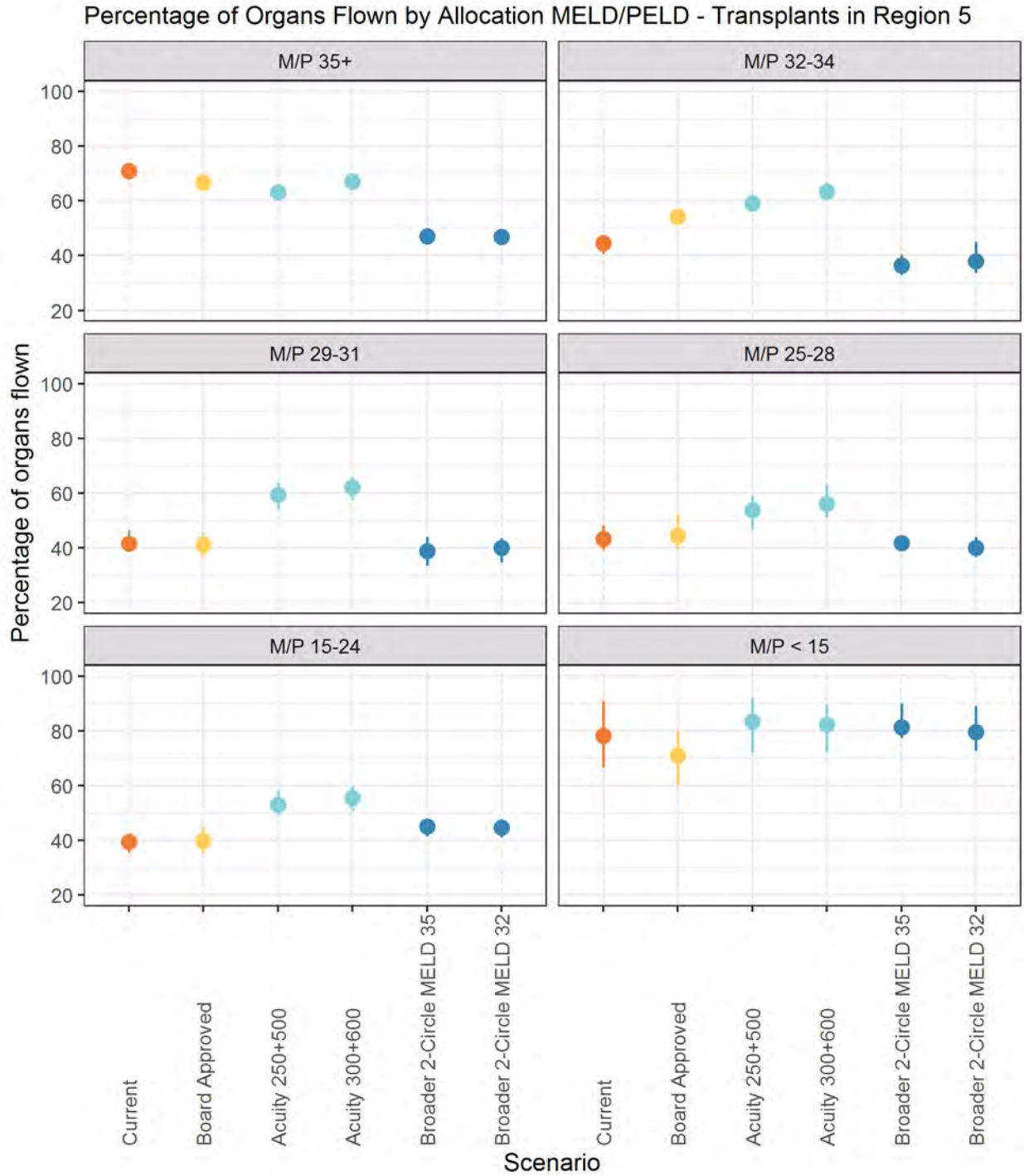


Figure 232 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 5

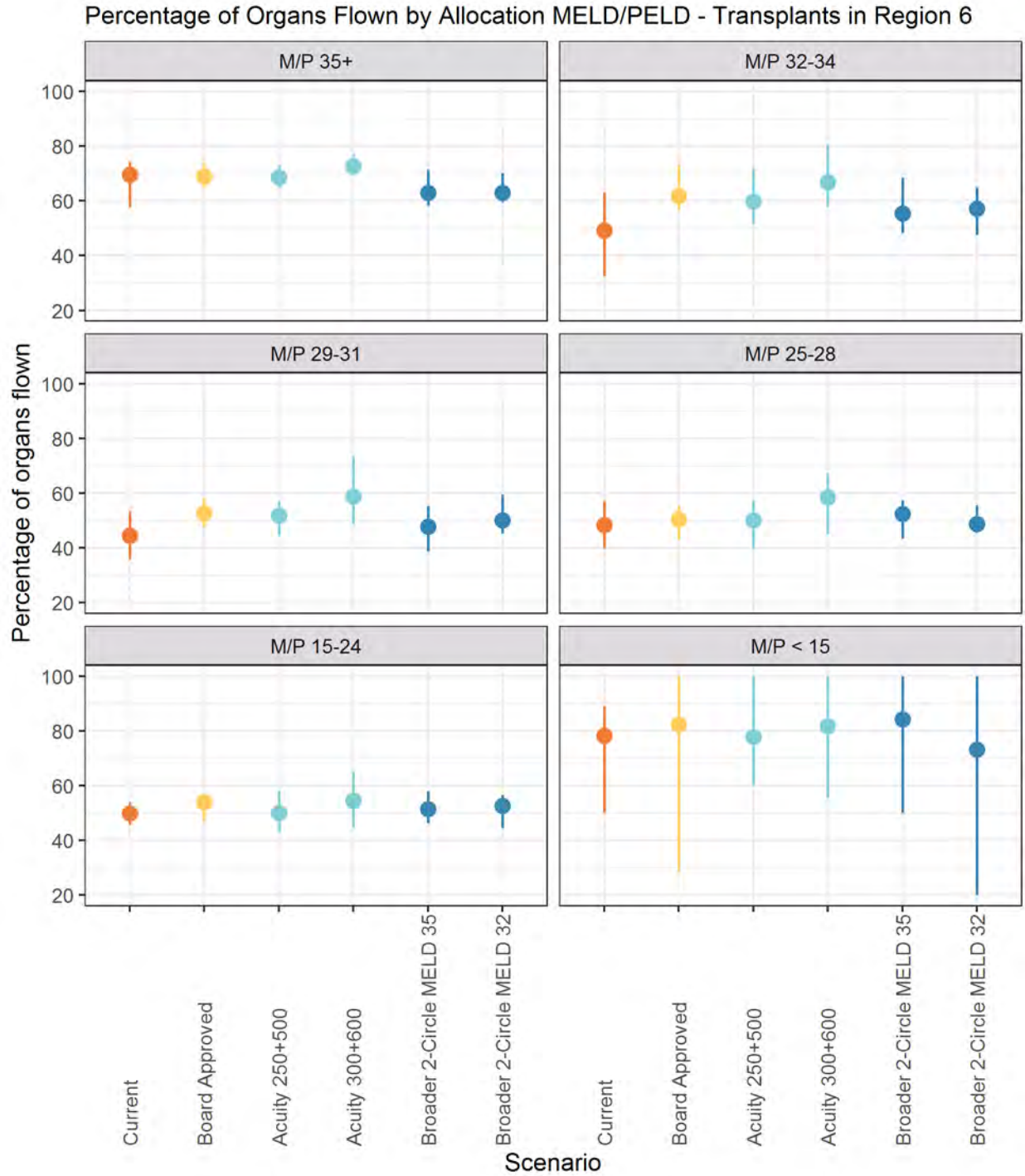


Figure 233 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 6

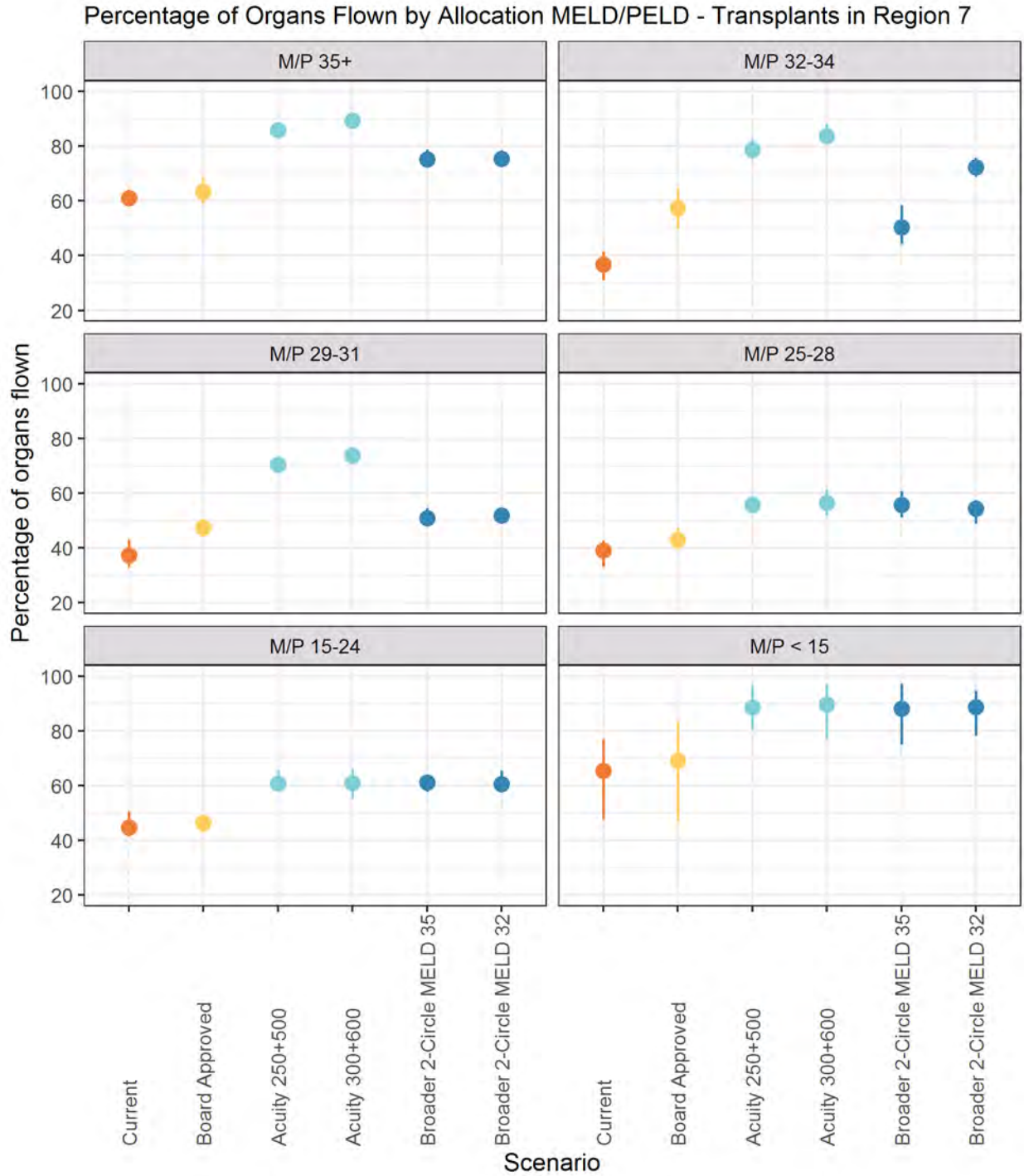


Figure 234 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 7

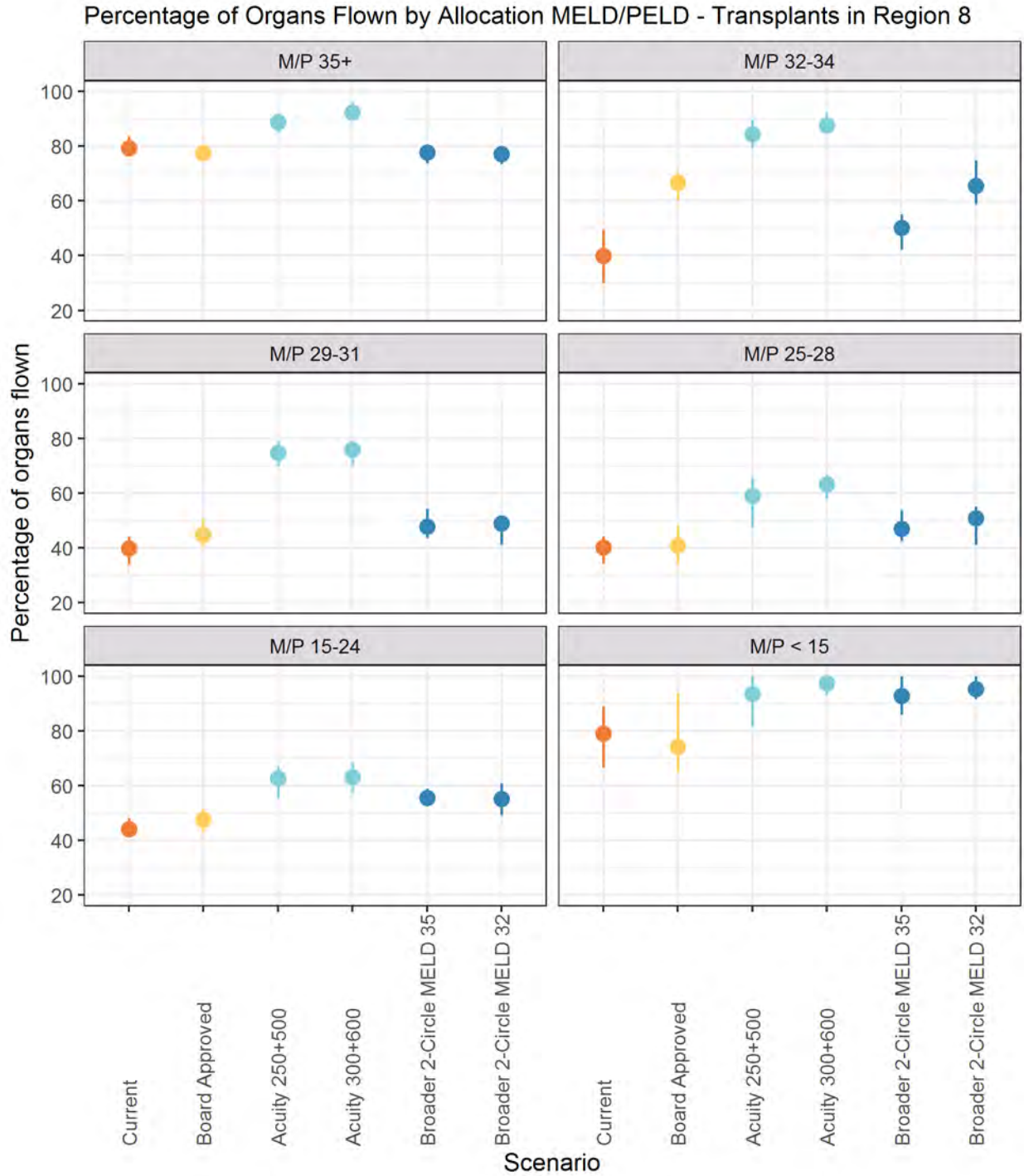


Figure 235 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 8

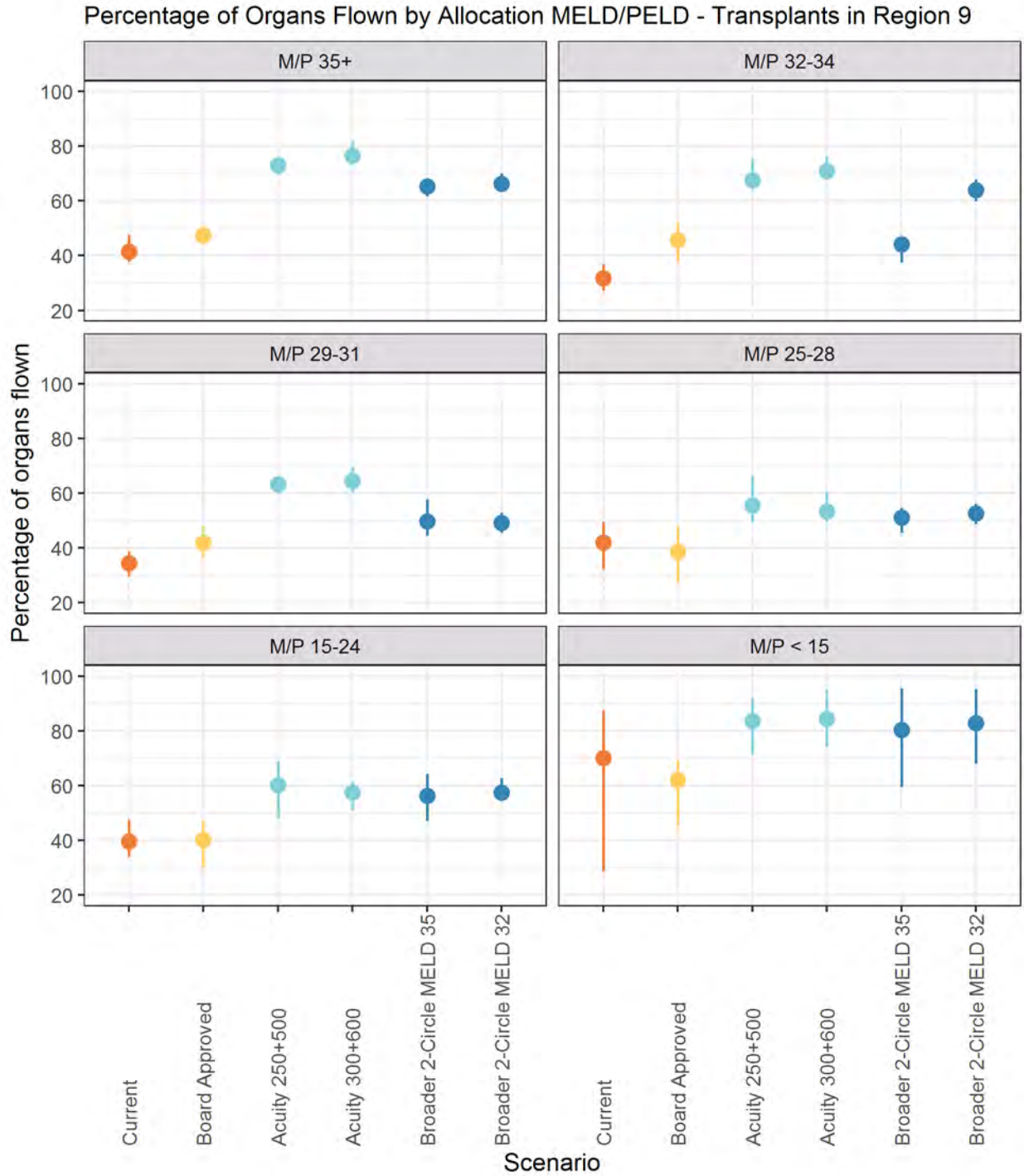


Figure 236 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 9

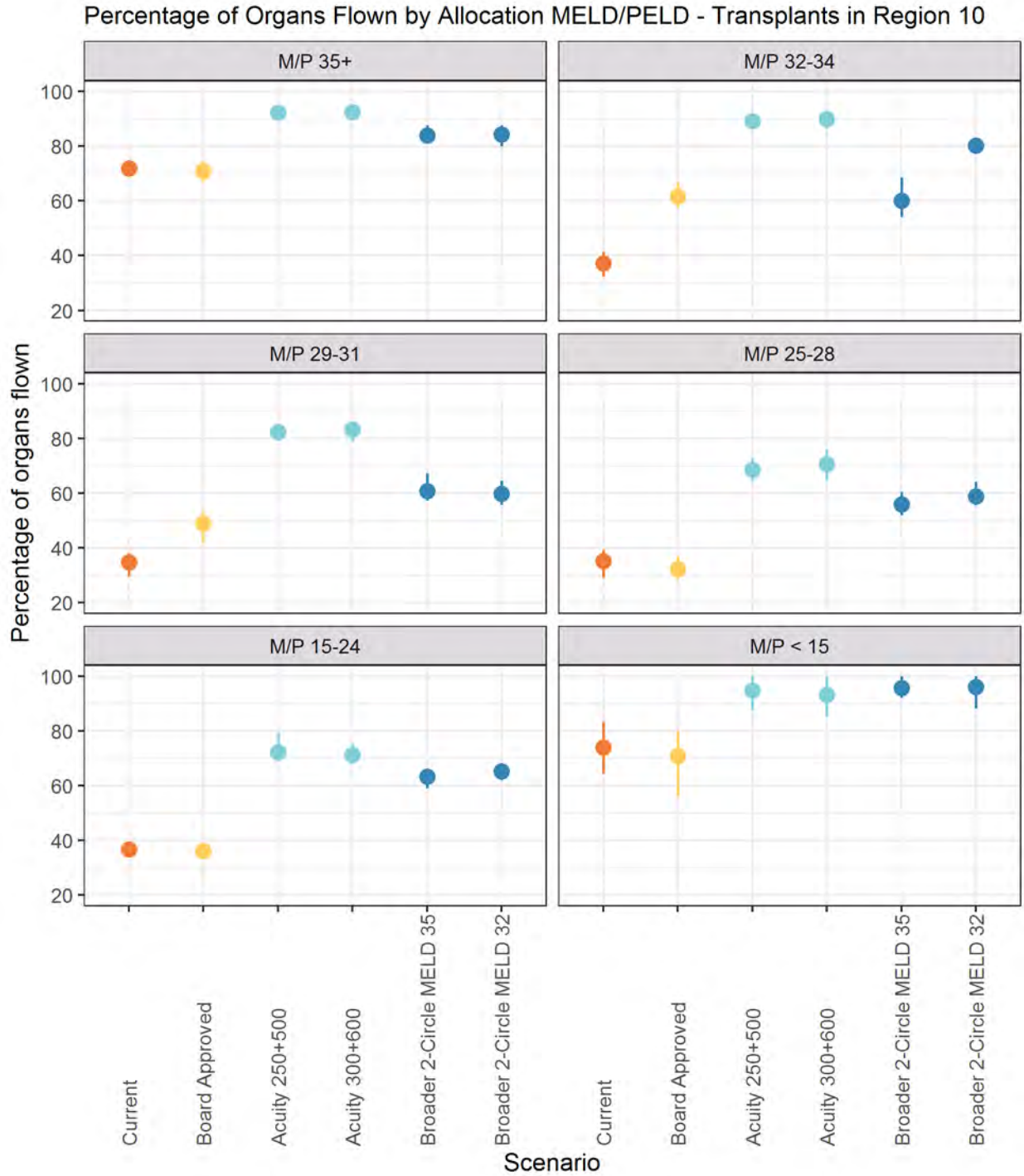


Figure 237 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 10

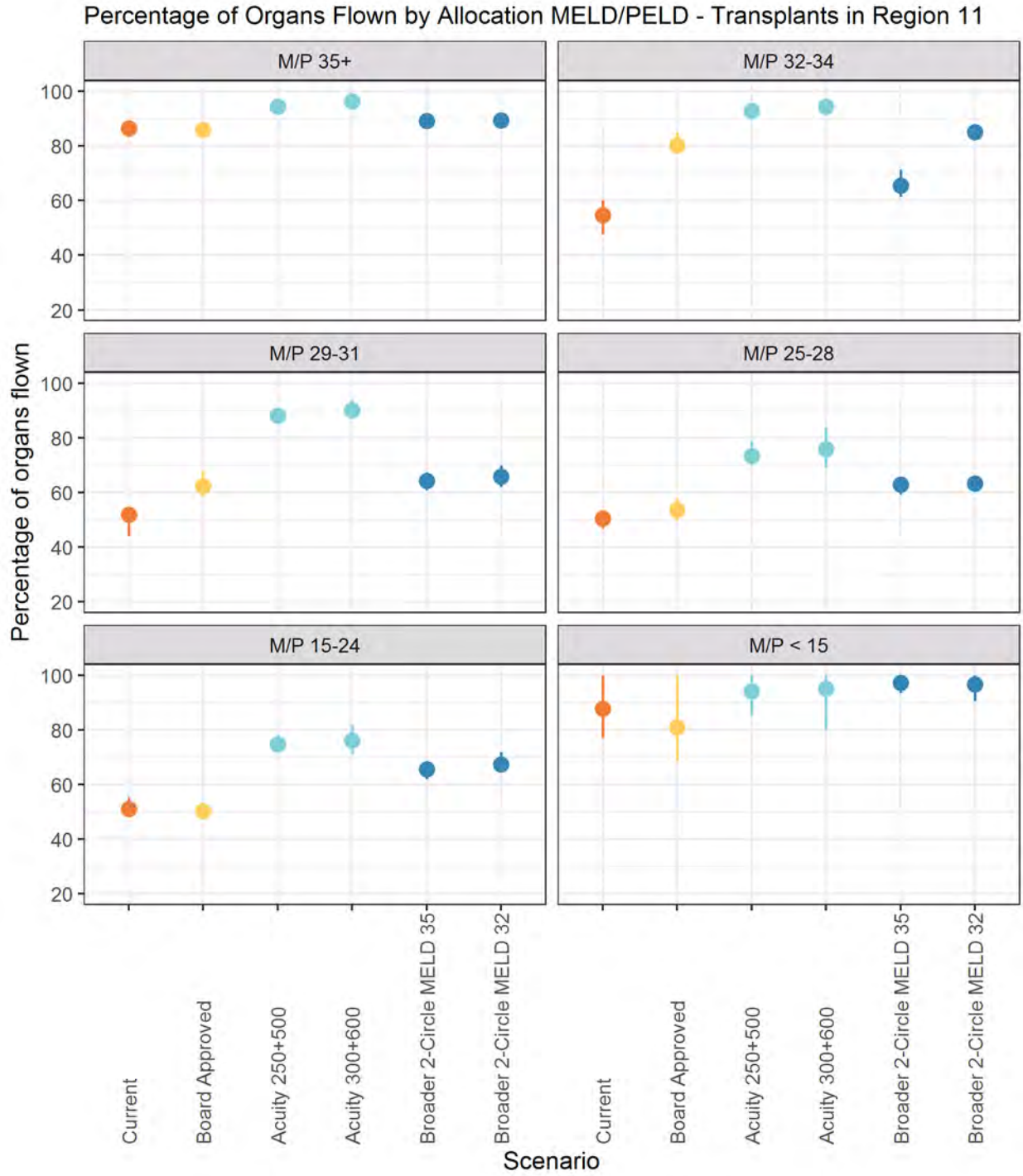


Figure 238 Percentage of Organs Flown by Allocation MELD/PELD - Transplants in Region 11

Appendix B: Results by Age, Sex, and Race/Ethnicity

Allocation MELD/PELD at Transplant

Variance in Median Allocation MELD/PELD at Transplant

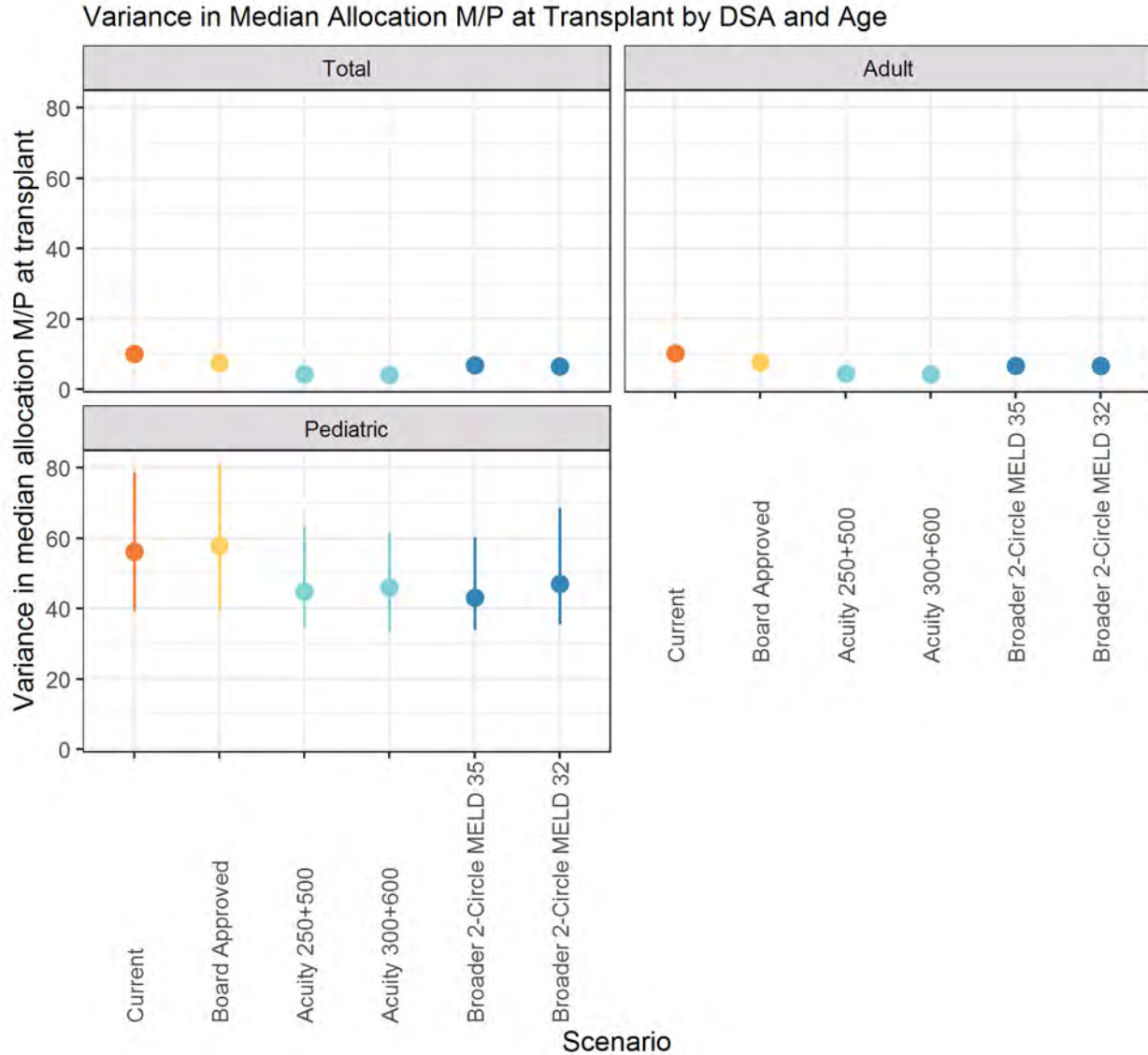


Figure 239 Variance in Median Allocation M/P at Transplant by DSA and Age

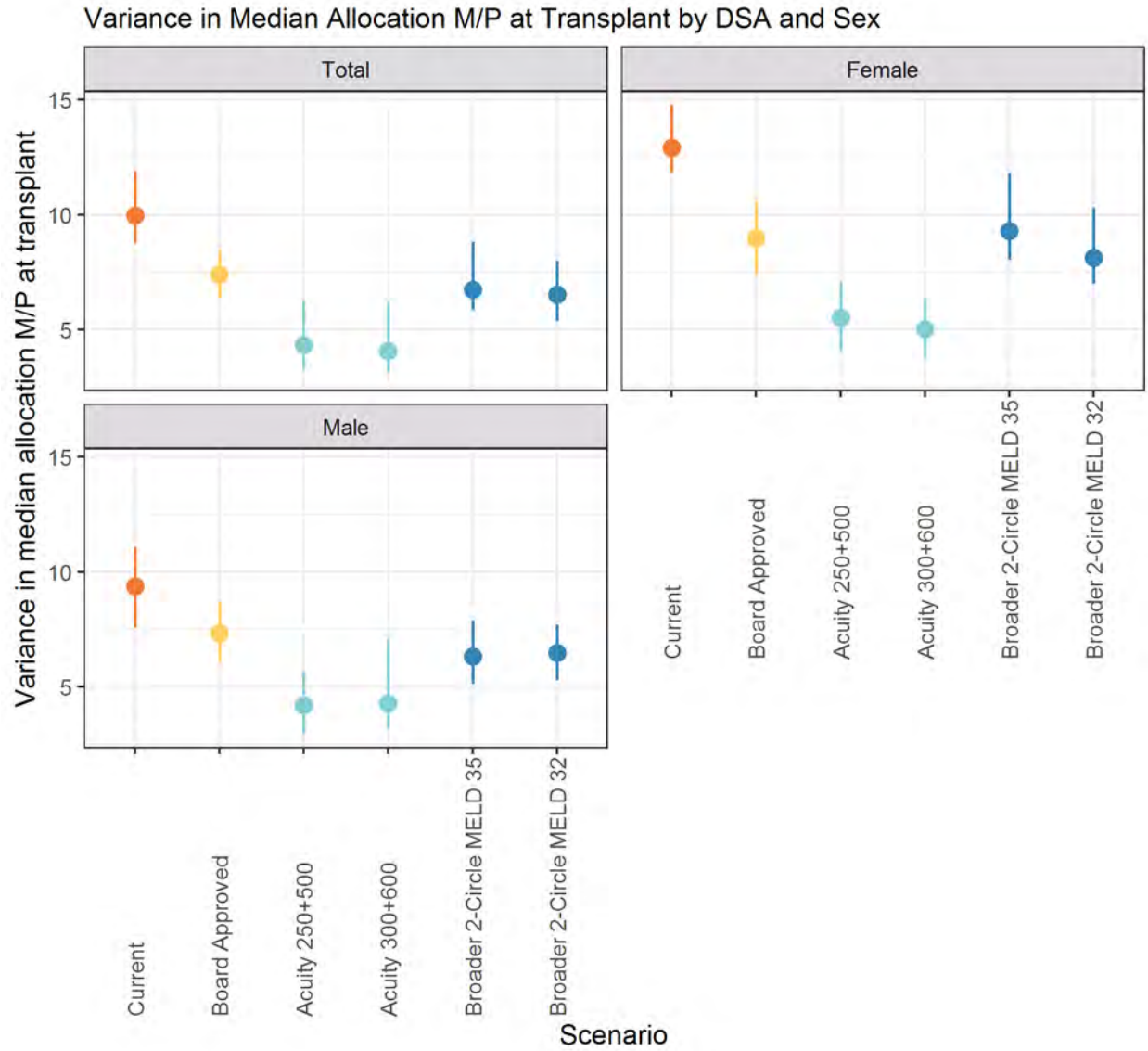


Figure 240 Variance in Median Allocation M/P at Transplant by DSA and Sex

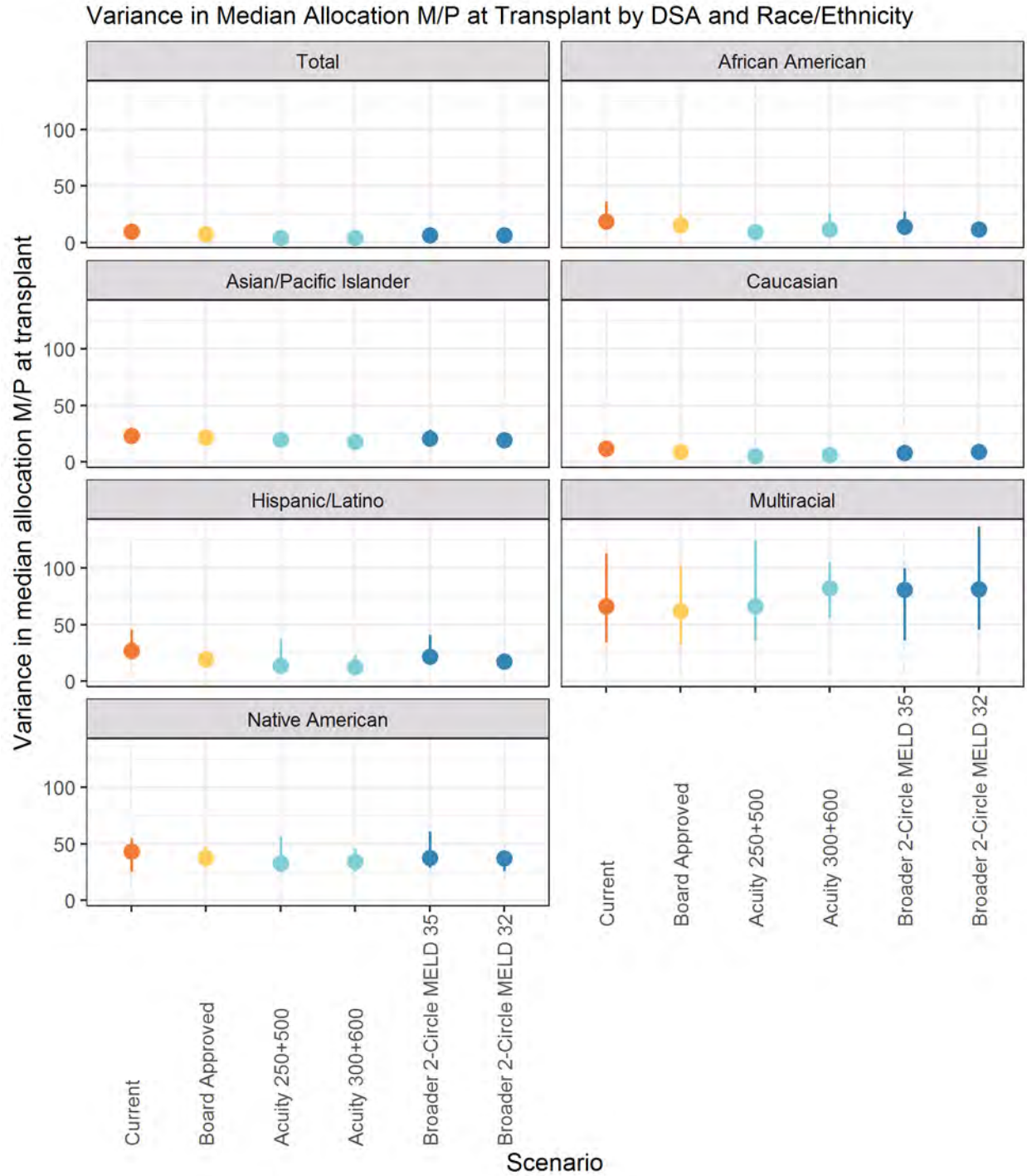


Figure 241 Variance in Median Allocation M/P at Transplant by DSA and Race/Ethnicity

Median Allocation MELD/PELD at Transplant

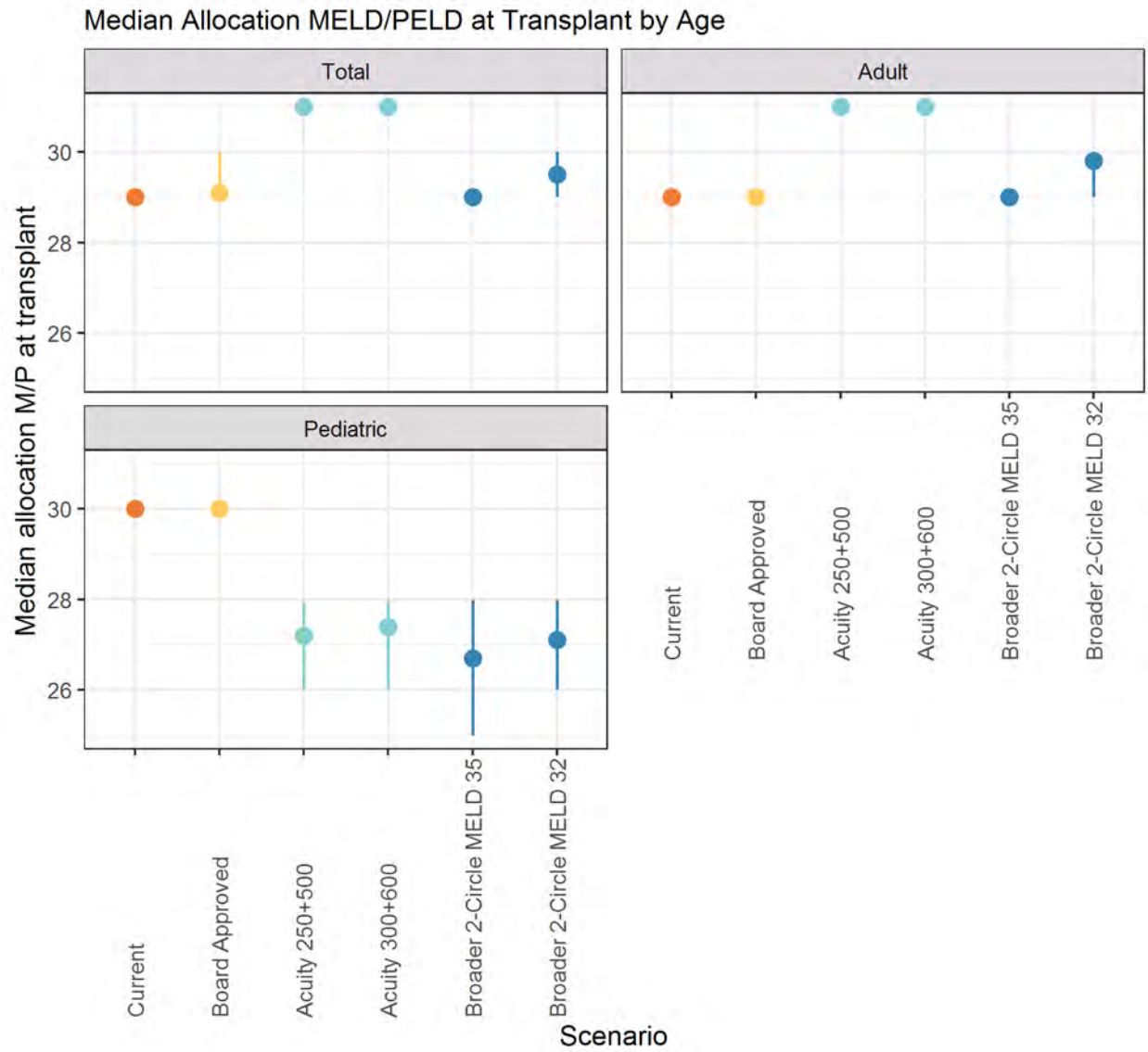


Figure 242 Median Allocation MELD/PELD at Transplant by Age

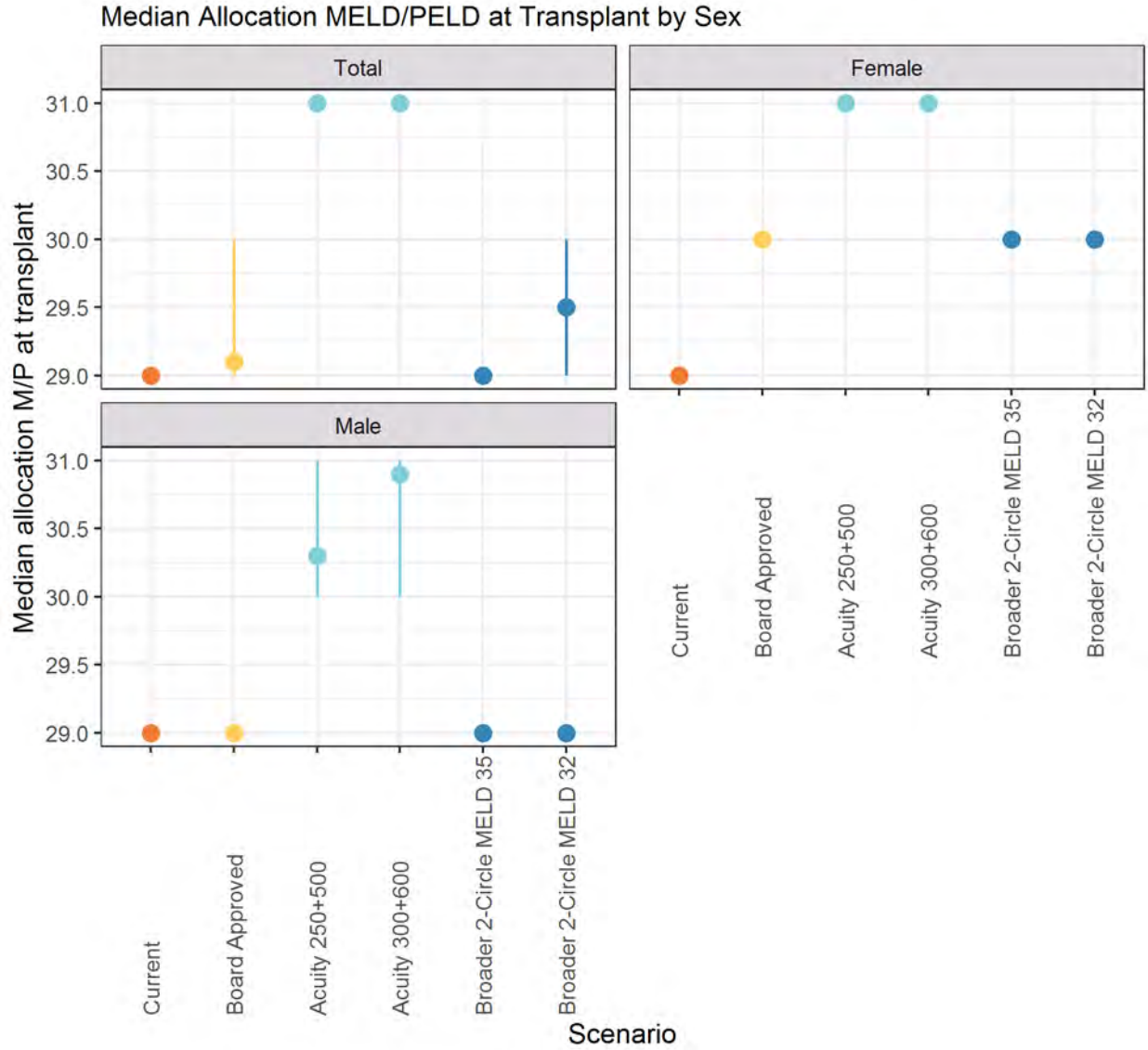


Figure 243 Median Allocation MELD/PELD at Transplant by Sex

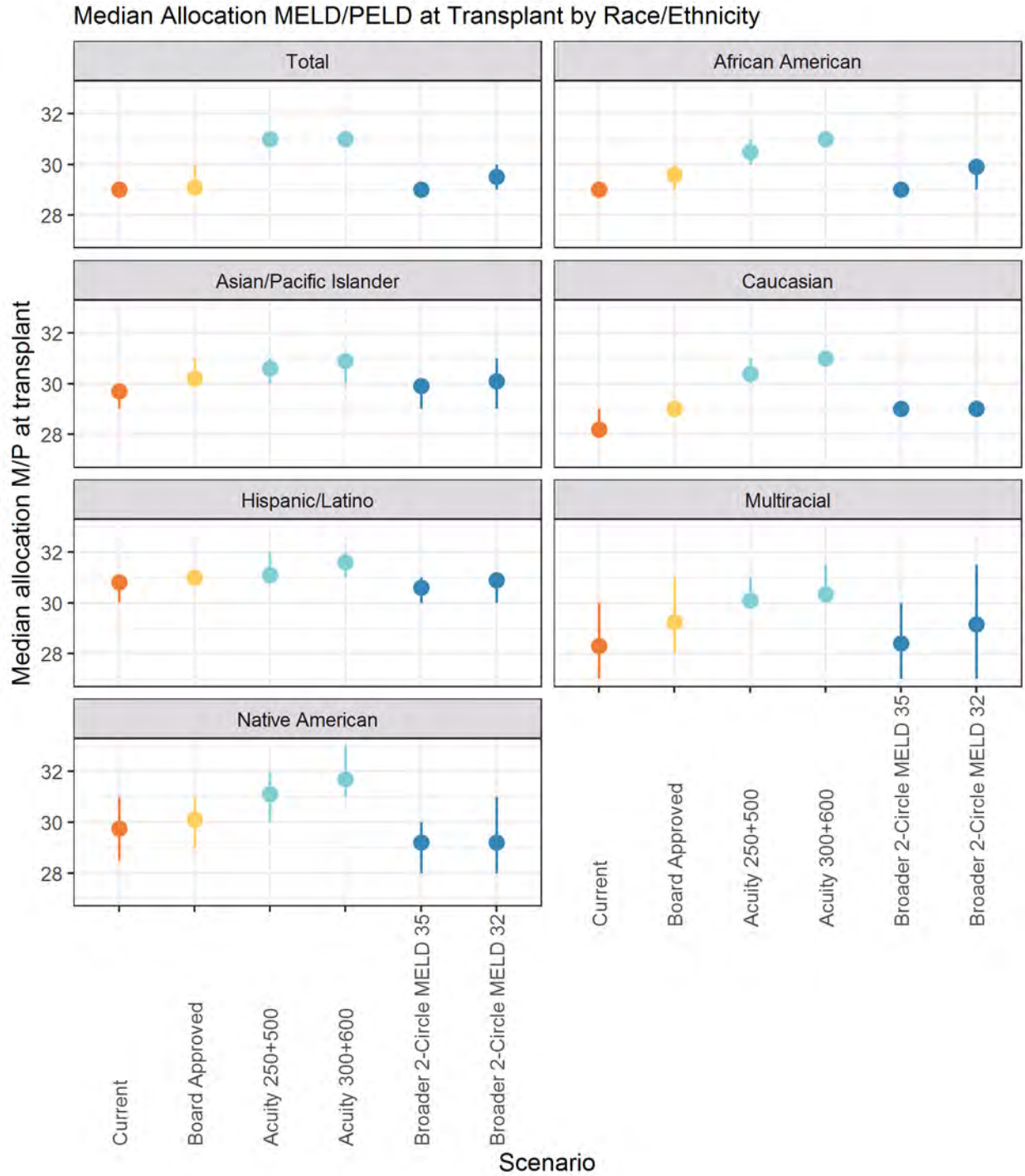


Figure 244 Median Allocation MELD/PELD at Transplant by Race/Ethnicity

Transplant

Transplant Rates

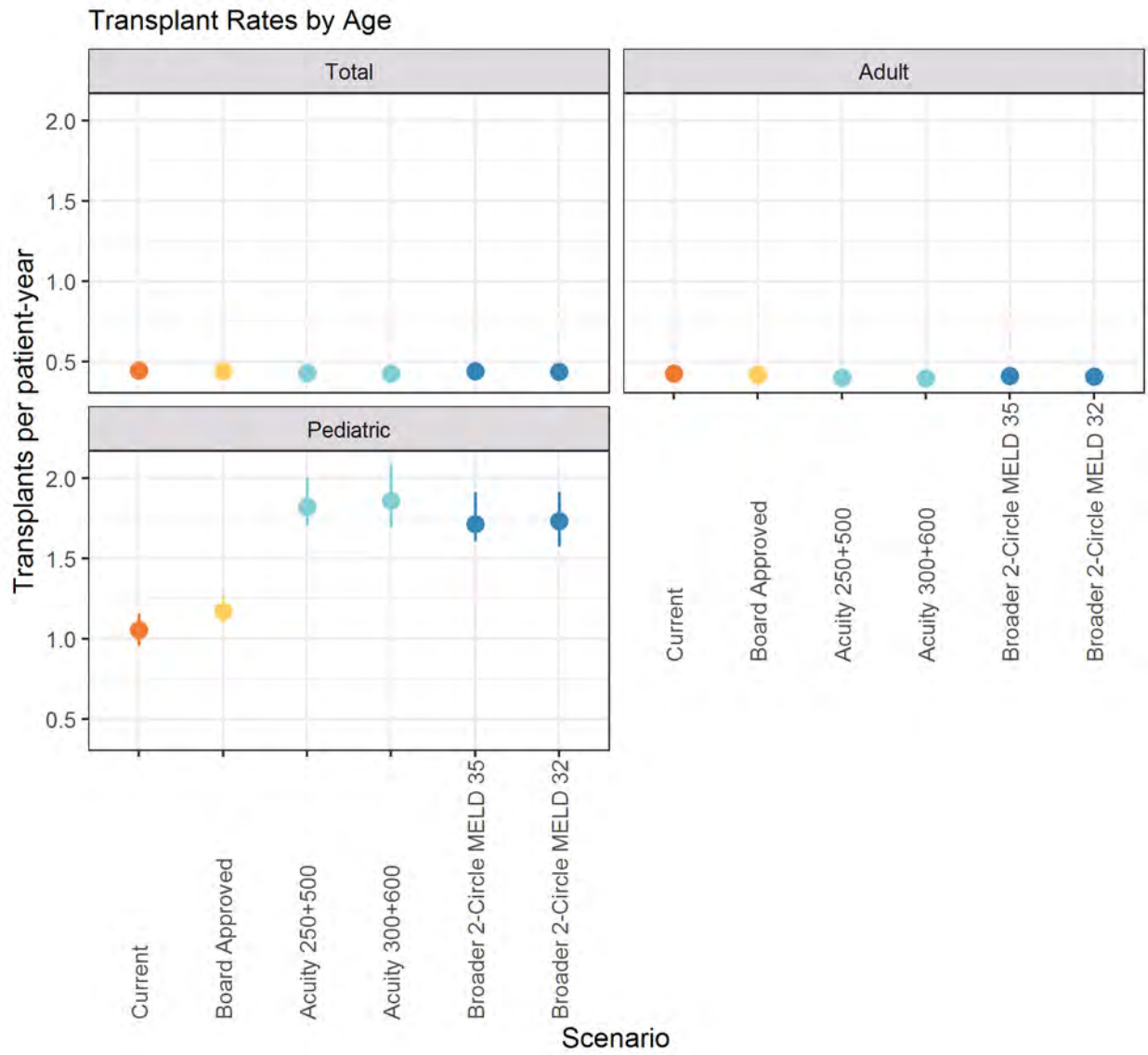


Figure 245 Transplant Rates by Age

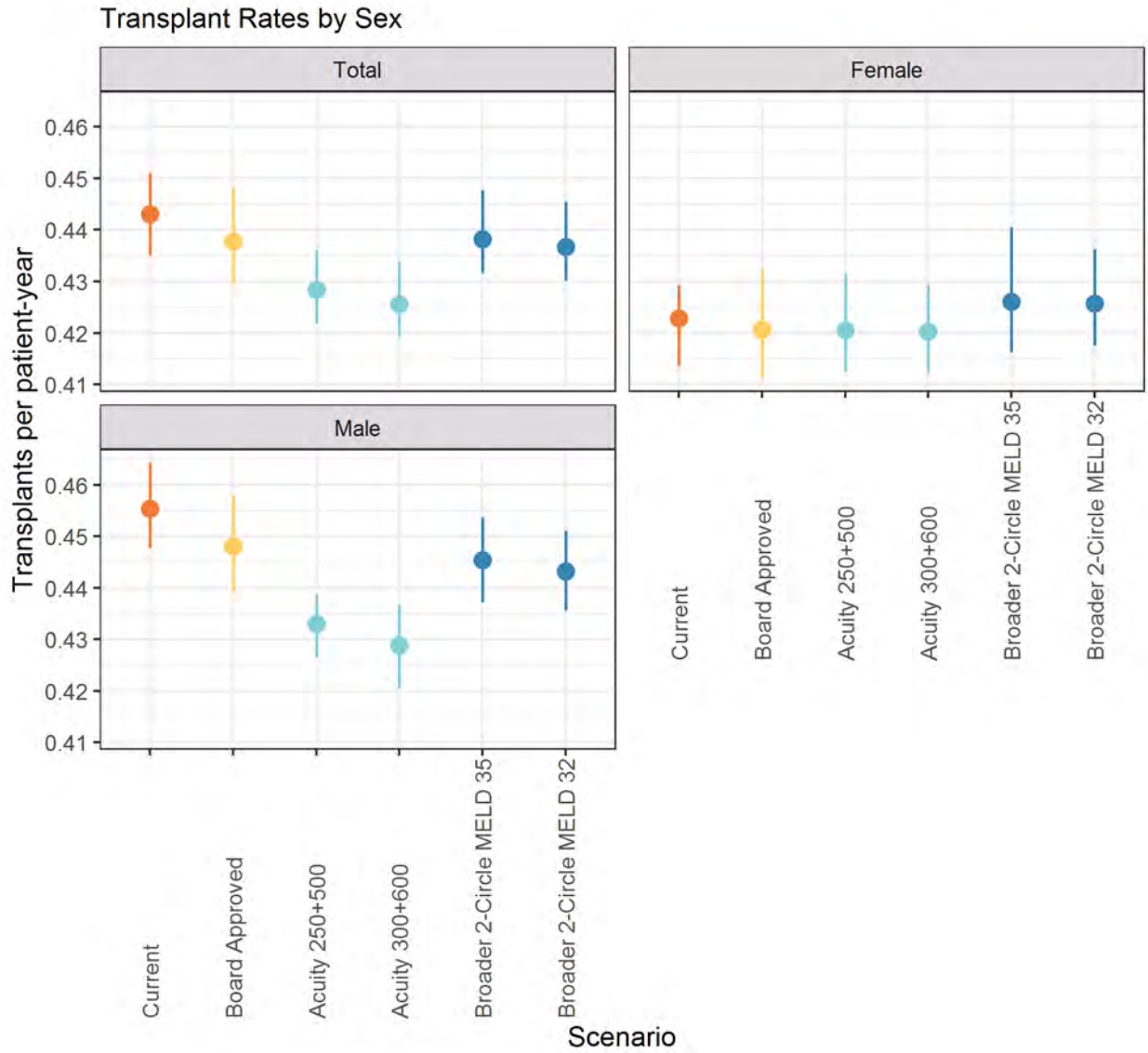


Figure 246 Transplant Rates by Sex

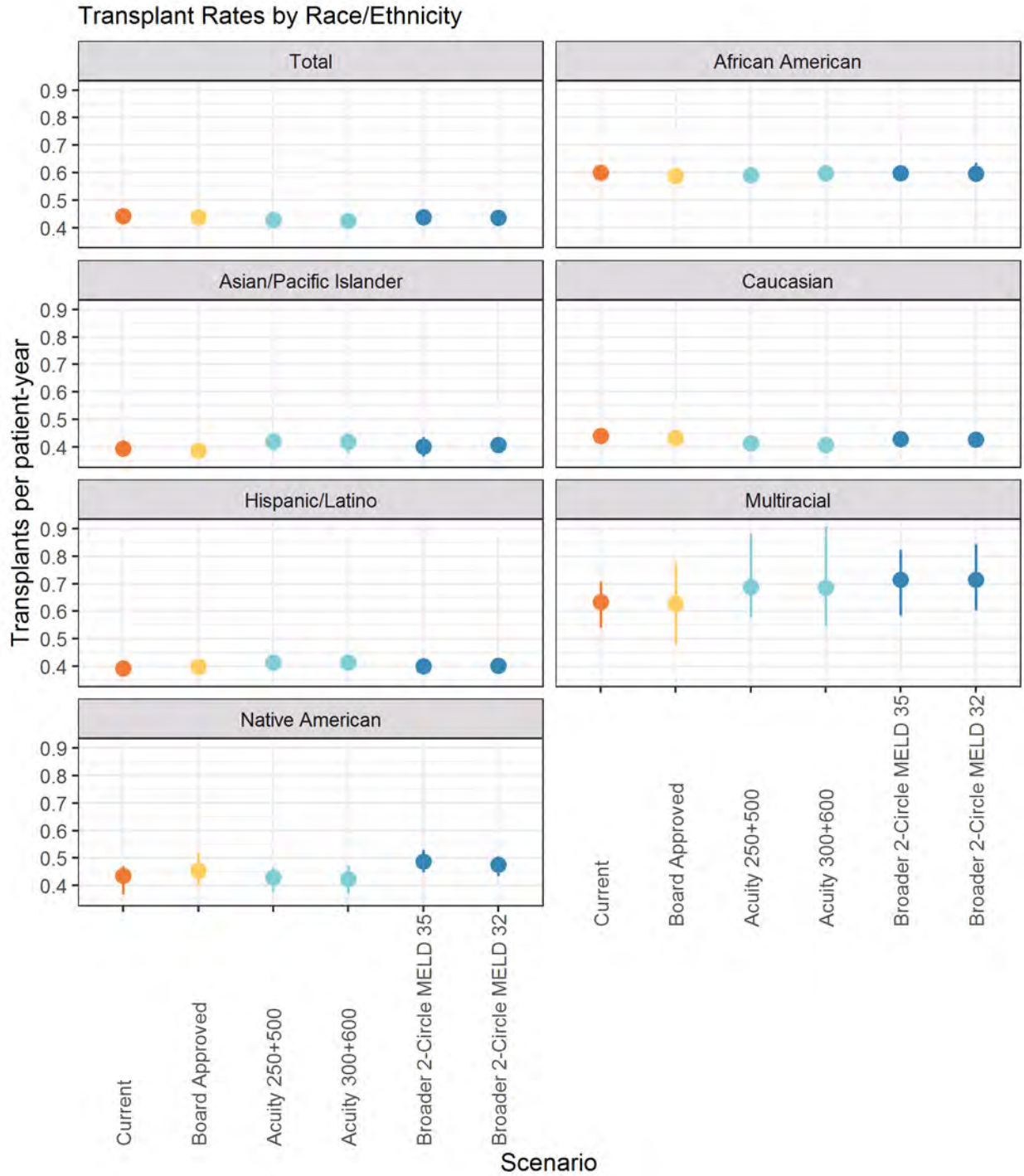


Figure 247 Transplant Rates by Race/Ethnicity

Transplant Counts

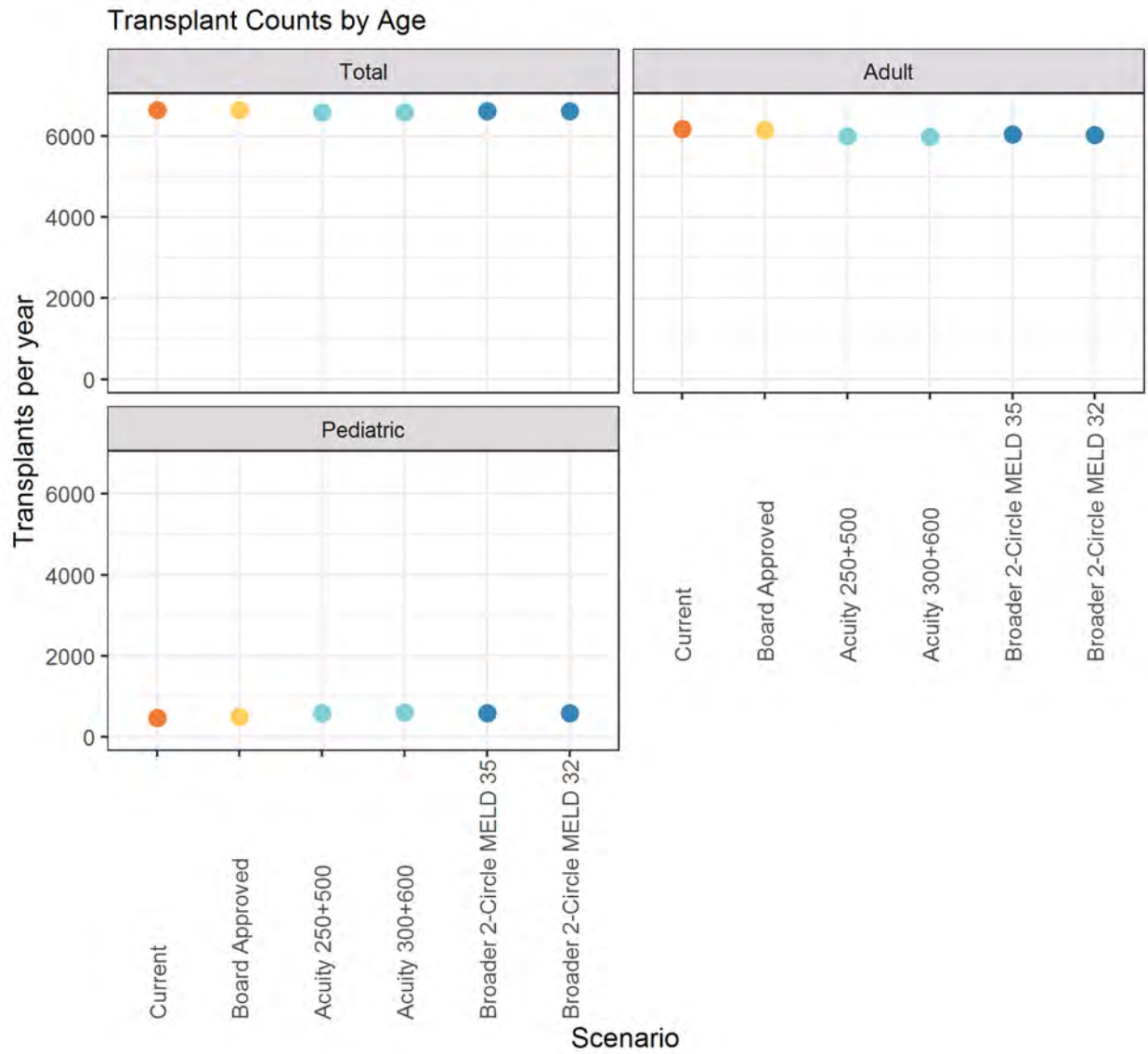


Figure 248 Transplant Counts by Age

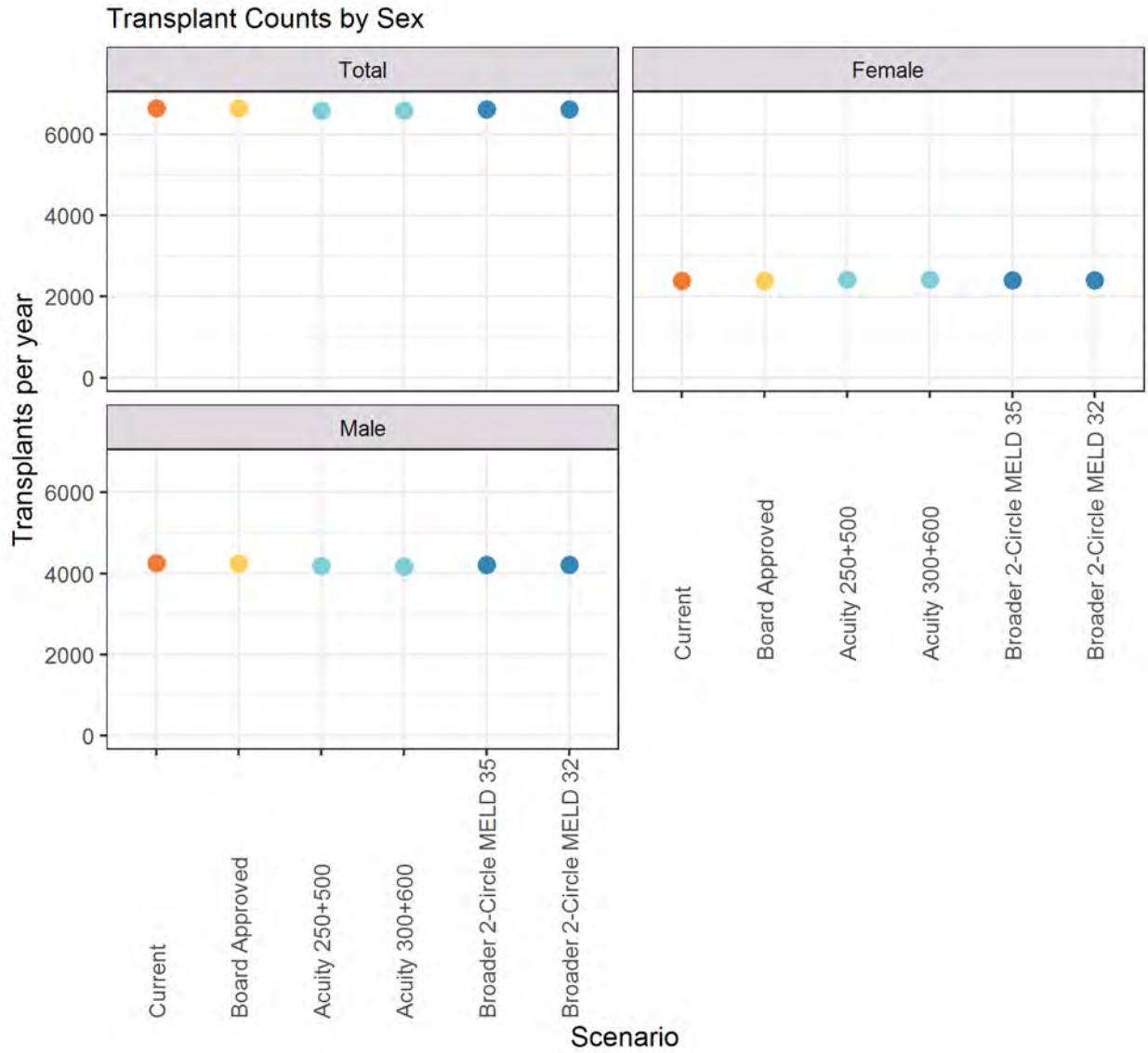


Figure 249 Transplant Counts by Sex

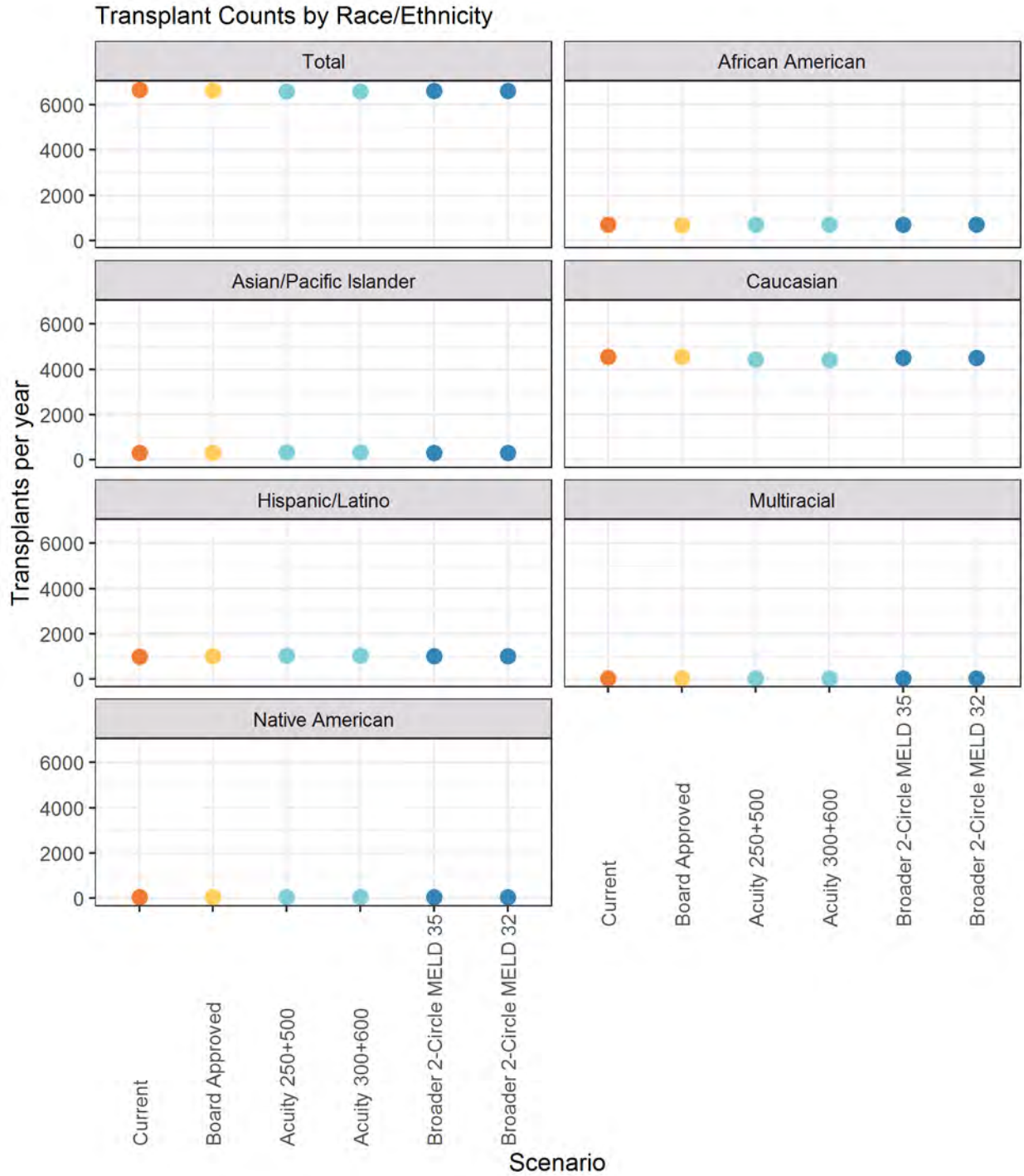


Figure 250 Transplant Counts by Race/Ethnicity

Variance in Transplant Rates

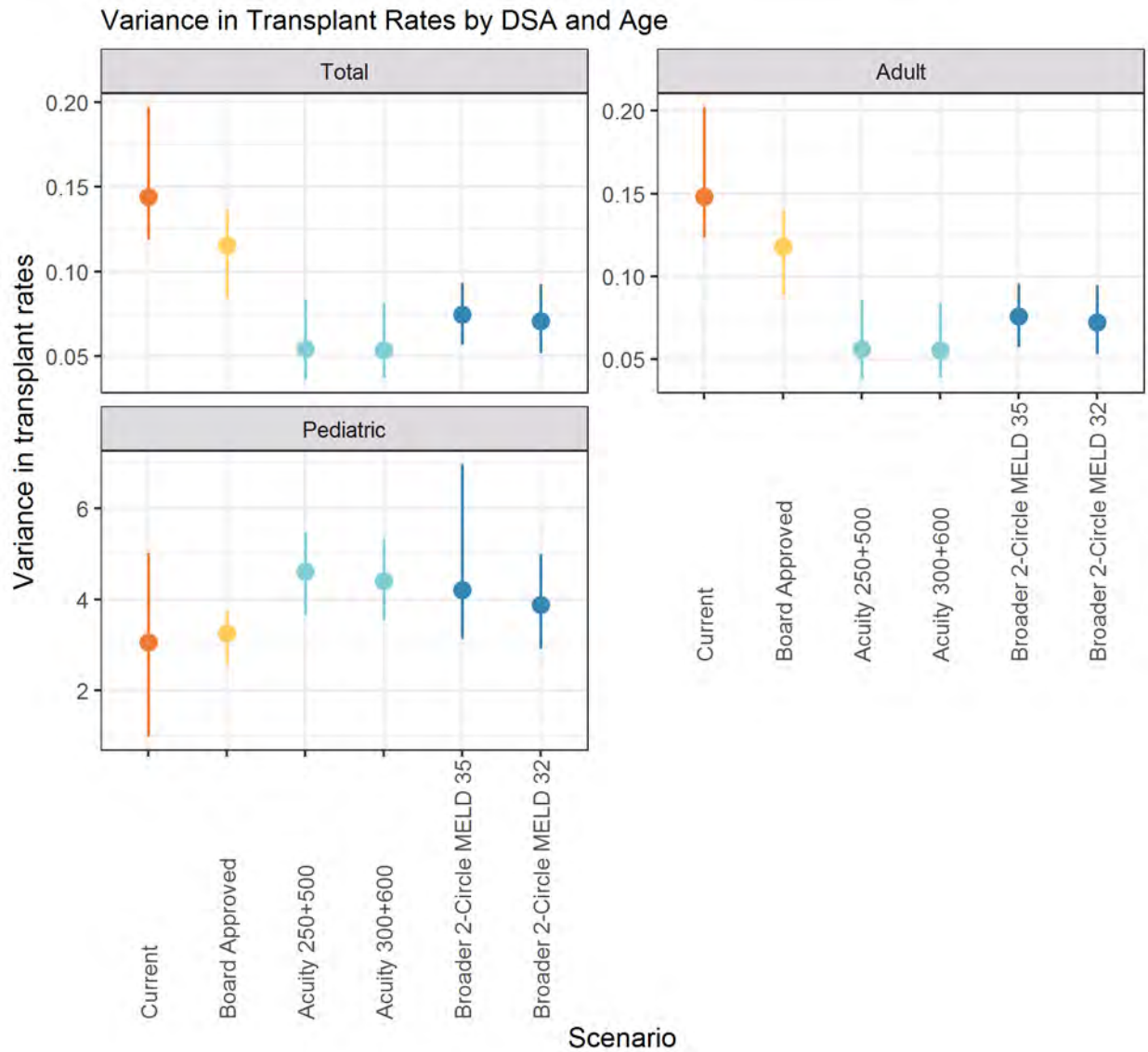


Figure 251 Variance in Transplant Rates by DSA and Age. Transplant rates were capped at the 99th percentile of all DSA and Age groups (14.6 transplants per patient-year) before calculating the variance.

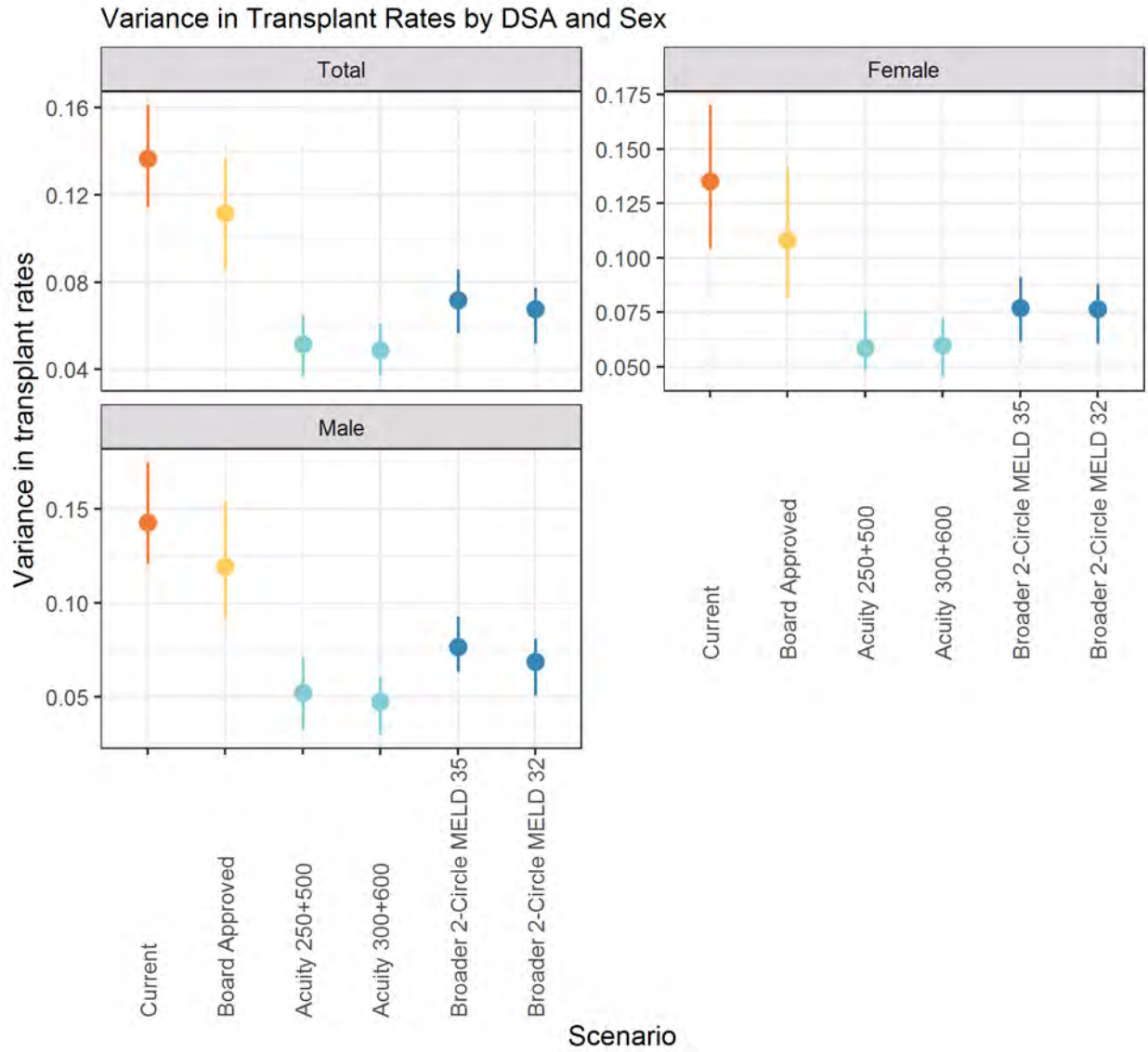


Figure 252 Variance in Transplant Rates by DSA and Sex. Transplant rates were capped at the 99th percentile of all DSA and Sex groups (1.7 transplants per patient-year) before calculating the variance.

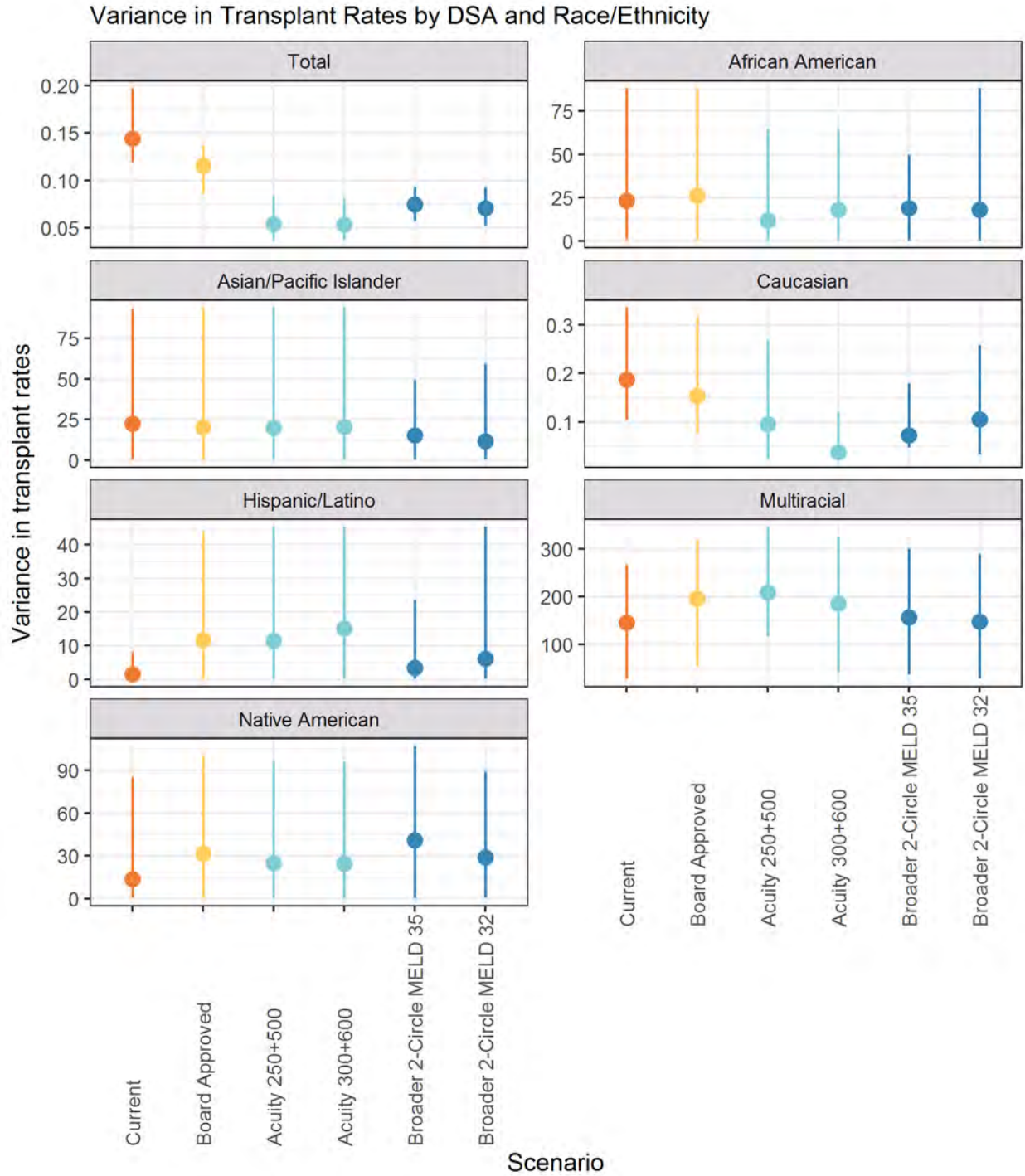


Figure 253 Variance in Transplant Rates by DSA and Race/Ethnicity. Transplant rates were capped at the 99th percentile of all DSA and Race/Ethnicity groups (59.8 transplants per patient-year) before calculating the variance.

Waitlist Mortality

Waitlist Mortality Rates

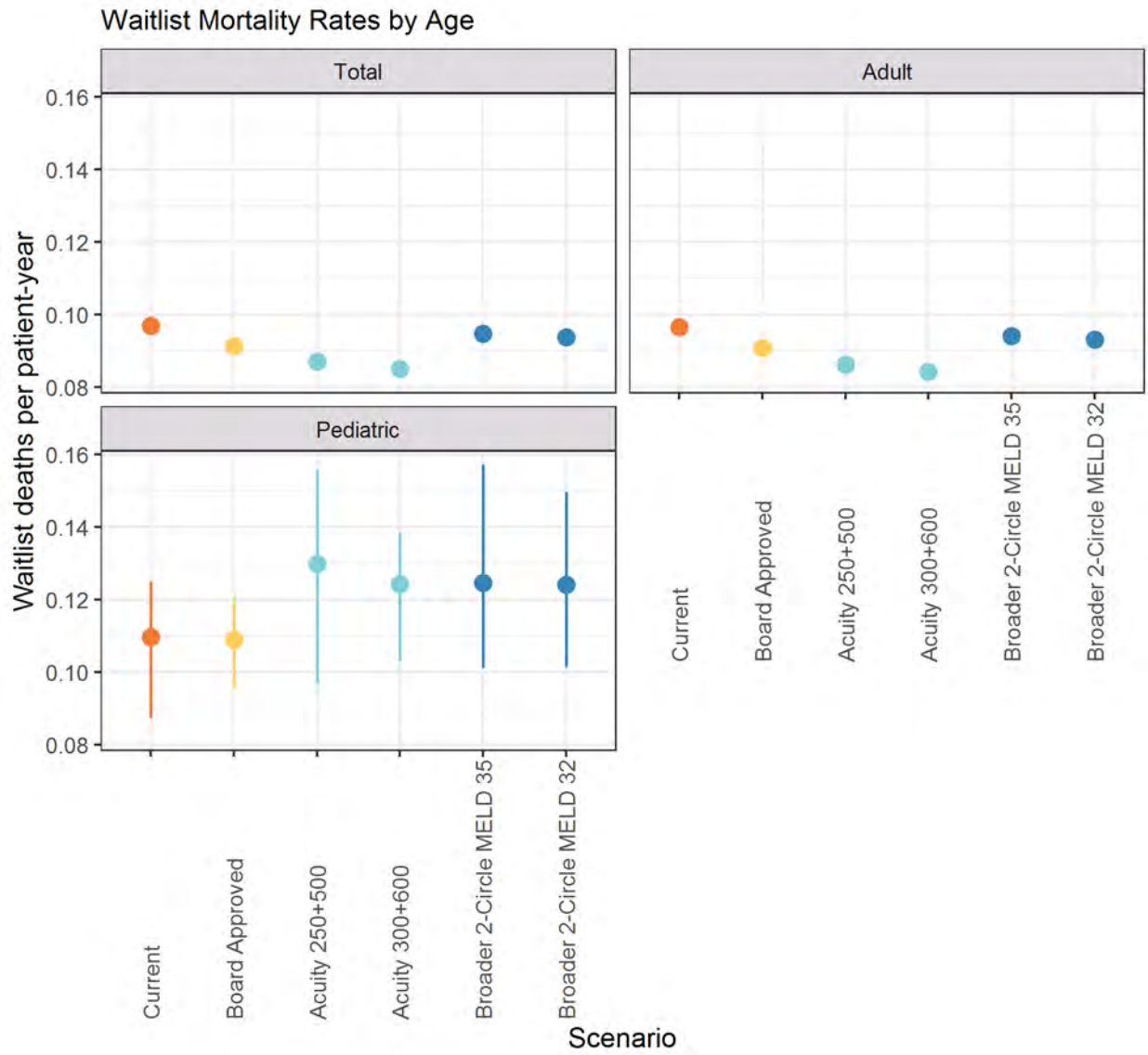


Figure 254 Waitlist Mortality Rates by Age

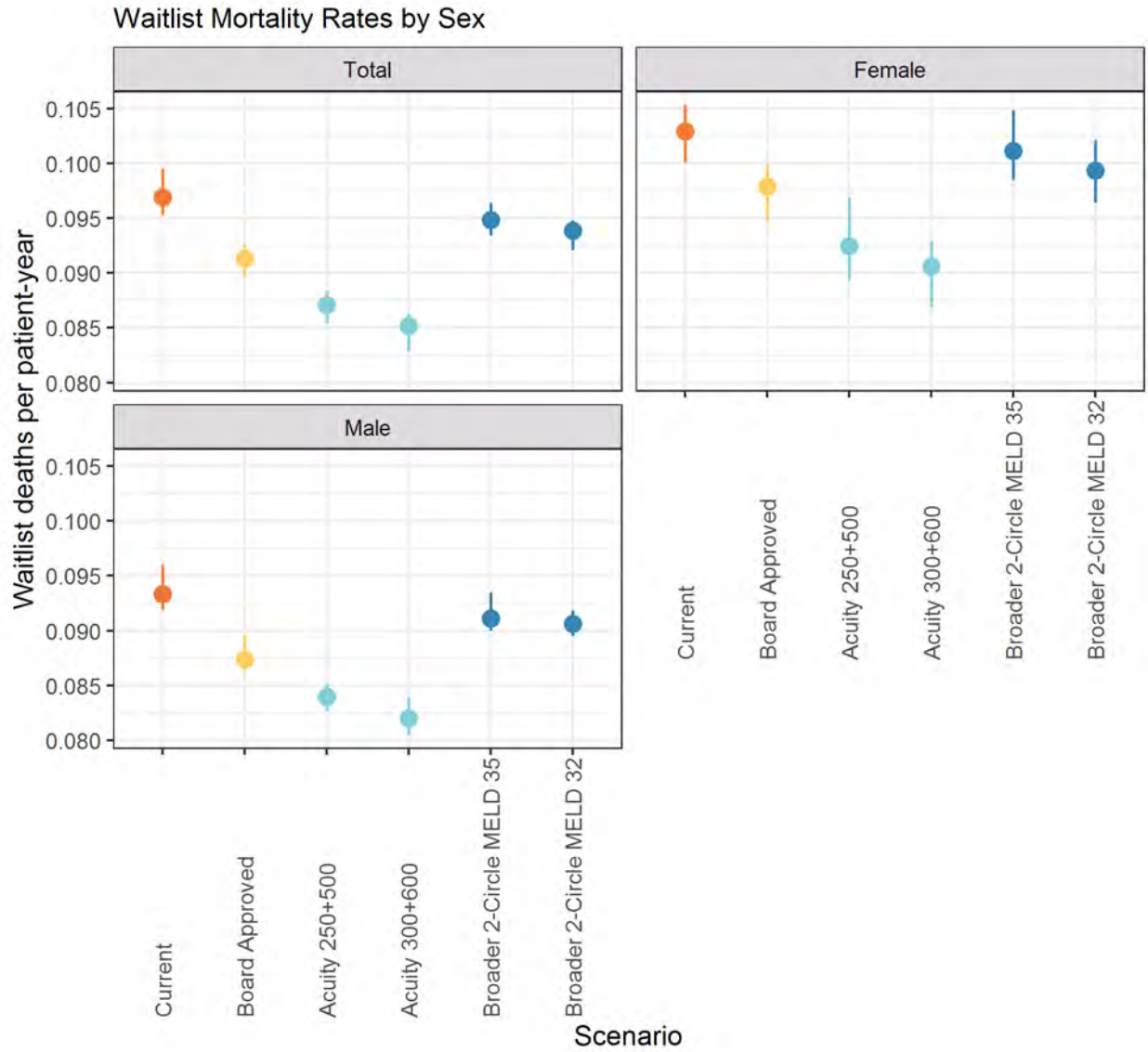


Figure 255 Waitlist Mortality Rates by Sex

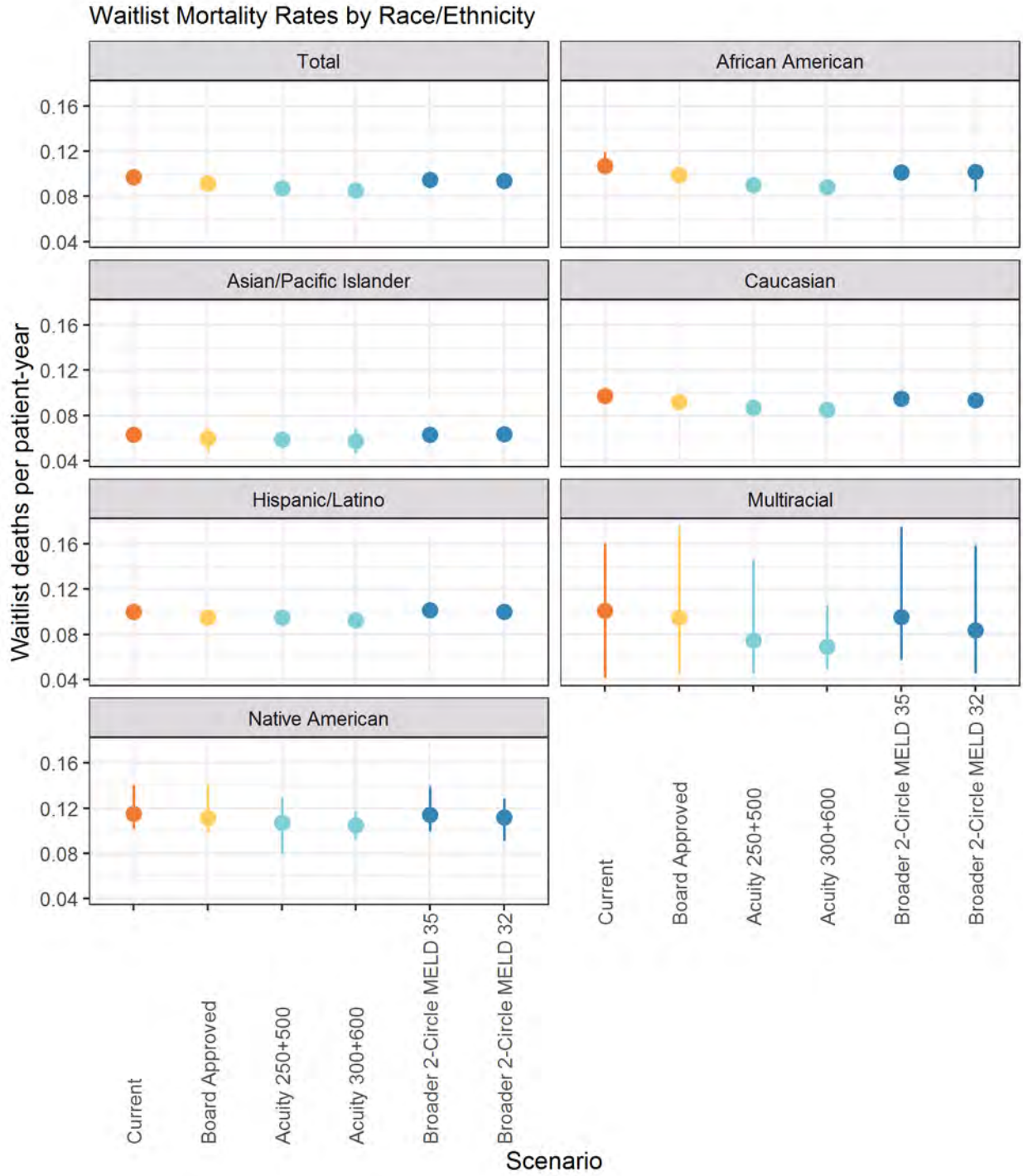


Figure 256 Waitlist Mortality Rates by Race/Ethnicity

Waitlist Mortality Counts

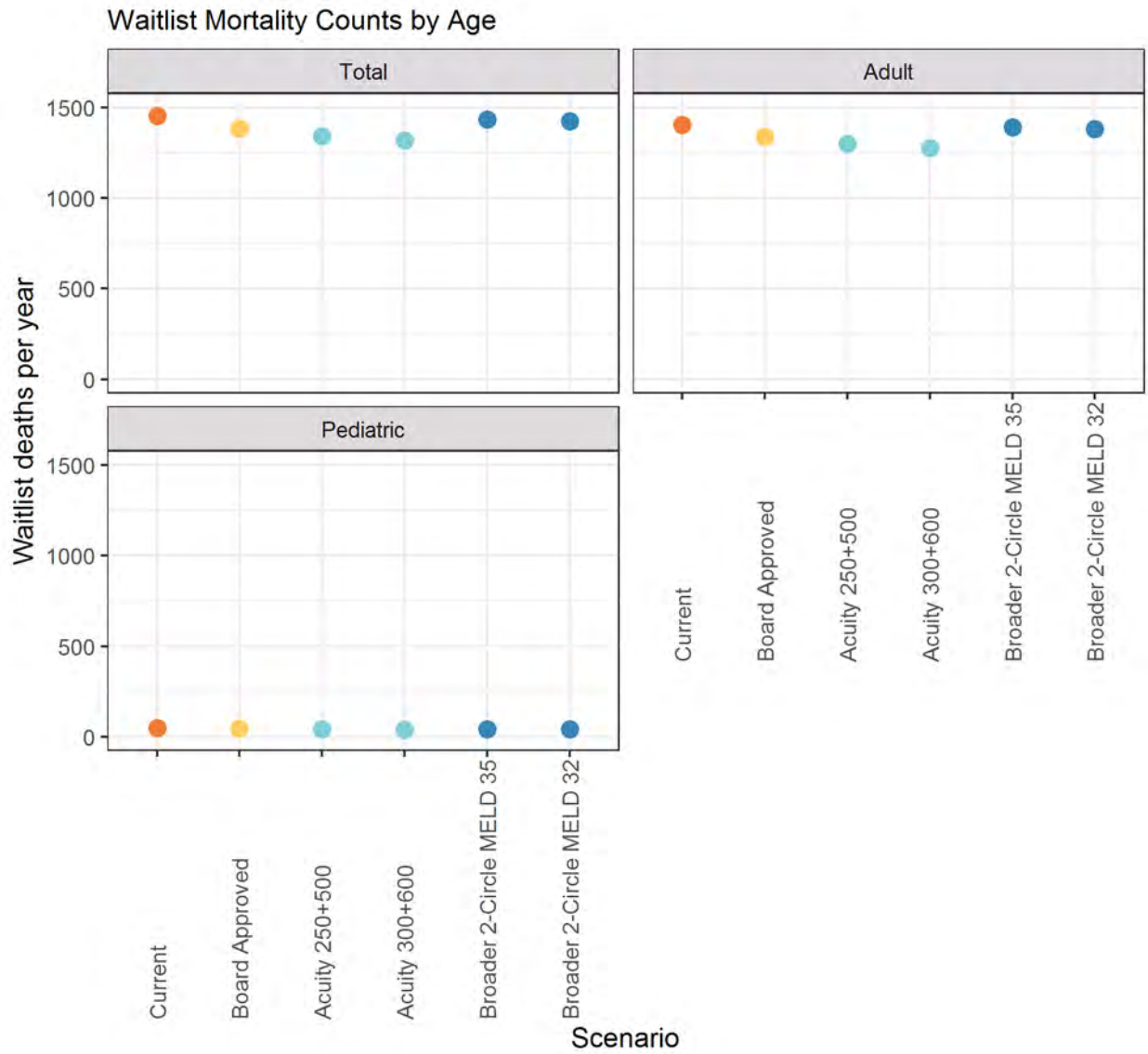


Figure 257 Waitlist Mortality Counts by Age

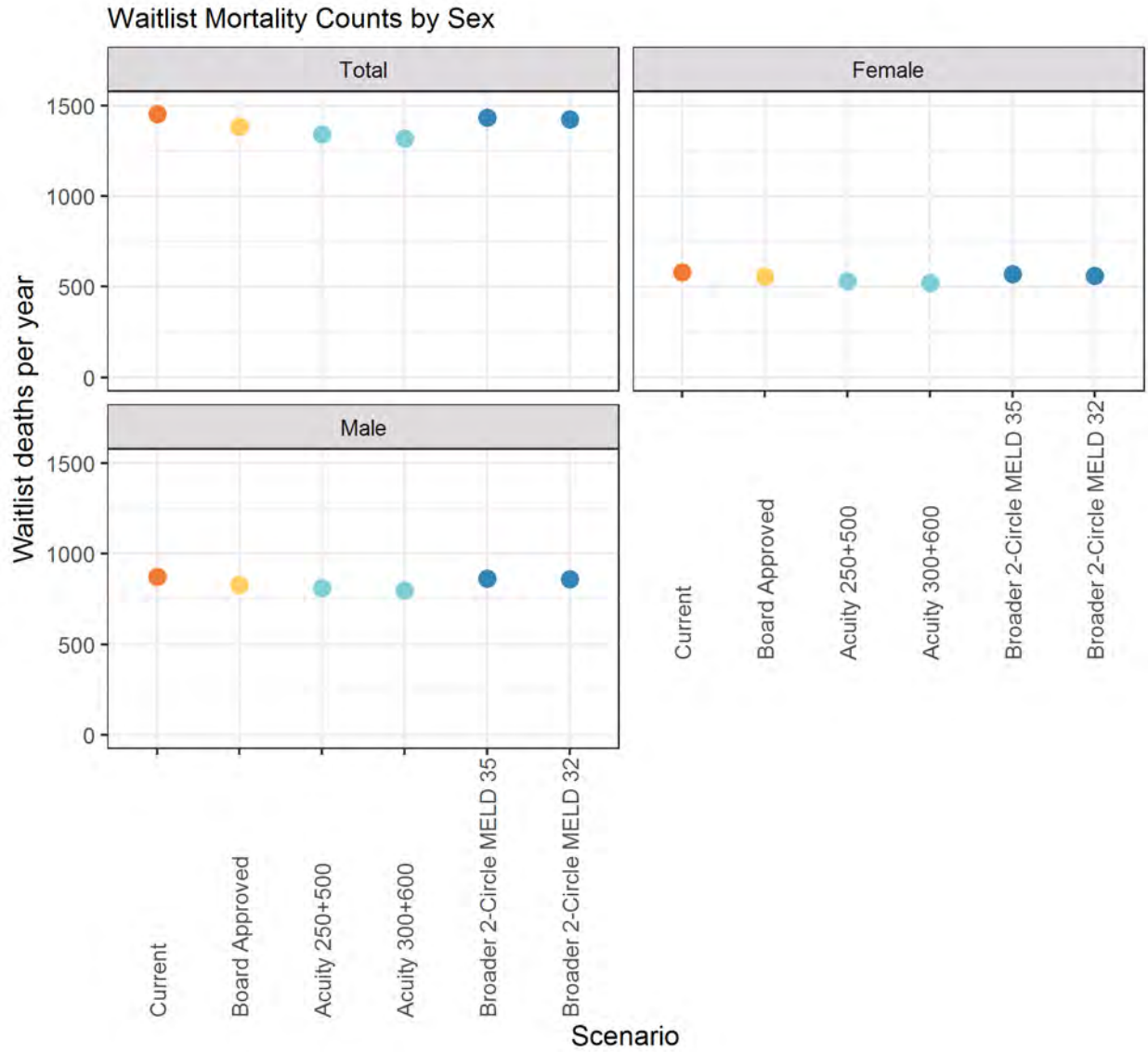


Figure 258 Waitlist Mortality Counts by Sex

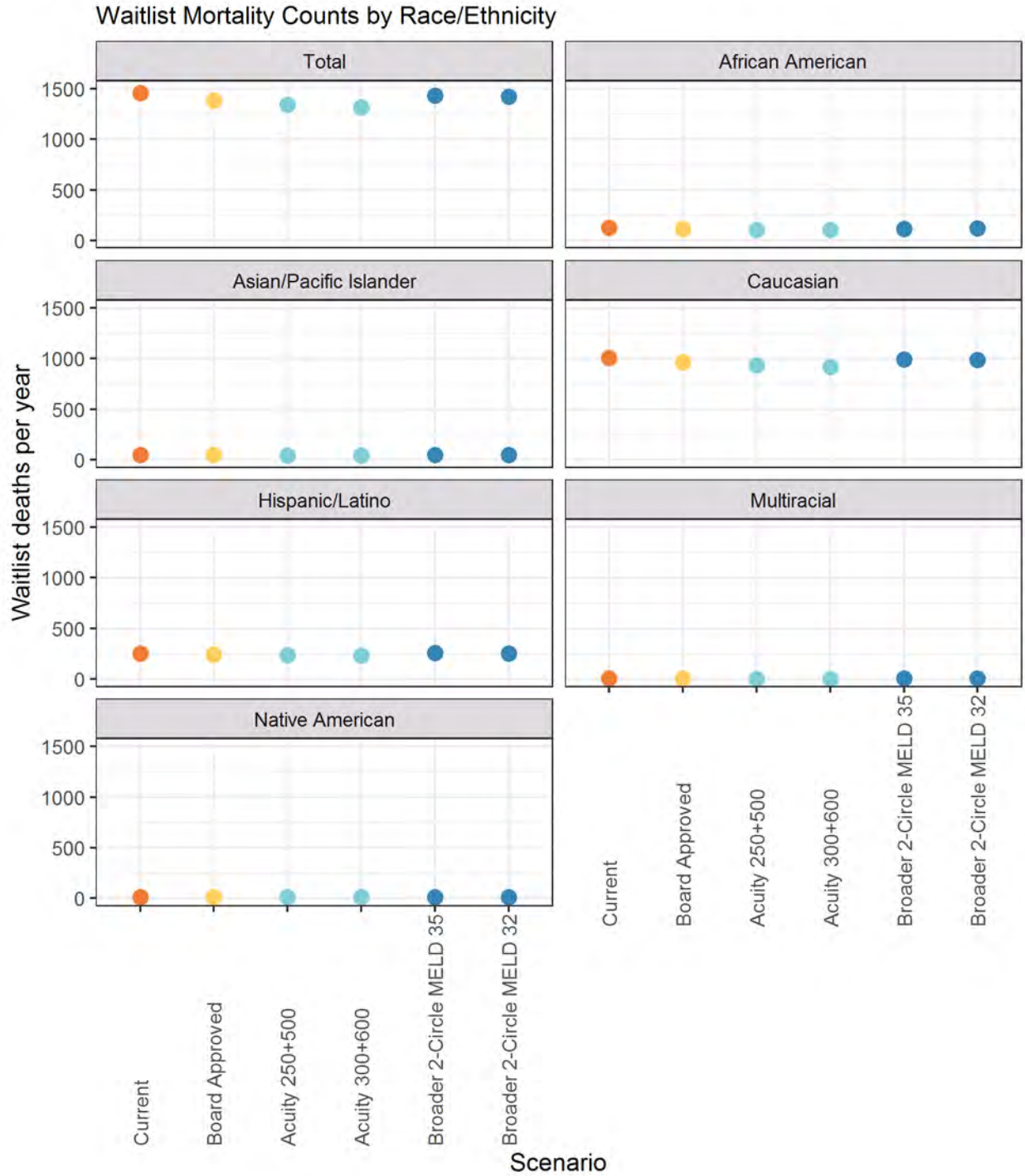


Figure 259 Waitlist Mortality Counts by Race/Ethnicity

Variance in Waitlist Mortality Rates

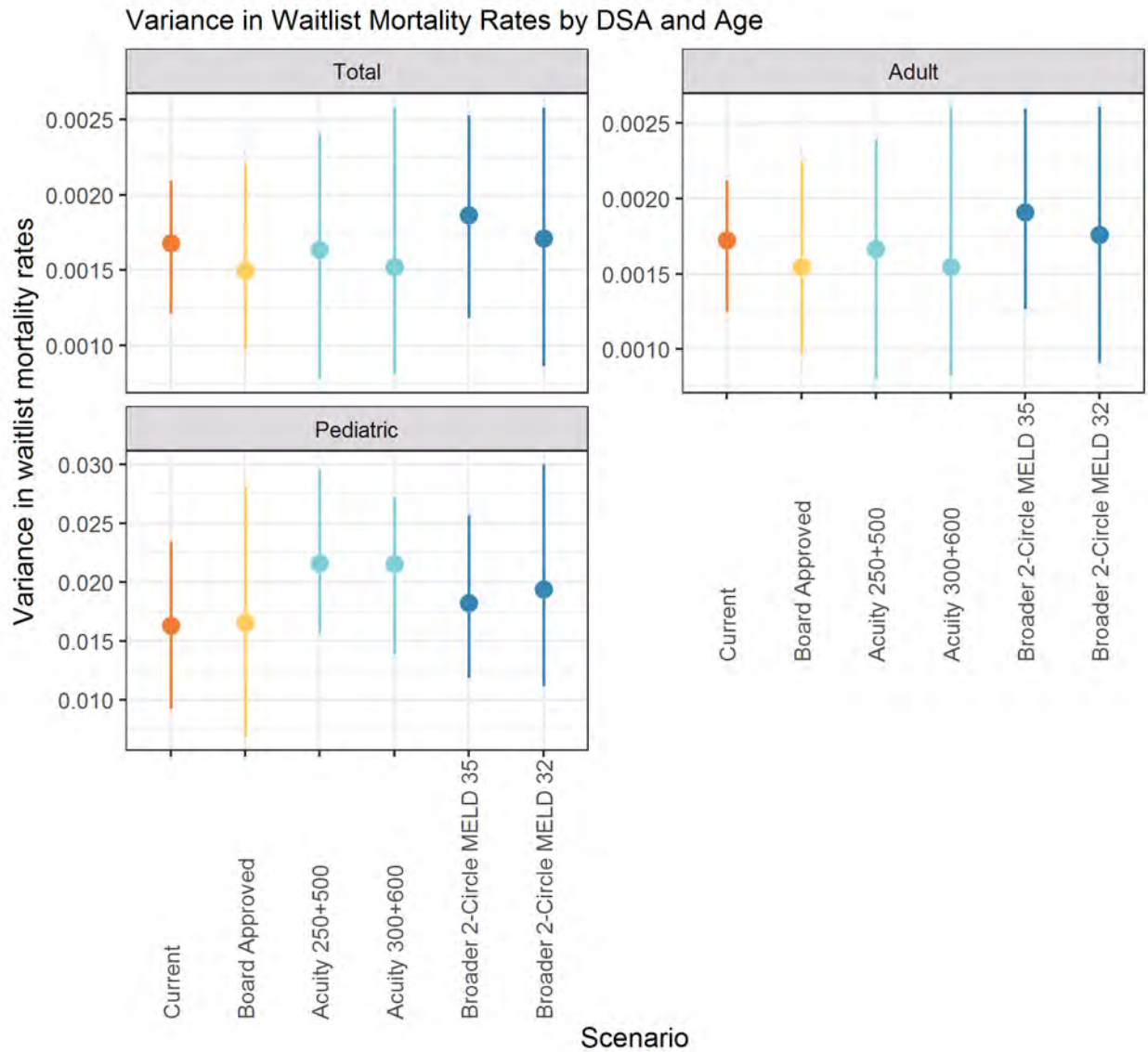


Figure 260 Variance in Waitlist Mortality Rates by DSA and Age. Waitlist mortality rates were capped at the 99th percentile of all DSA and Age groups (0.7 waitlist deaths per patient-year) before calculating the variance.

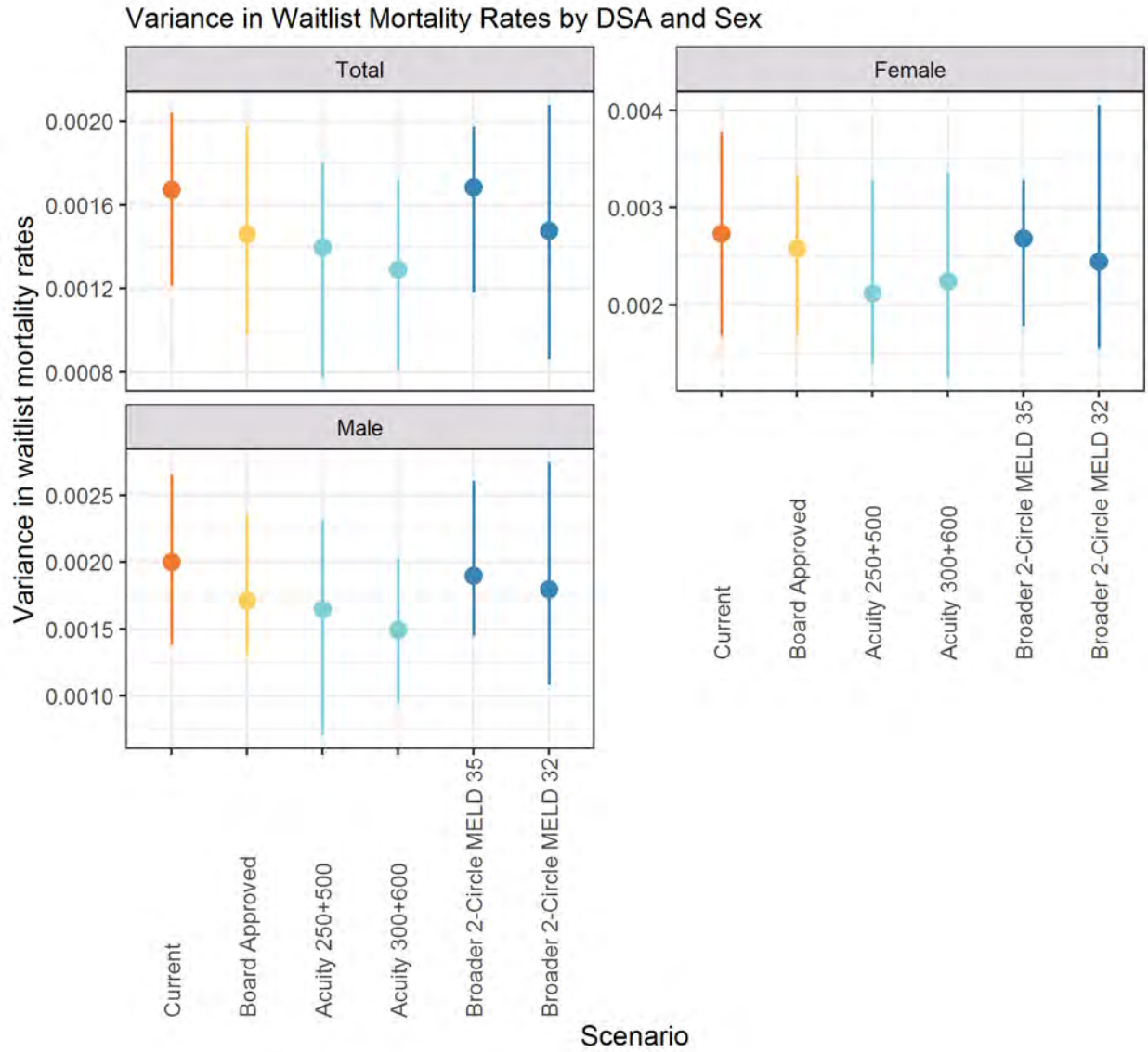


Figure 261 Variance in Waitlist Mortality Rates by DSA and Sex. Waitlist mortality rates were capped at the 99th percentile of all DSA and Sex groups (0.3 waitlist deaths per patient-year) before calculating the variance.

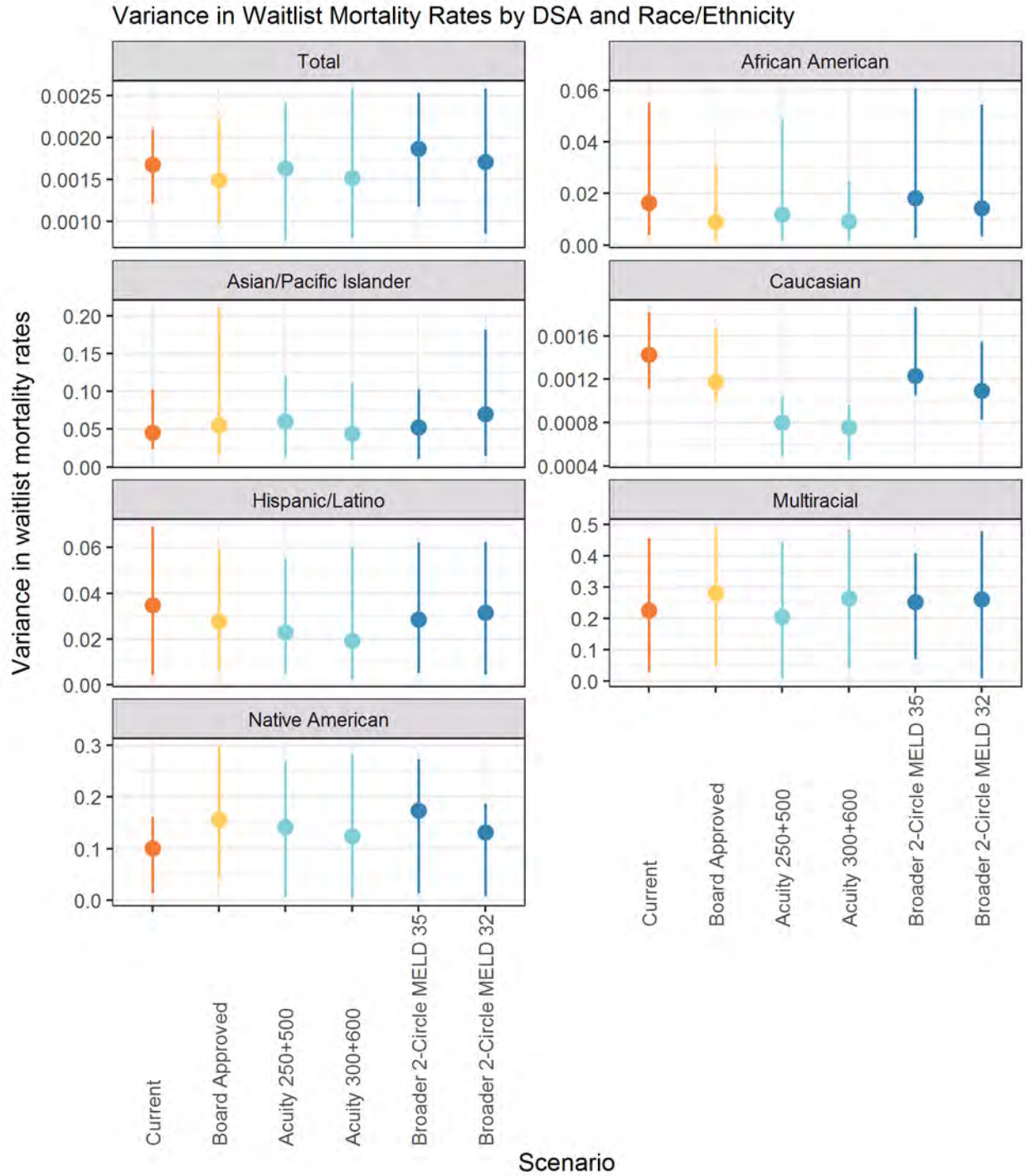


Figure 262 Variance in Waitlist Mortality Rates by DSA and Race/Ethnicity. Waitlist mortality rates were capped at the 99th percentile of all DSA and Race/Ethnicity groups (2.1 waitlist deaths per patient-year) before calculating the variance.

Posttransplant Mortality

Posttransplant Mortality Rates

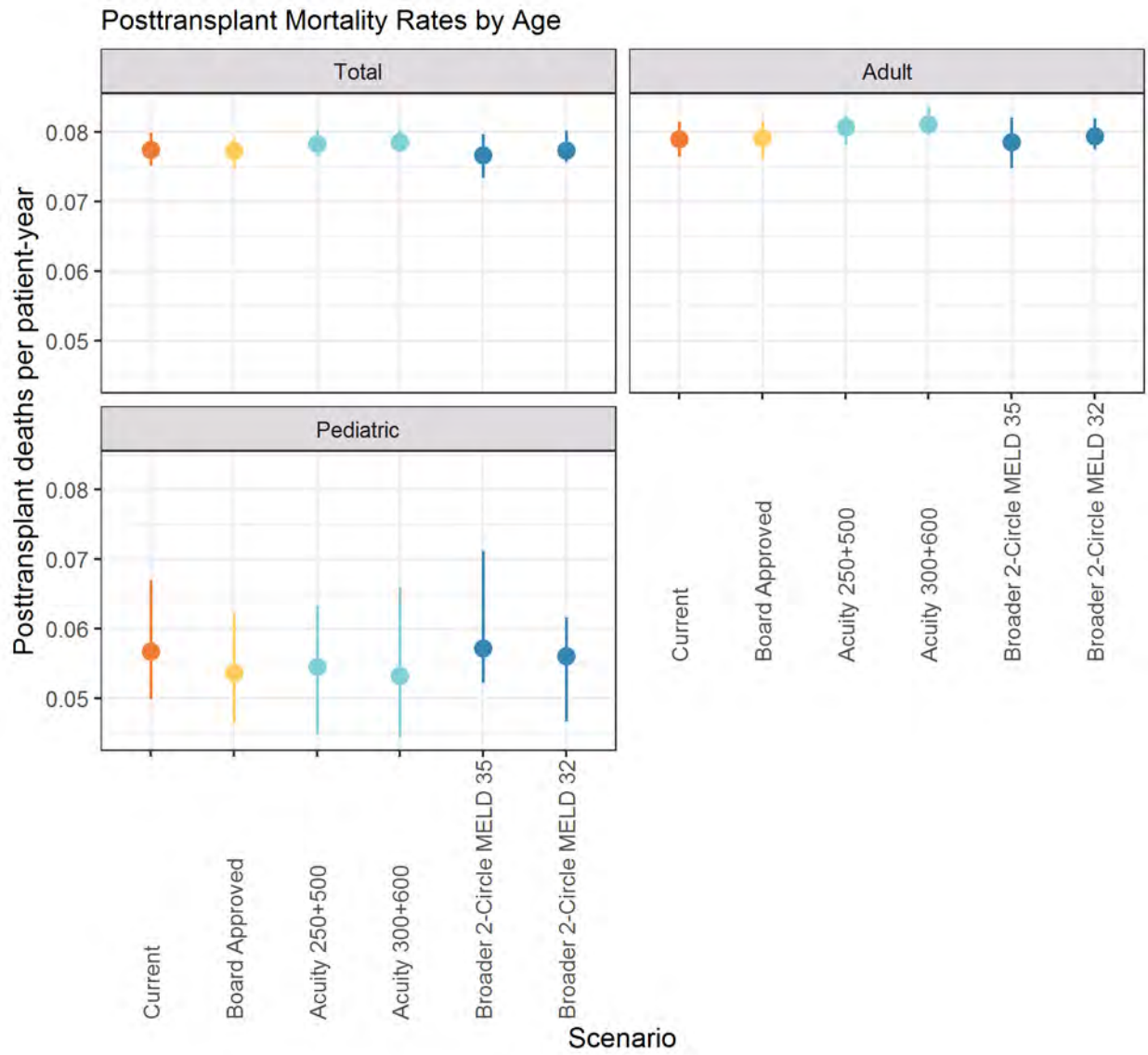


Figure 263 Posttransplant Mortality Rates by Age

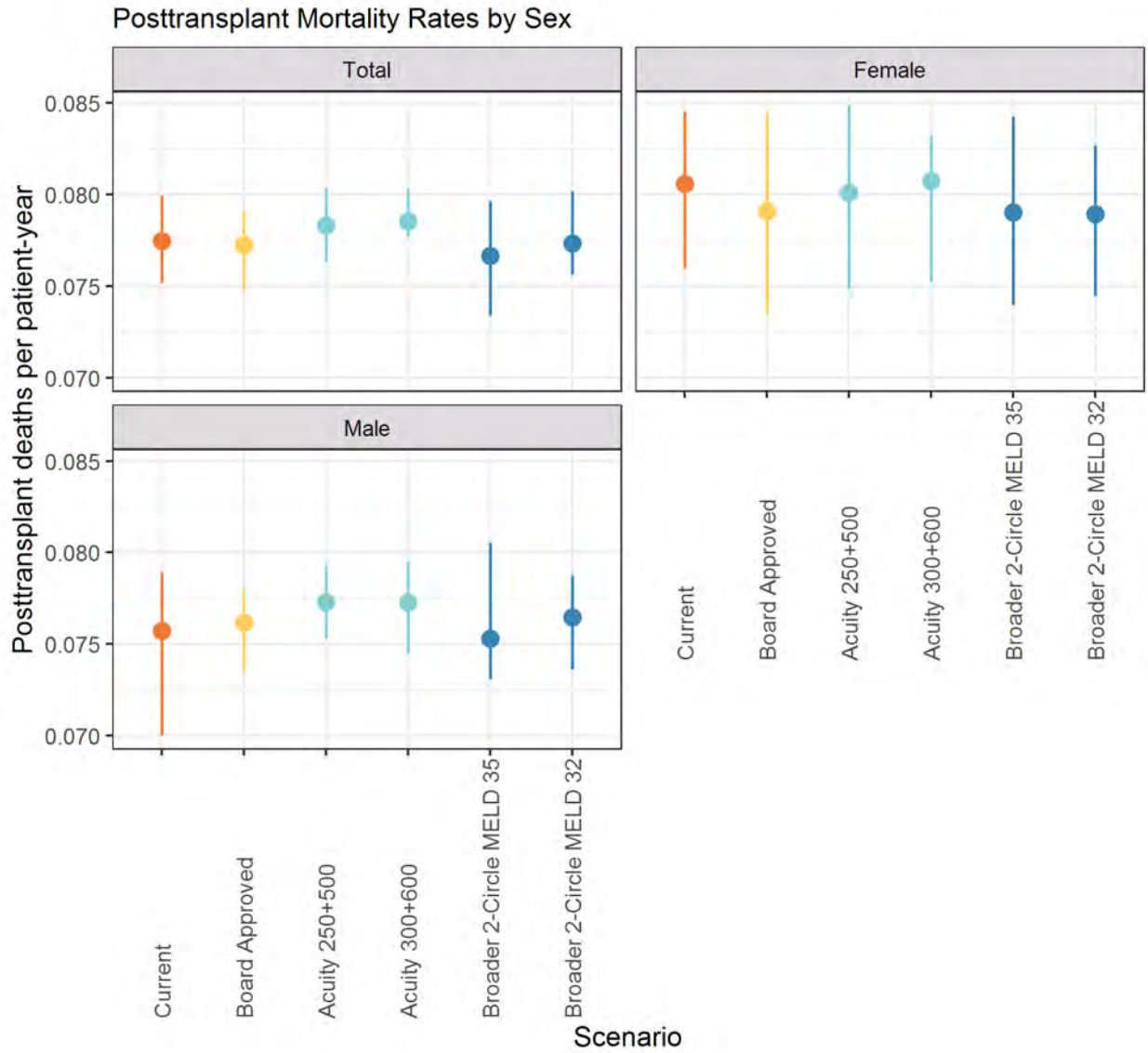


Figure 264 Posttransplant Mortality Rates by Sex

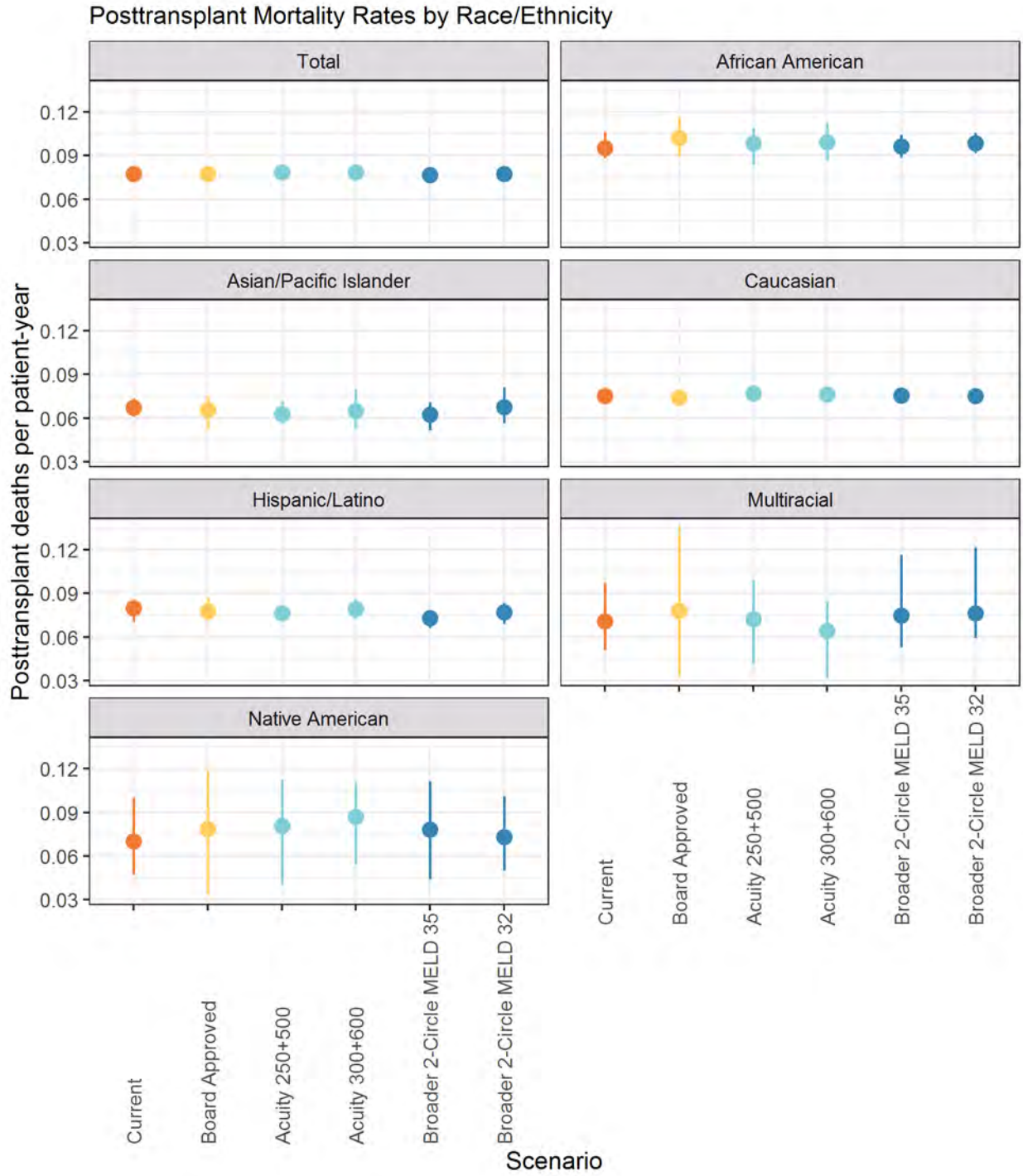


Figure 265 Posttransplant Mortality Rates by Race/Ethnicity

Posttransplant Mortality Counts

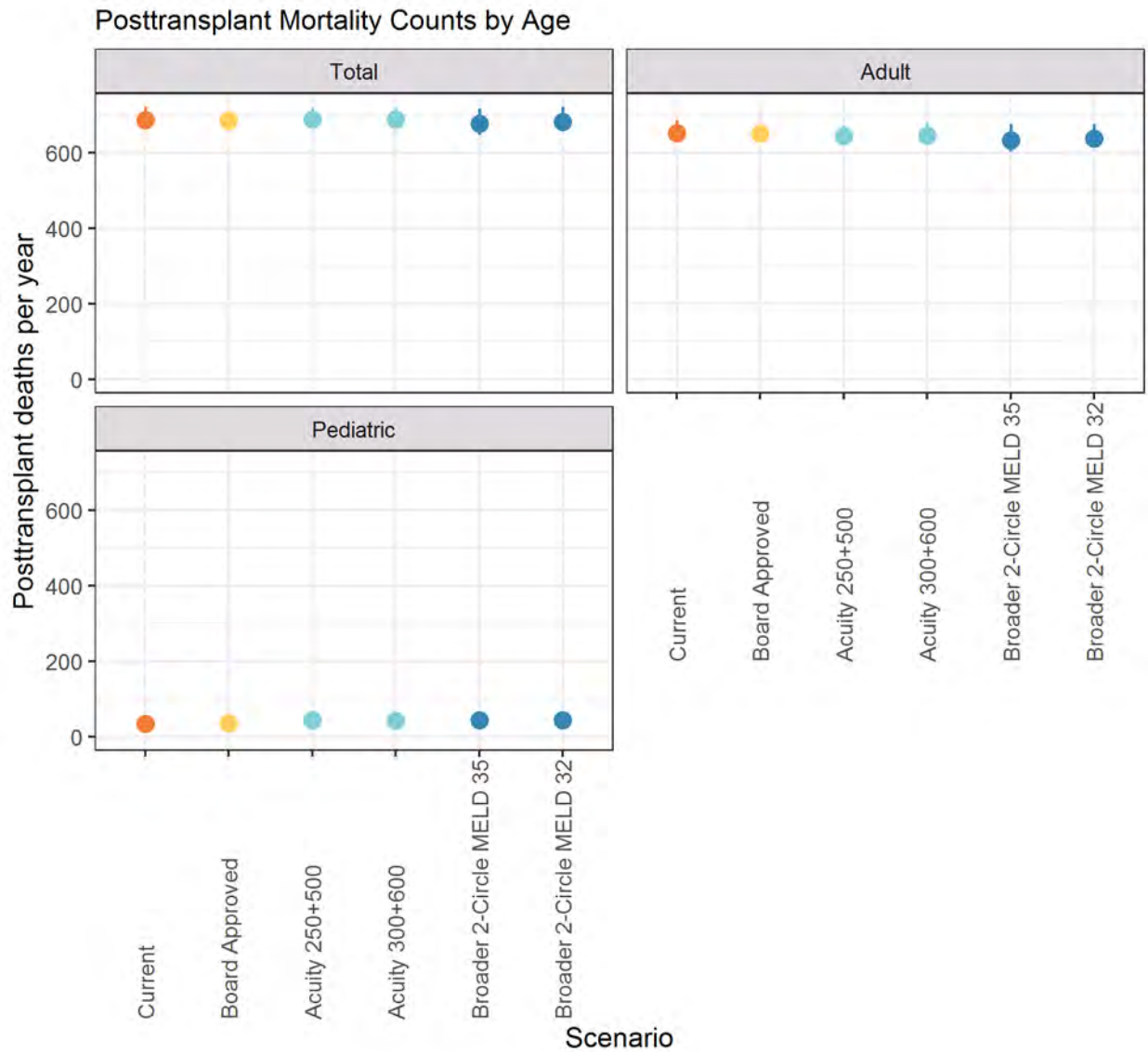


Figure 266 Posttransplant Mortality Counts by Age

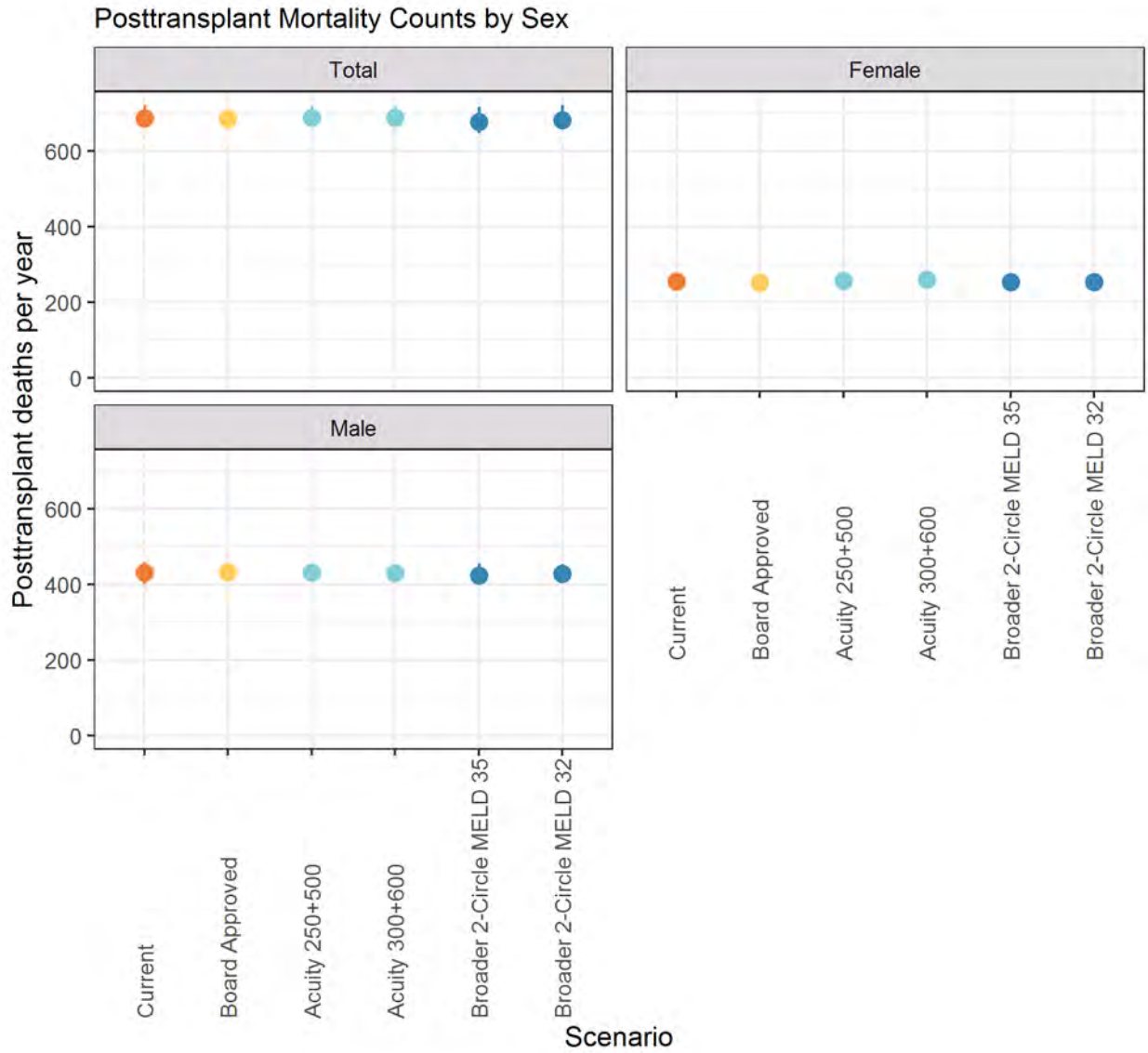


Figure 267 Posttransplant Mortality Counts by Sex

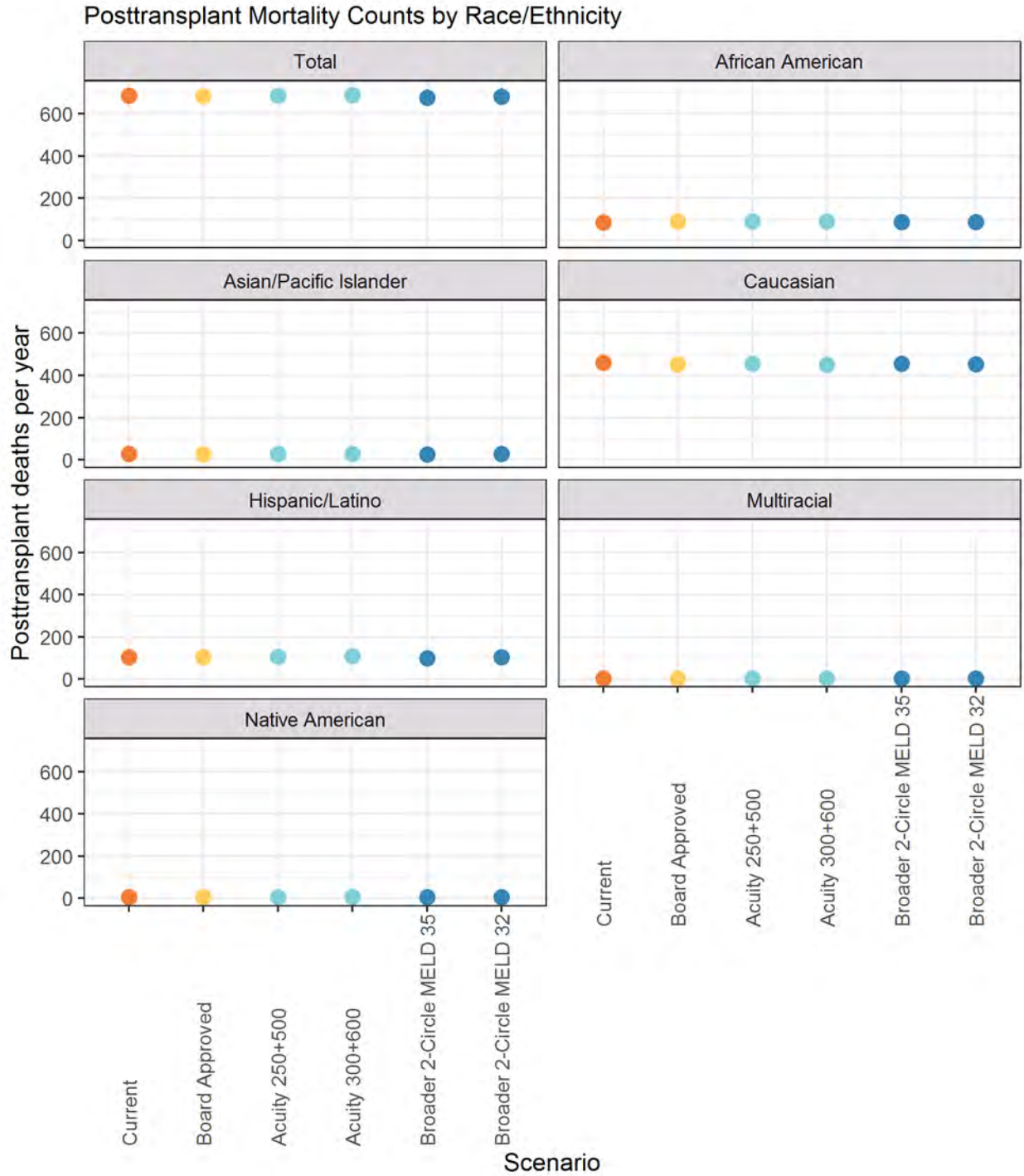


Figure 268 Posttransplant Mortality Counts by Race/Ethnicity

Appendix C: Results by Education, Insurance, CCRS, and Urbanicity

Allocation MELD/PELD at Transplant

Variance in Median Allocation MELD/PELD at Transplant

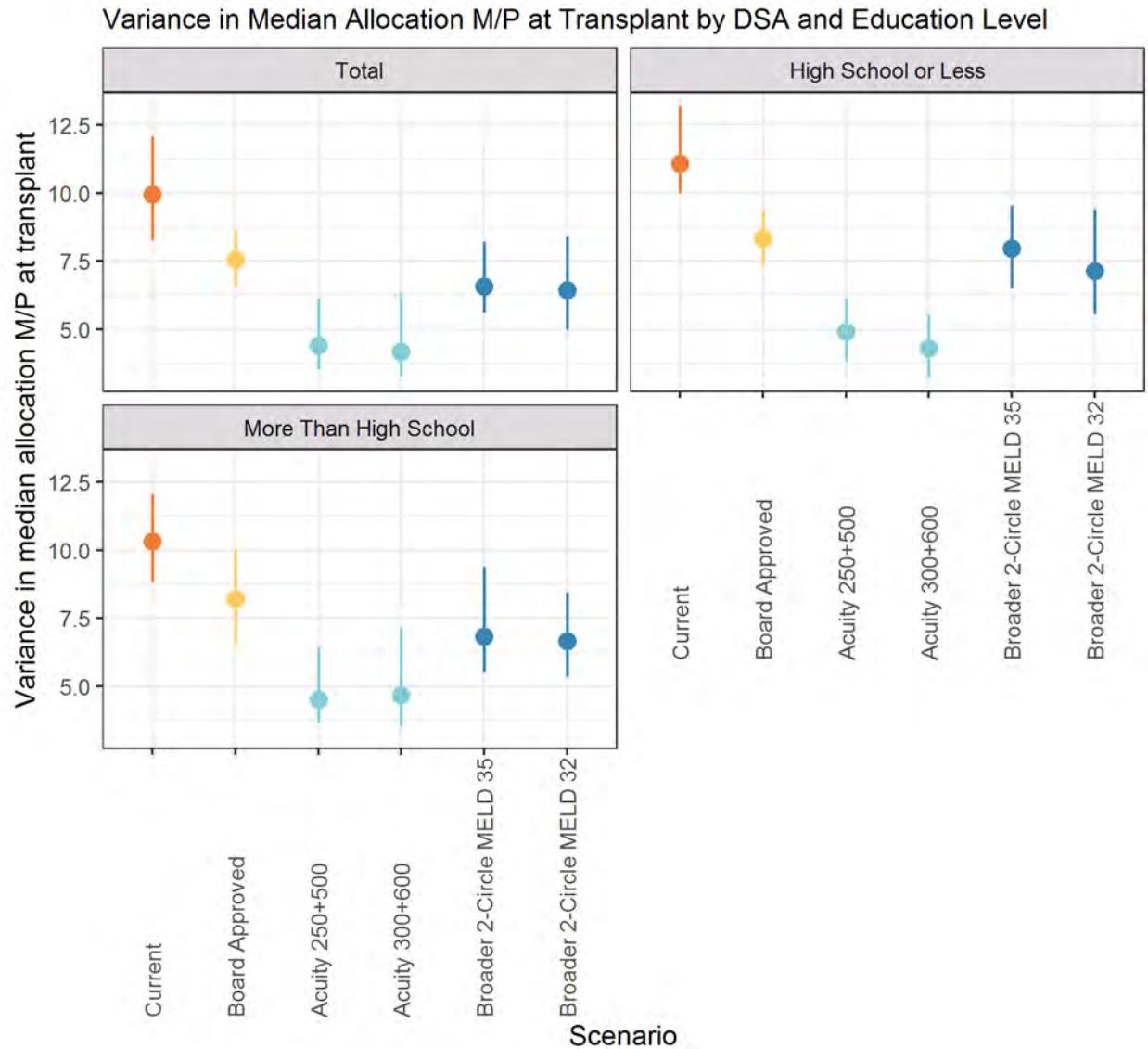


Figure 269 Variance in Median Allocation M/P at Transplant by DSA and Education Level

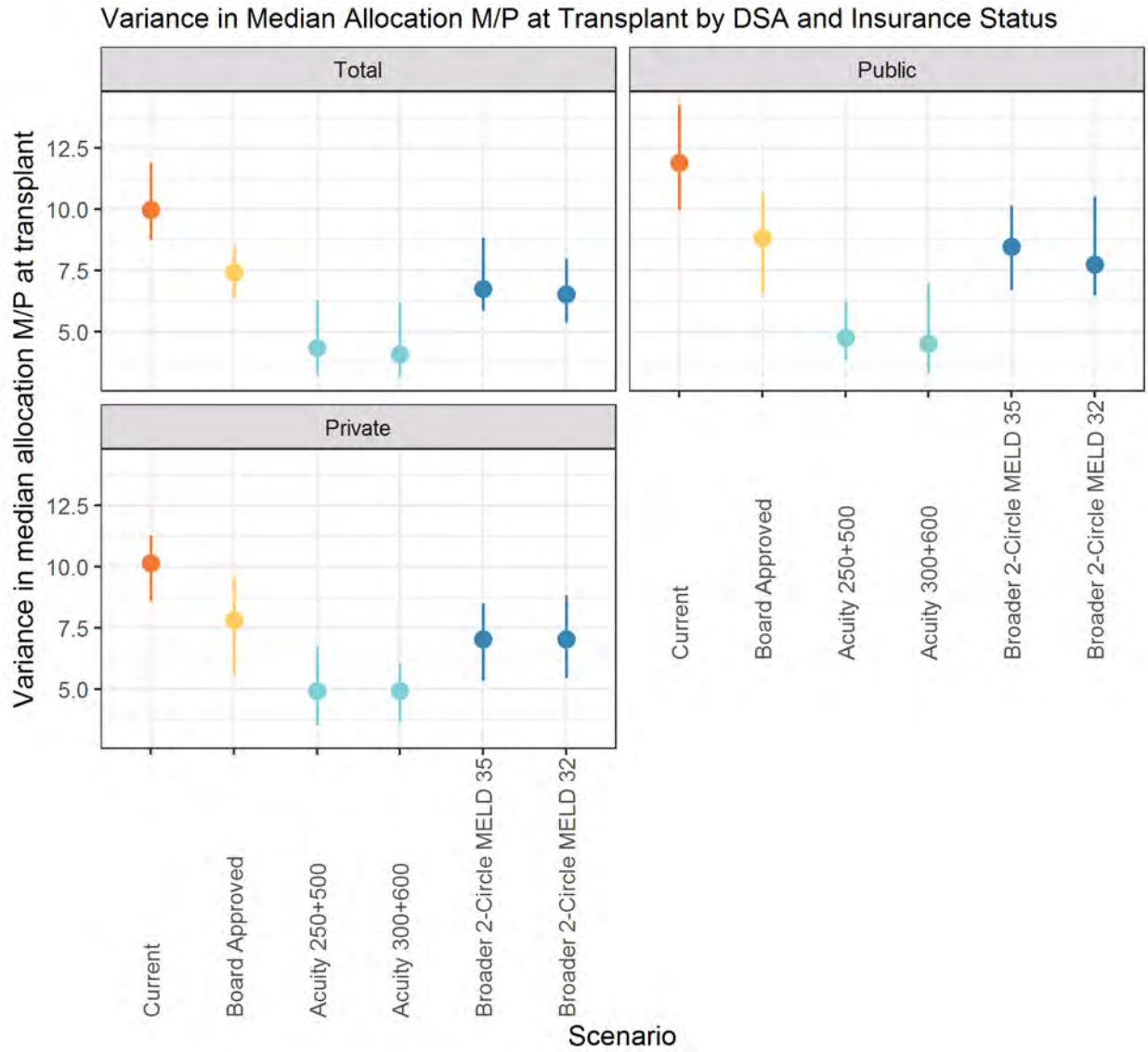


Figure 270 Variance in Median Allocation M/P at Transplant by DSA and Insurance Status

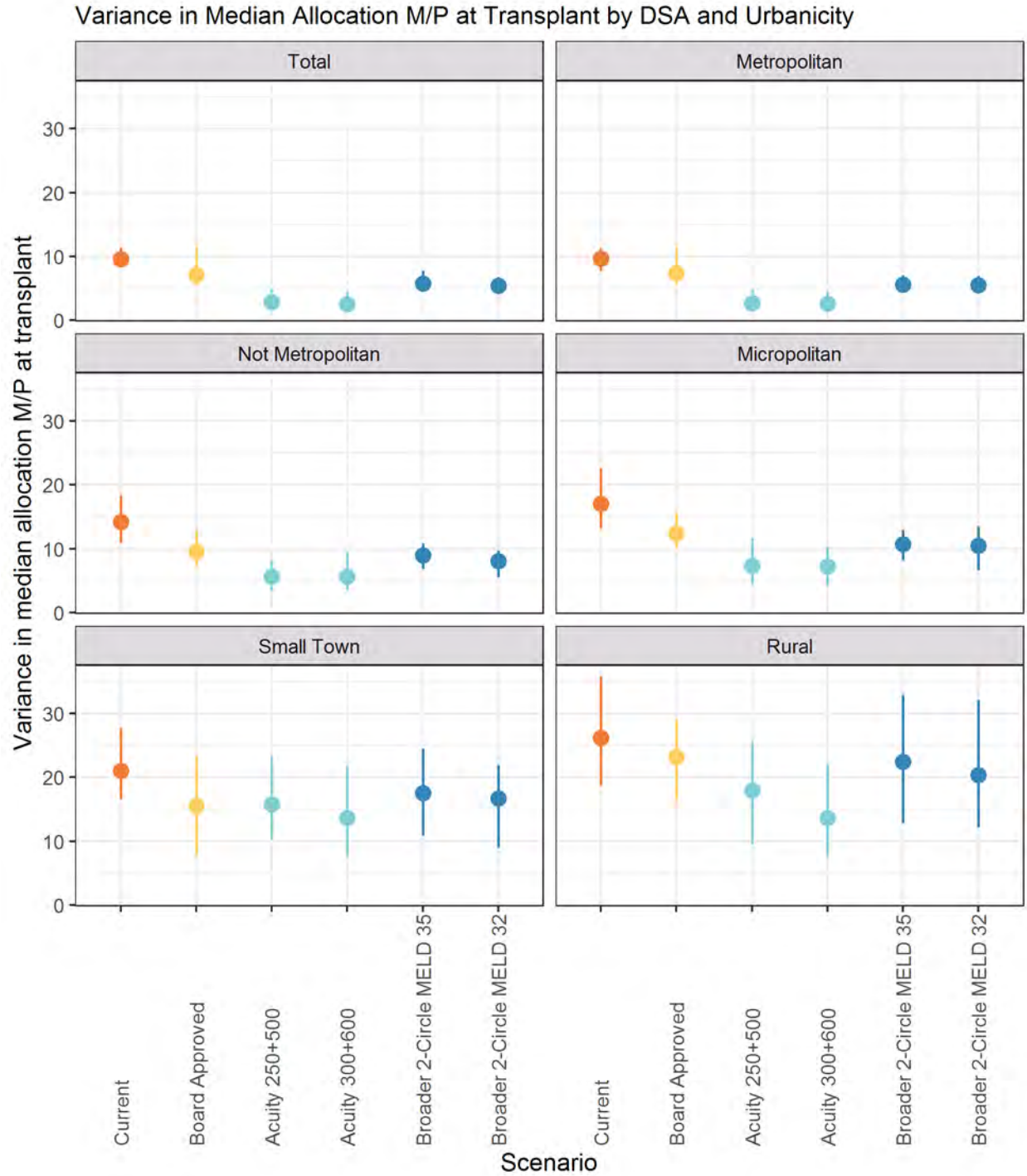


Figure 271 Variance in Median Allocation M/P at Transplant by DSA and Urbanicity

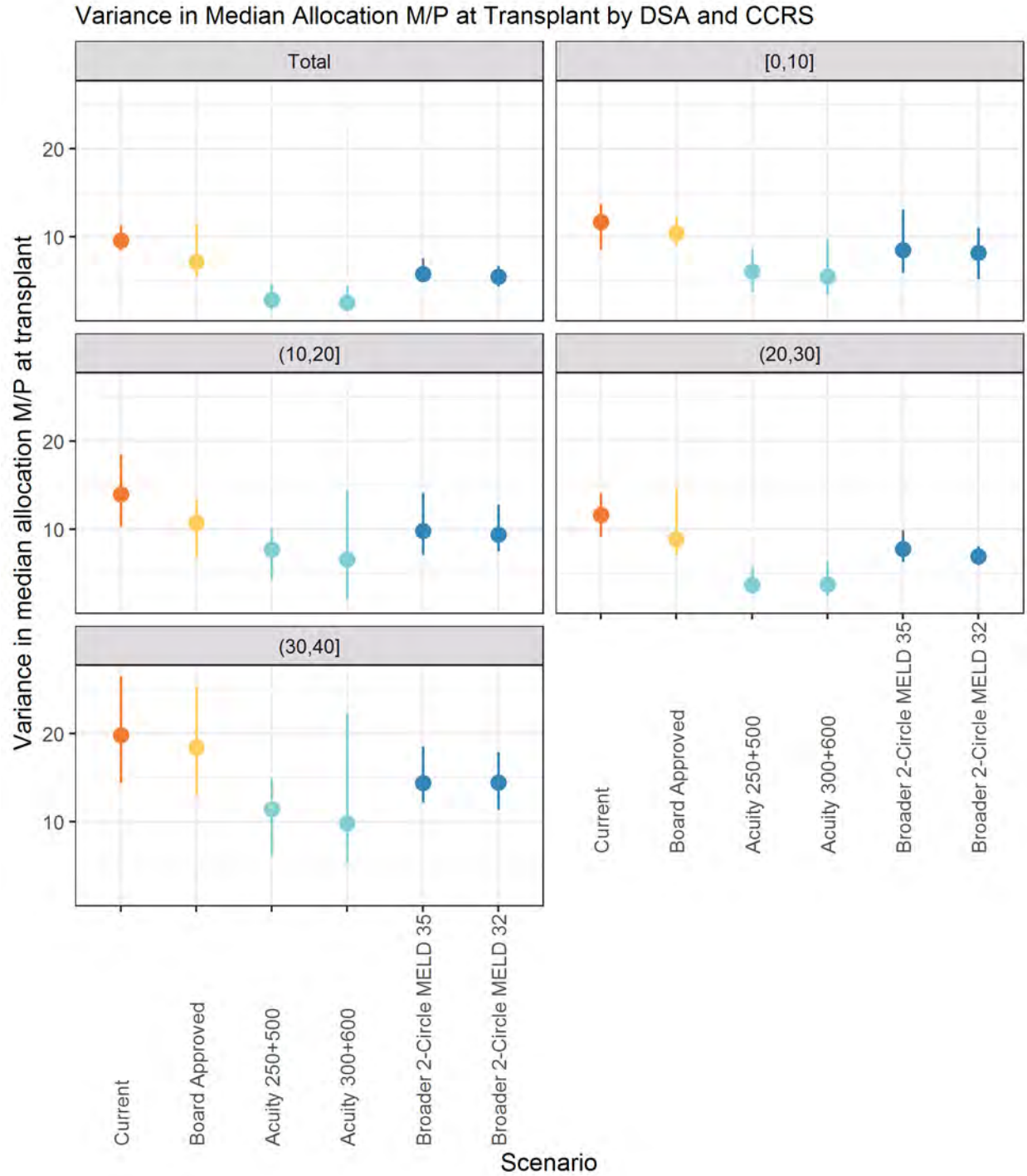


Figure 272 Variance in Median Allocation M/P at Transplant by DSA and CCRS

Median Allocation MELD/PELD at Transplant

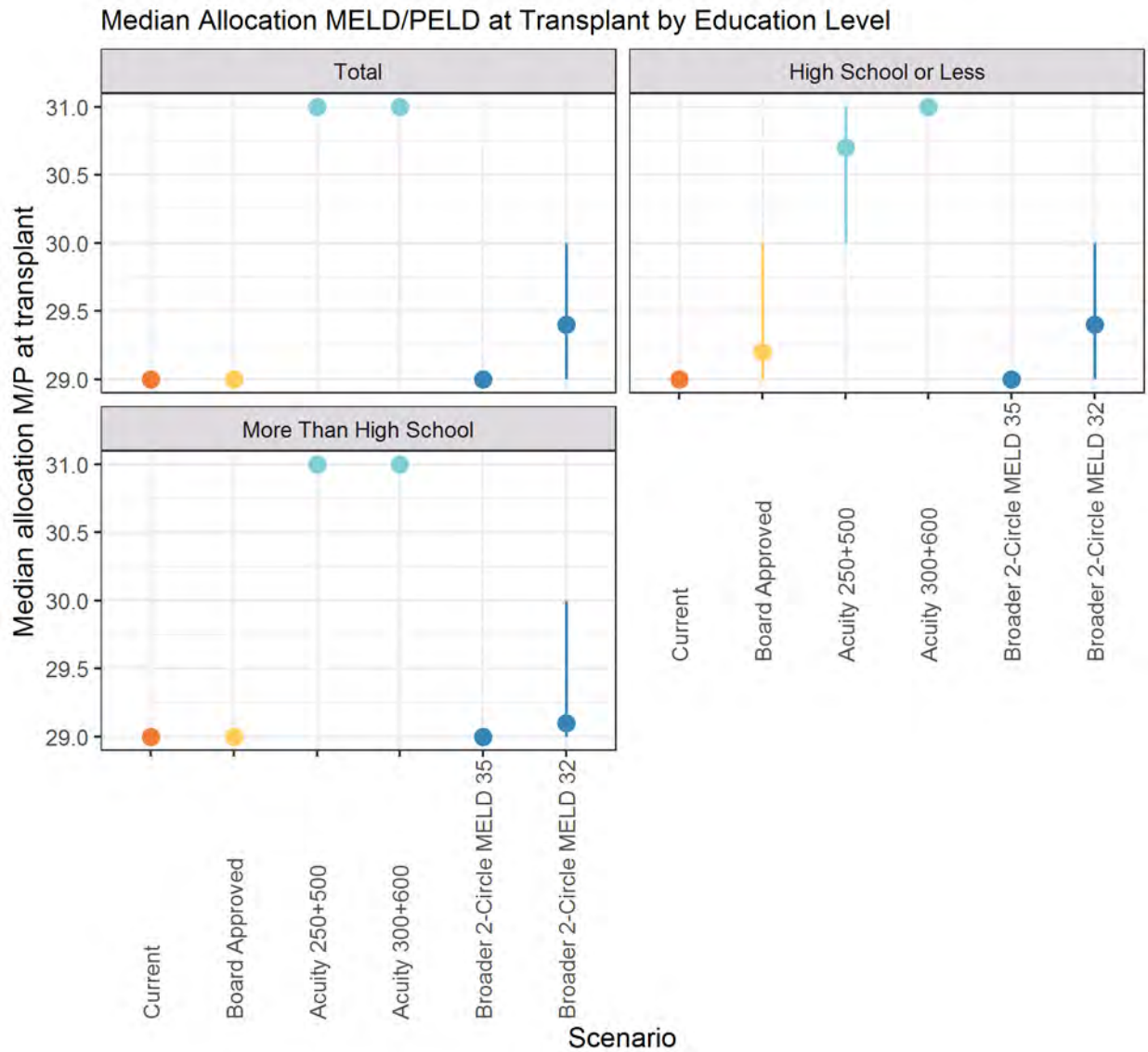


Figure 273 Median Allocation MELD/PELD at Transplant by Education Level

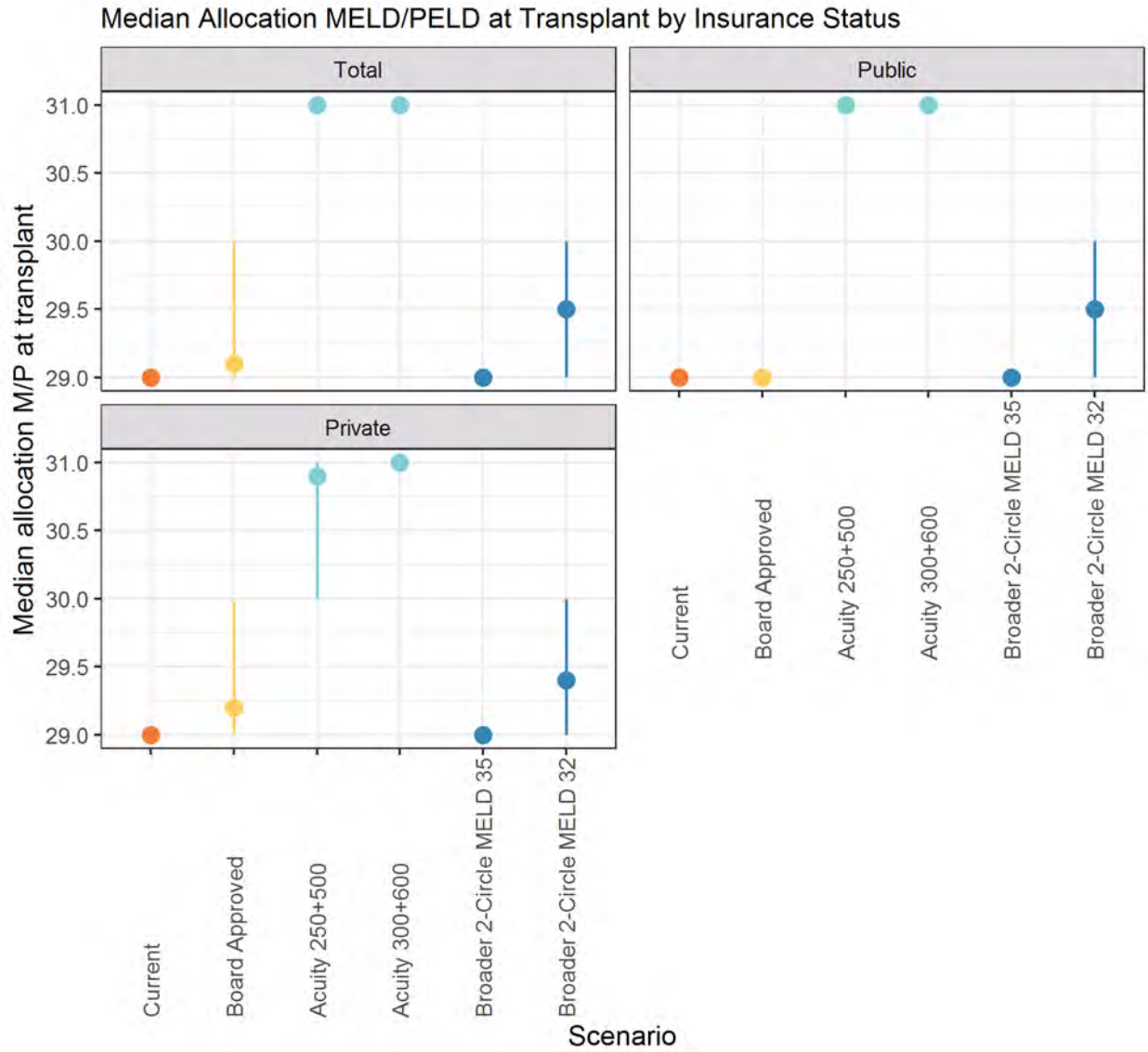


Figure 274 Median Allocation MELD/PELD at Transplant by Insurance Status

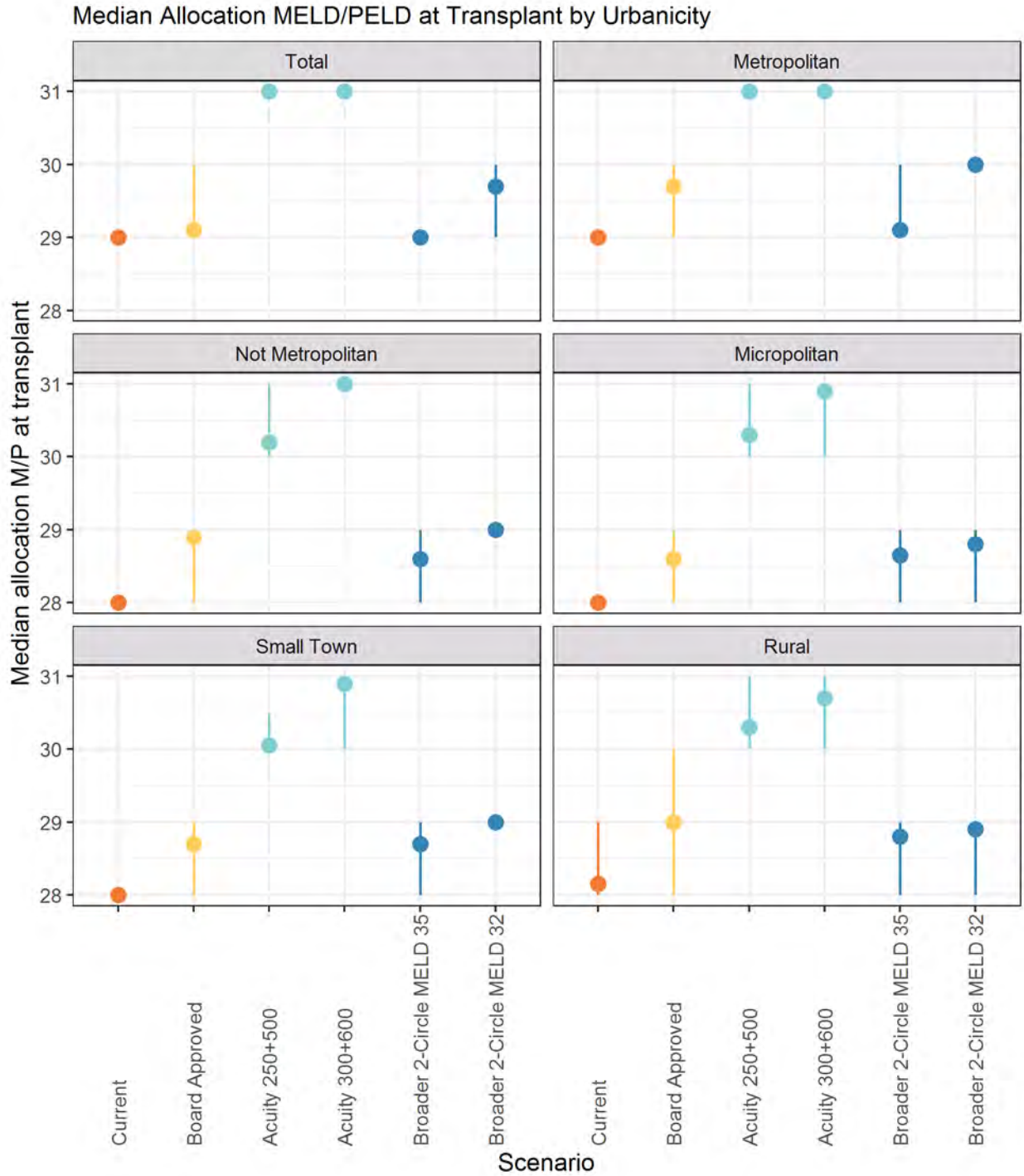


Figure 275 Median Allocation MELD/PELD at Transplant by Urbanicity

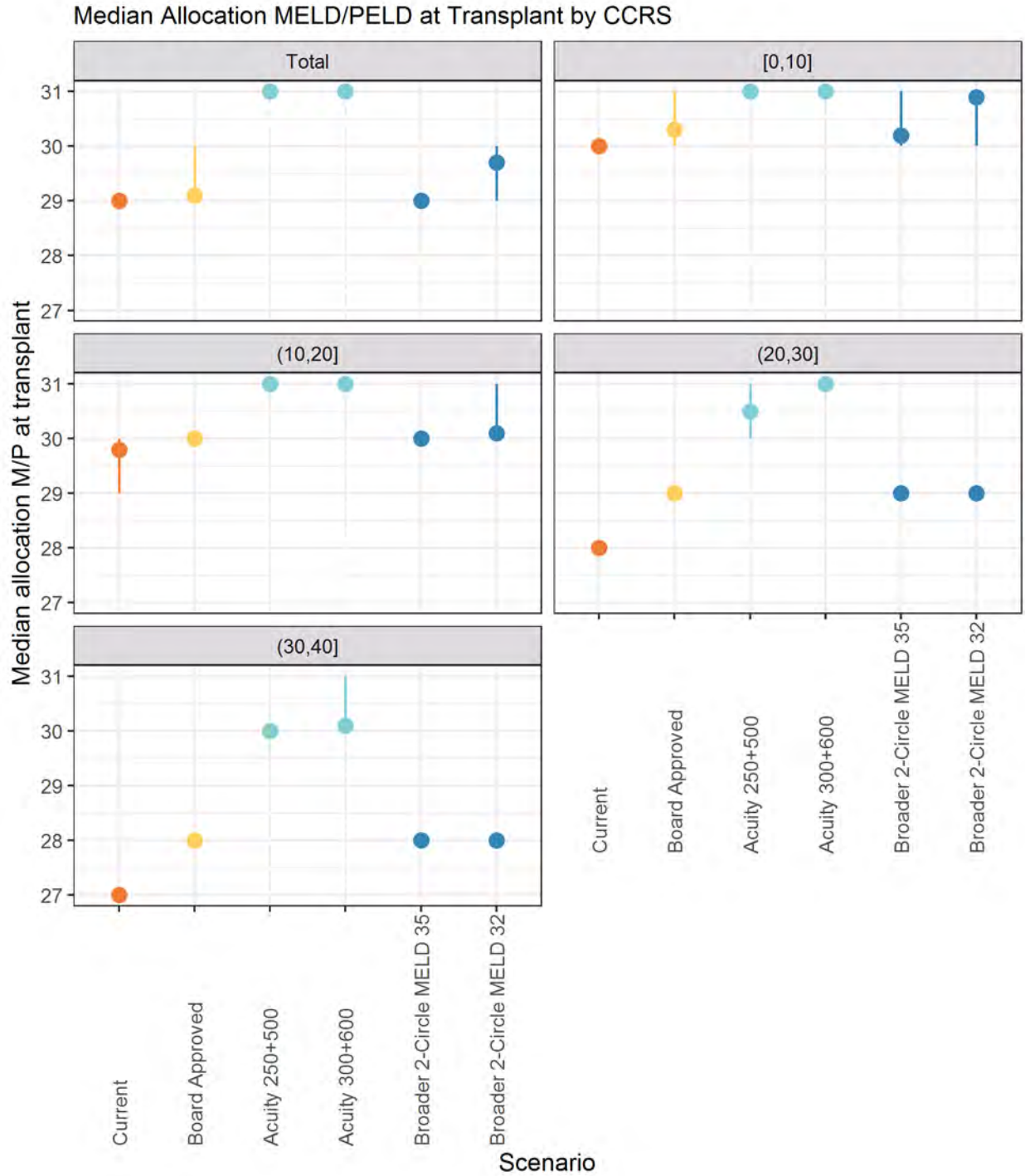


Figure 276 Median Allocation MELD/PELD at Transplant by CCRS

Transplant

Transplant Rates

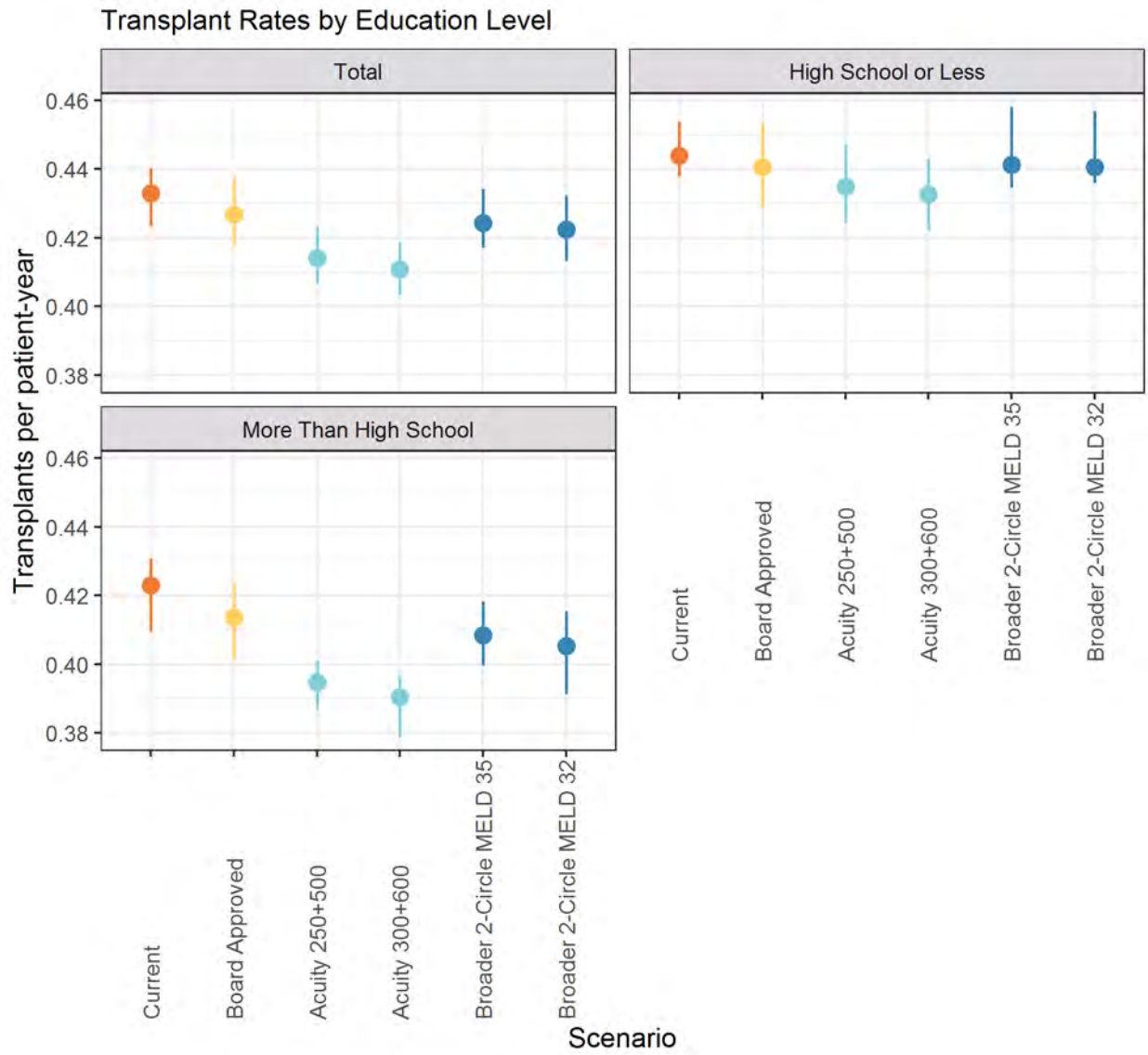


Figure 277 Transplant Rates by Education Level

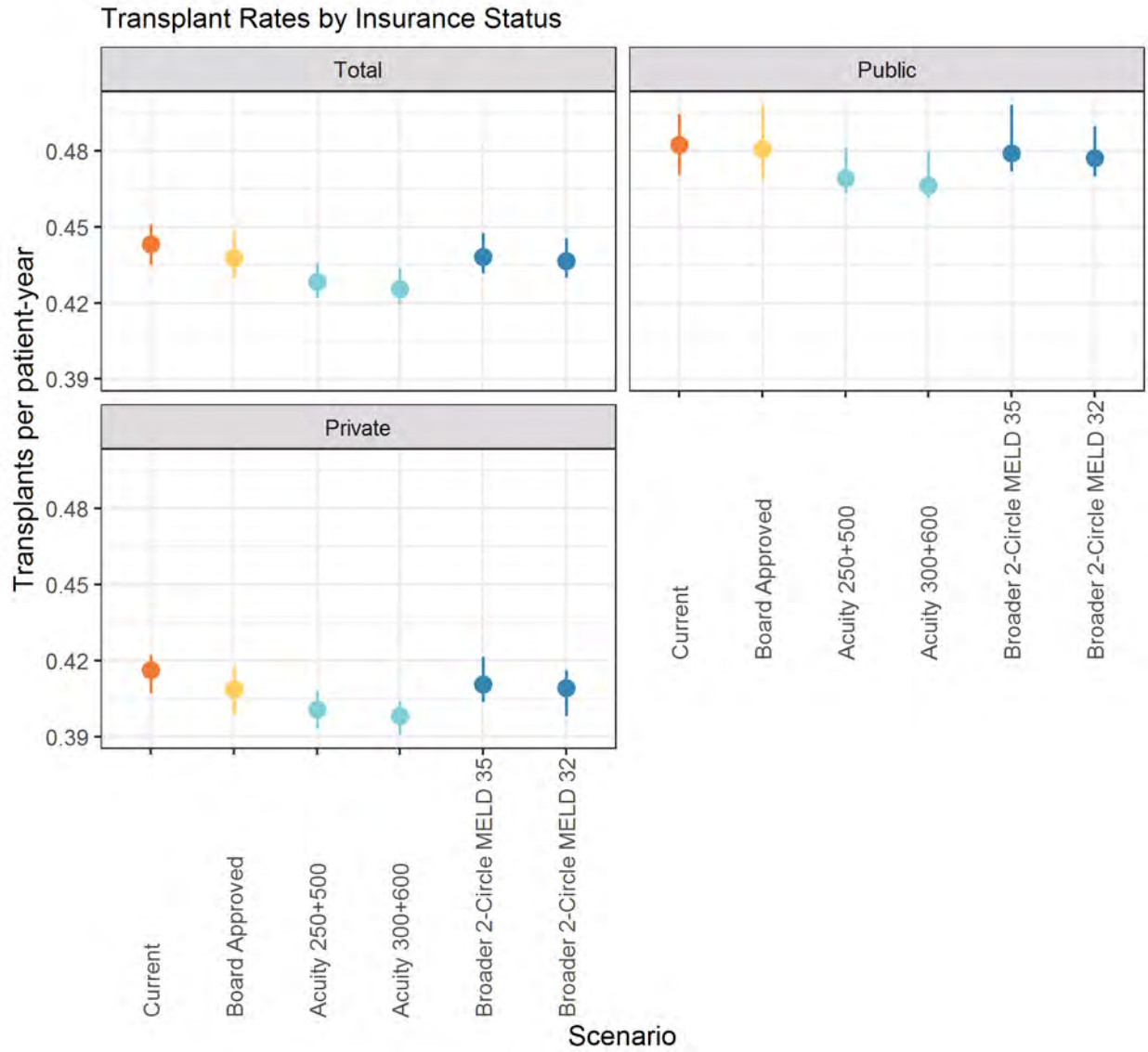


Figure 278 Transplant Rates by Insurance Status

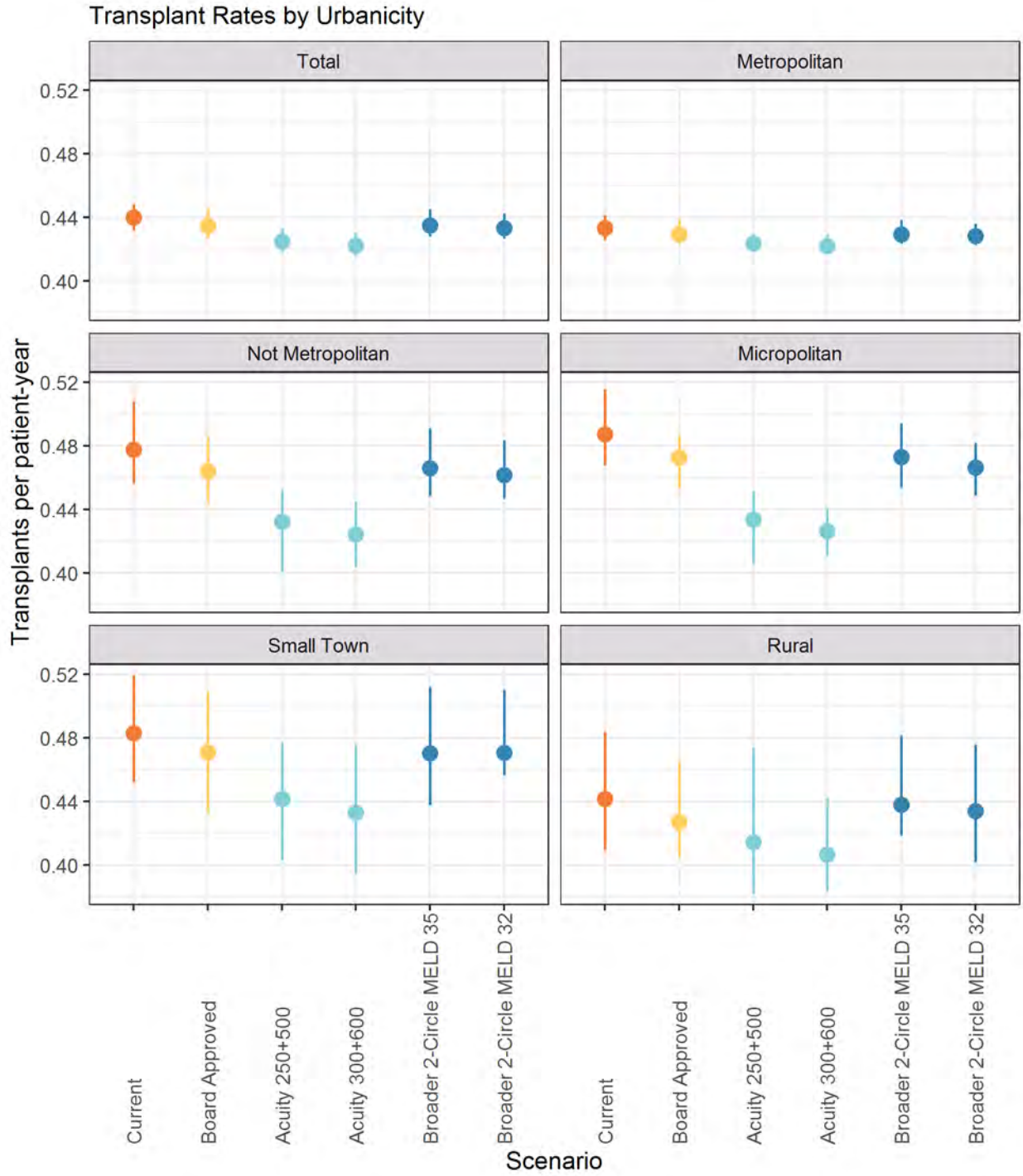


Figure 279 Transplant Rates by Urbanicity

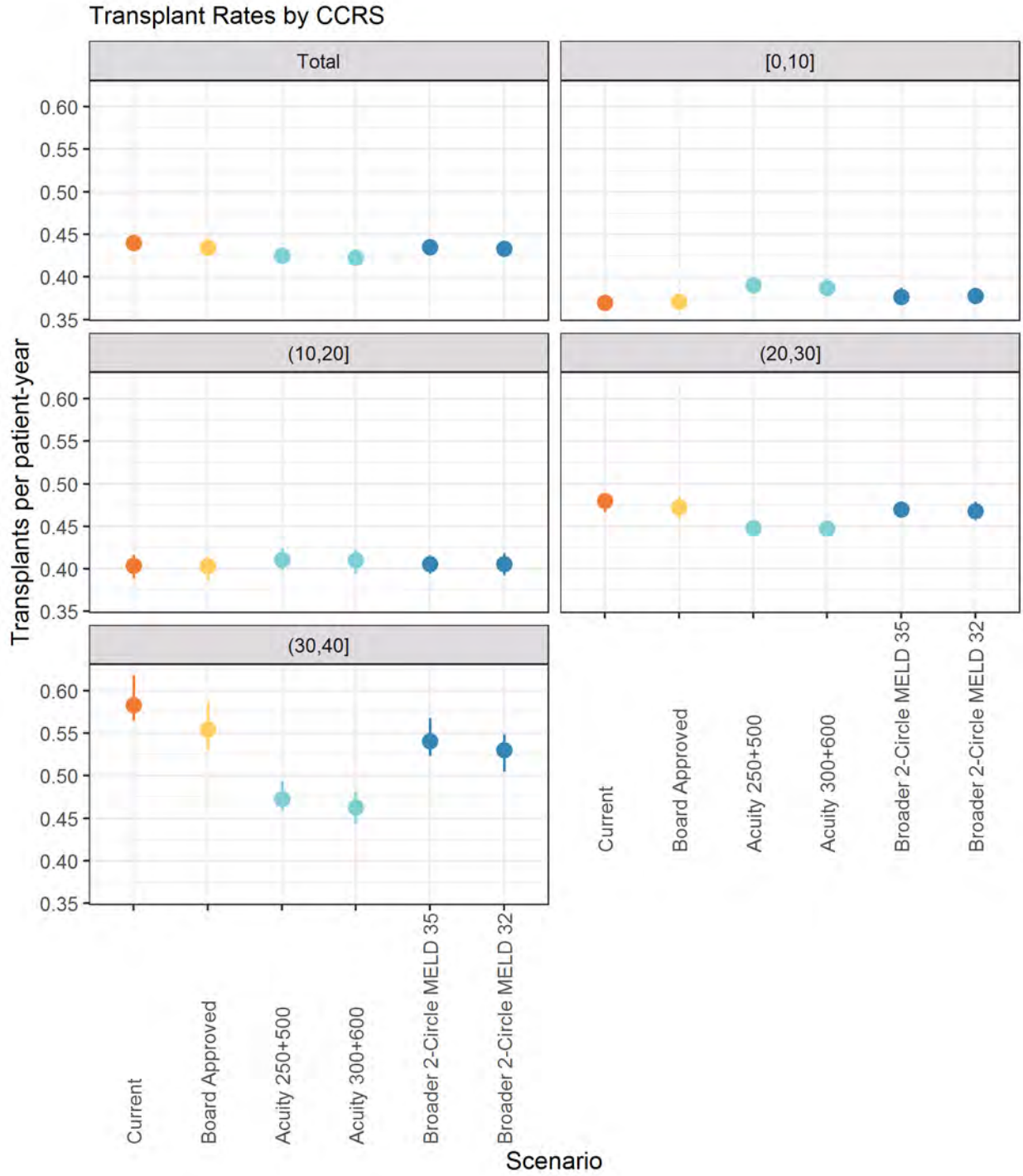


Figure 280 Transplant Rates by CCRS

Transplant Counts

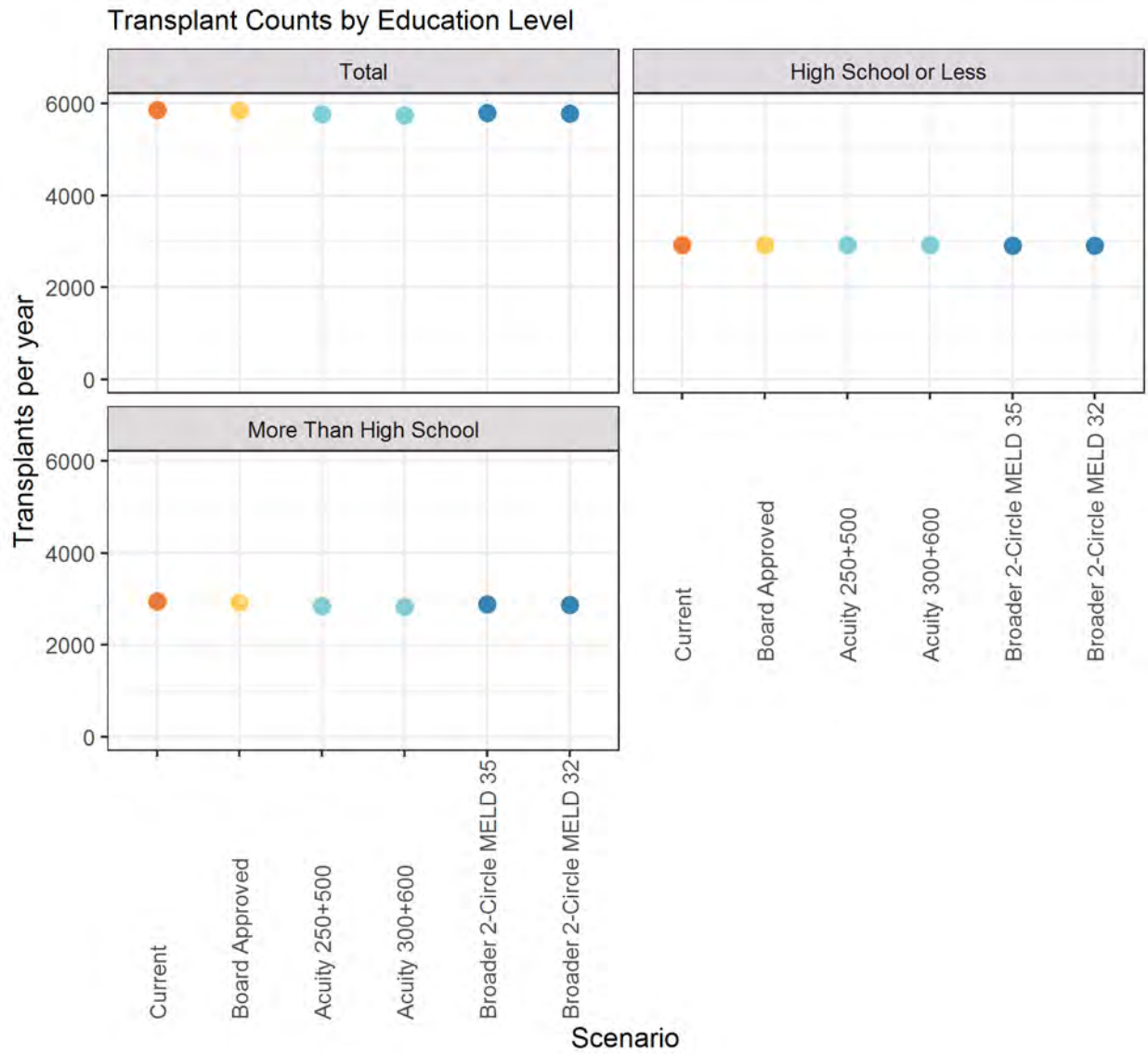


Figure 281 Transplant Counts by Education Level

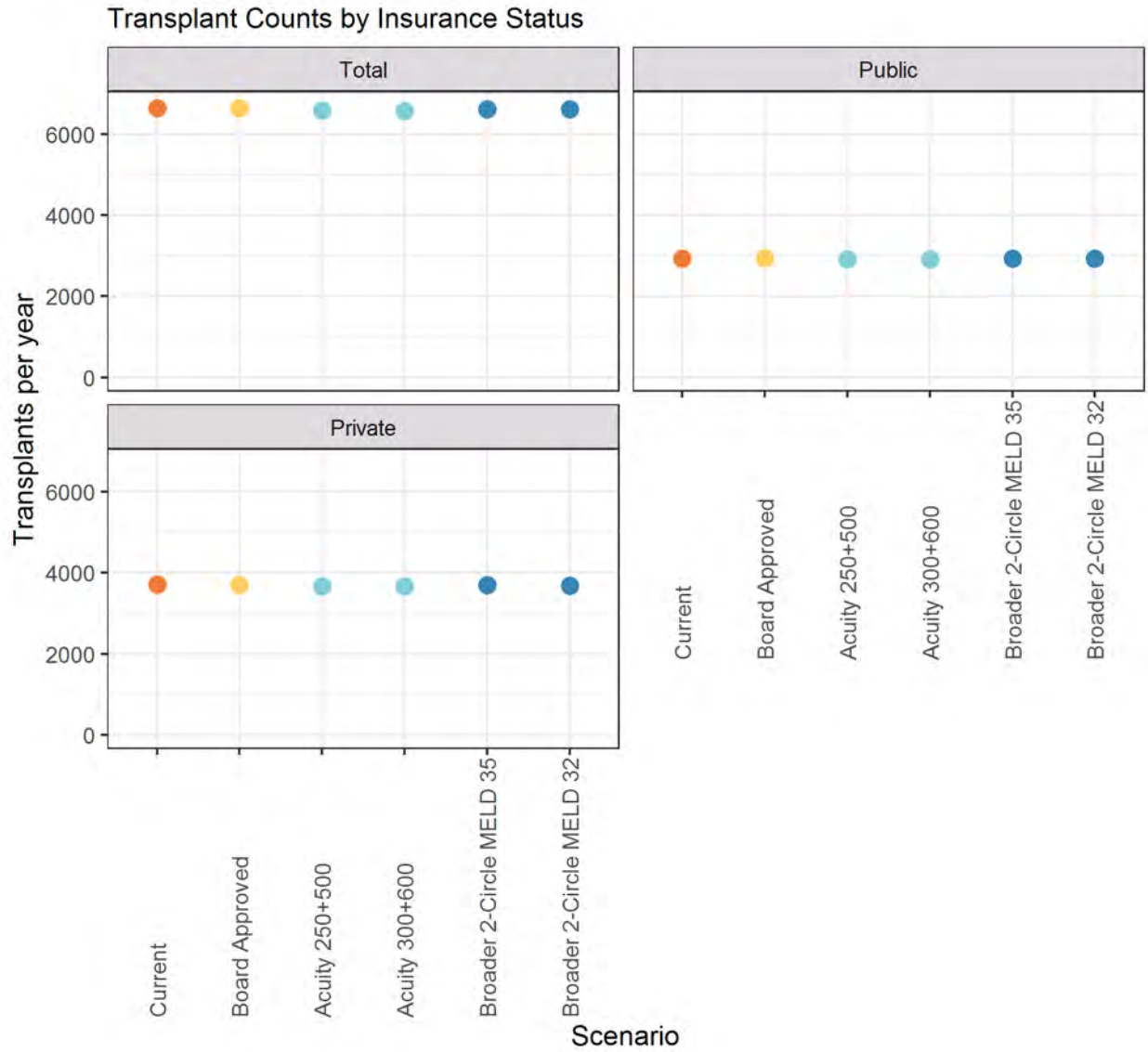


Figure 282 Transplant Counts by Insurance Status

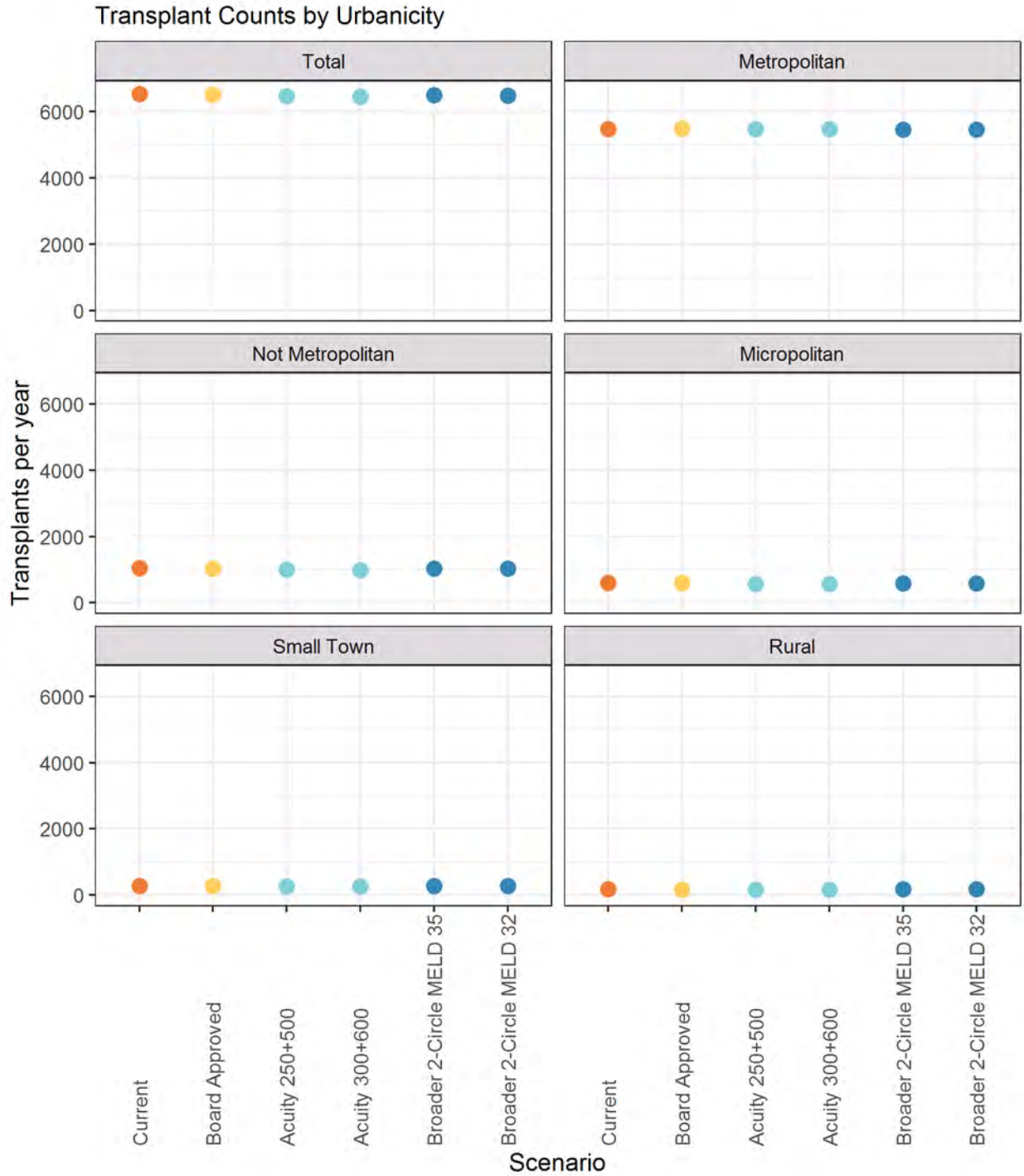


Figure 283 Transplant Counts by Urbanicity

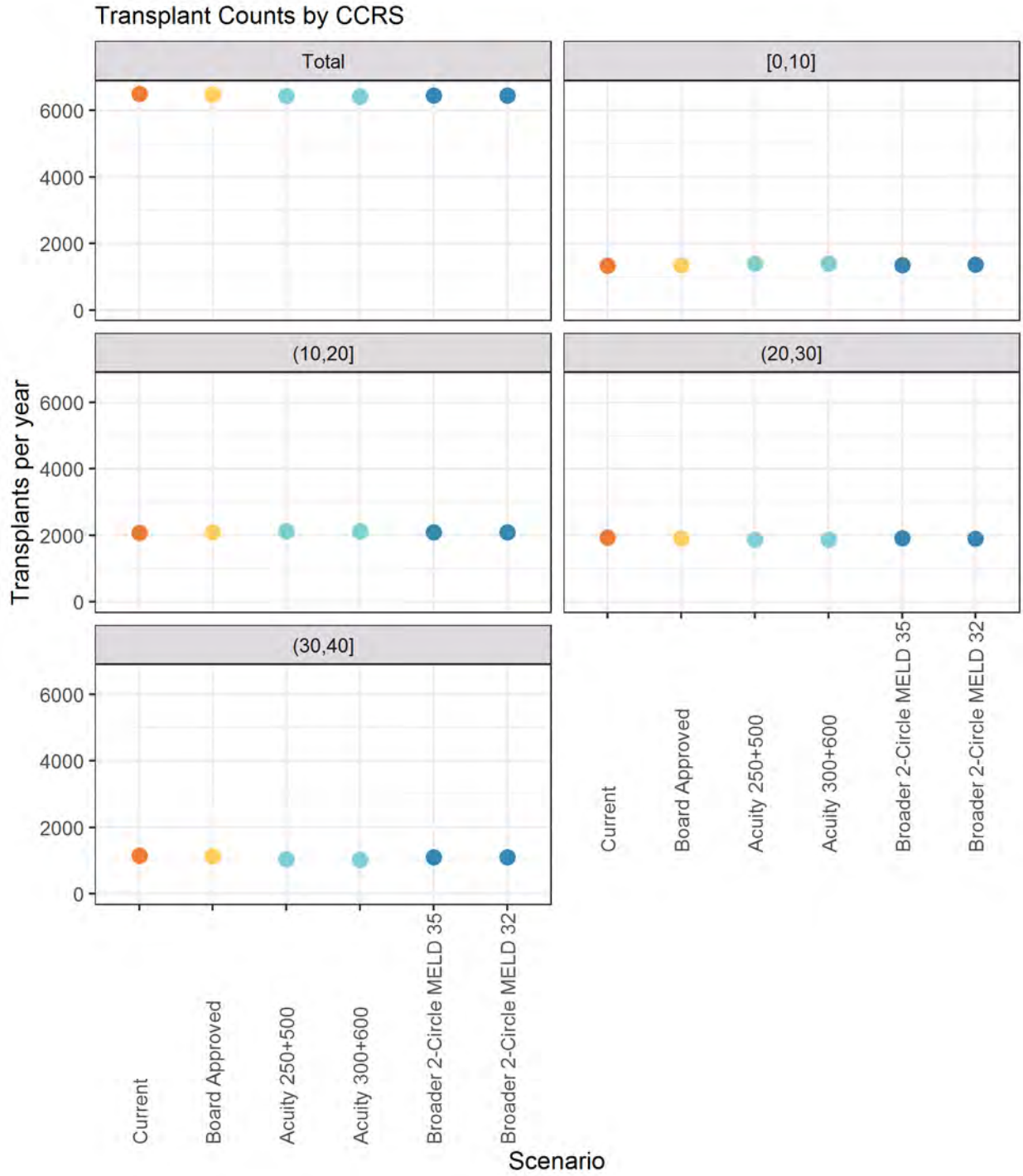


Figure 284 Transplant Counts by CCRS

Variance in Transplant Rates

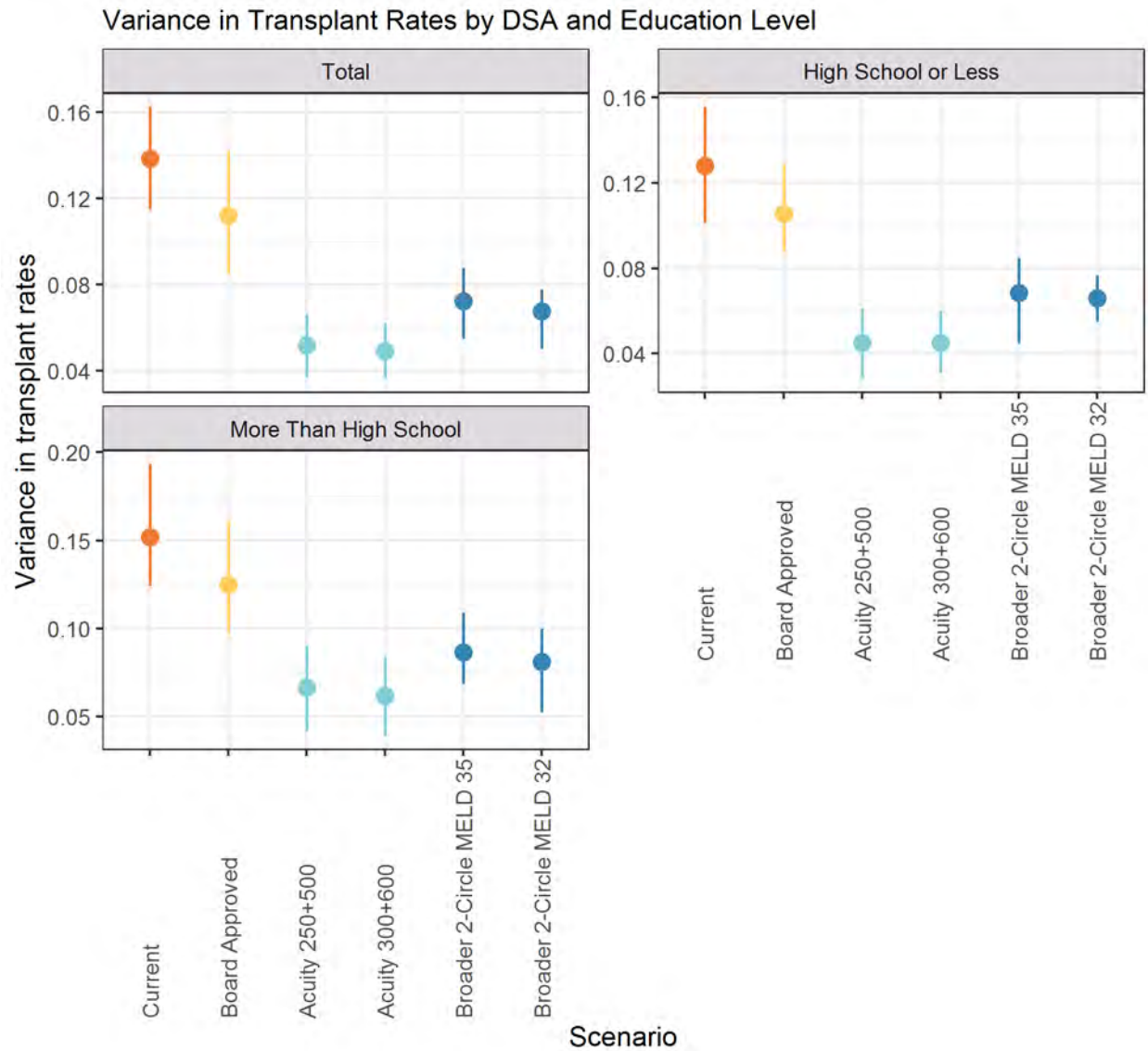


Figure 285 Variance in Transplant Rates by DSA and Education Level. Transplant rates were capped at the 99th percentile of all DSA and Education Level groups (4.5 transplants per patient-year) before calculating the variance.

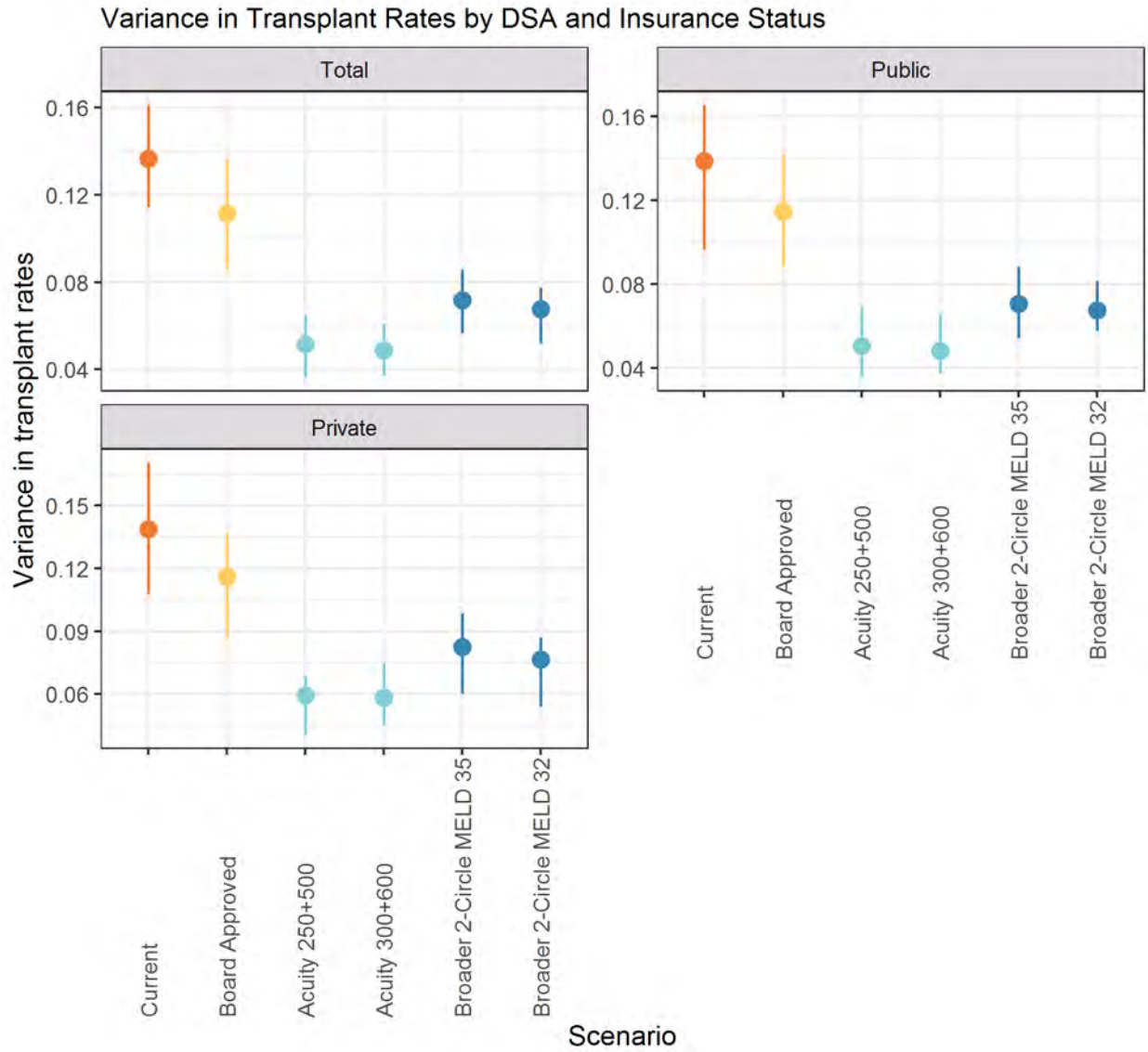


Figure 286 Variance in Transplant Rates by DSA and Insurance Status. Transplant rates were capped at the 99th percentile of all DSA and Insurance Status groups (2.3 transplants per patient-year) before calculating the variance.

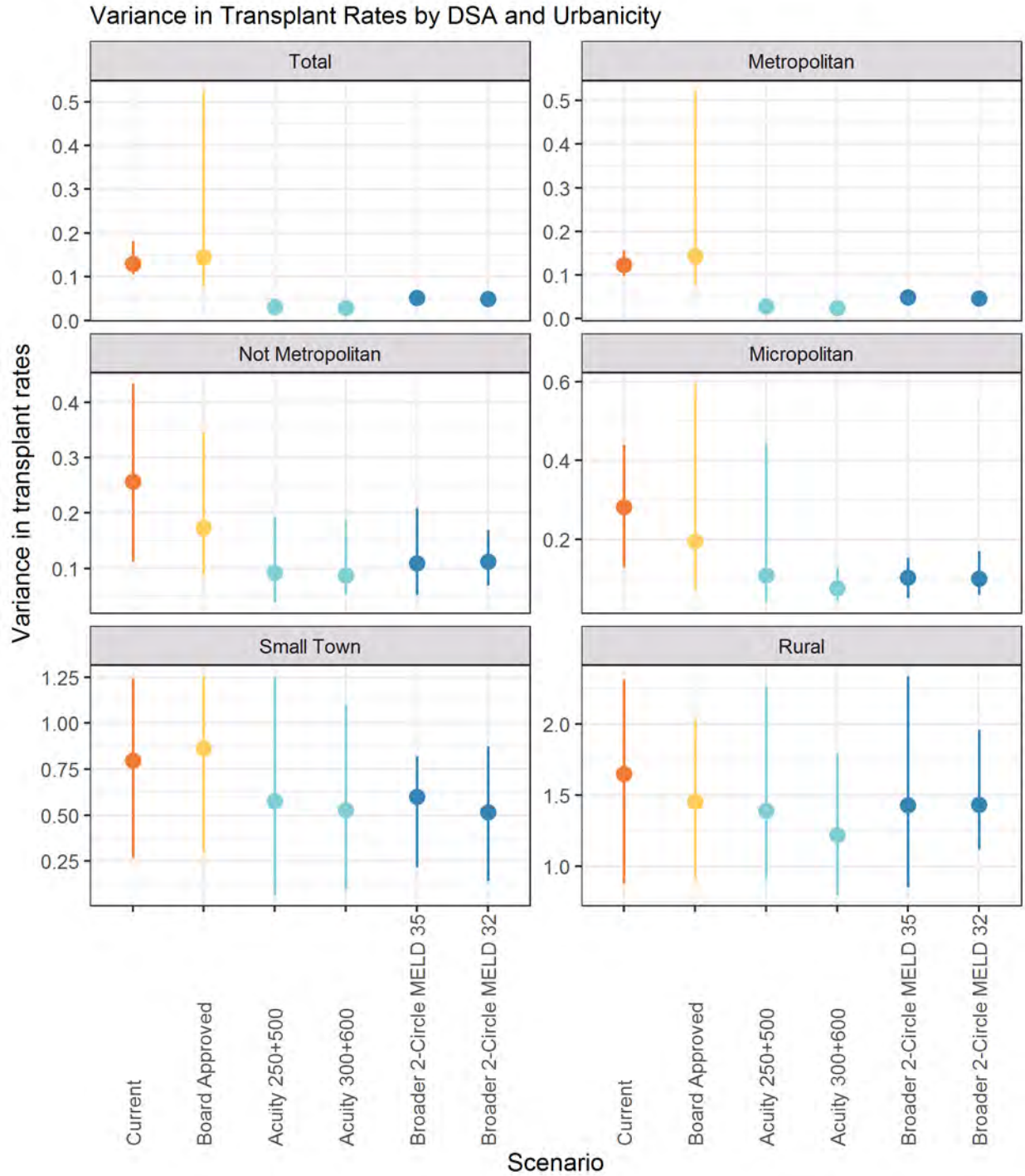


Figure 287 Variance in Transplant Rates by DSA and Urbanicity. Transplant rates were capped at the 99th percentile of all DSA and Urbanicity groups (15.7 transplants per patient-year) before calculating the variance.

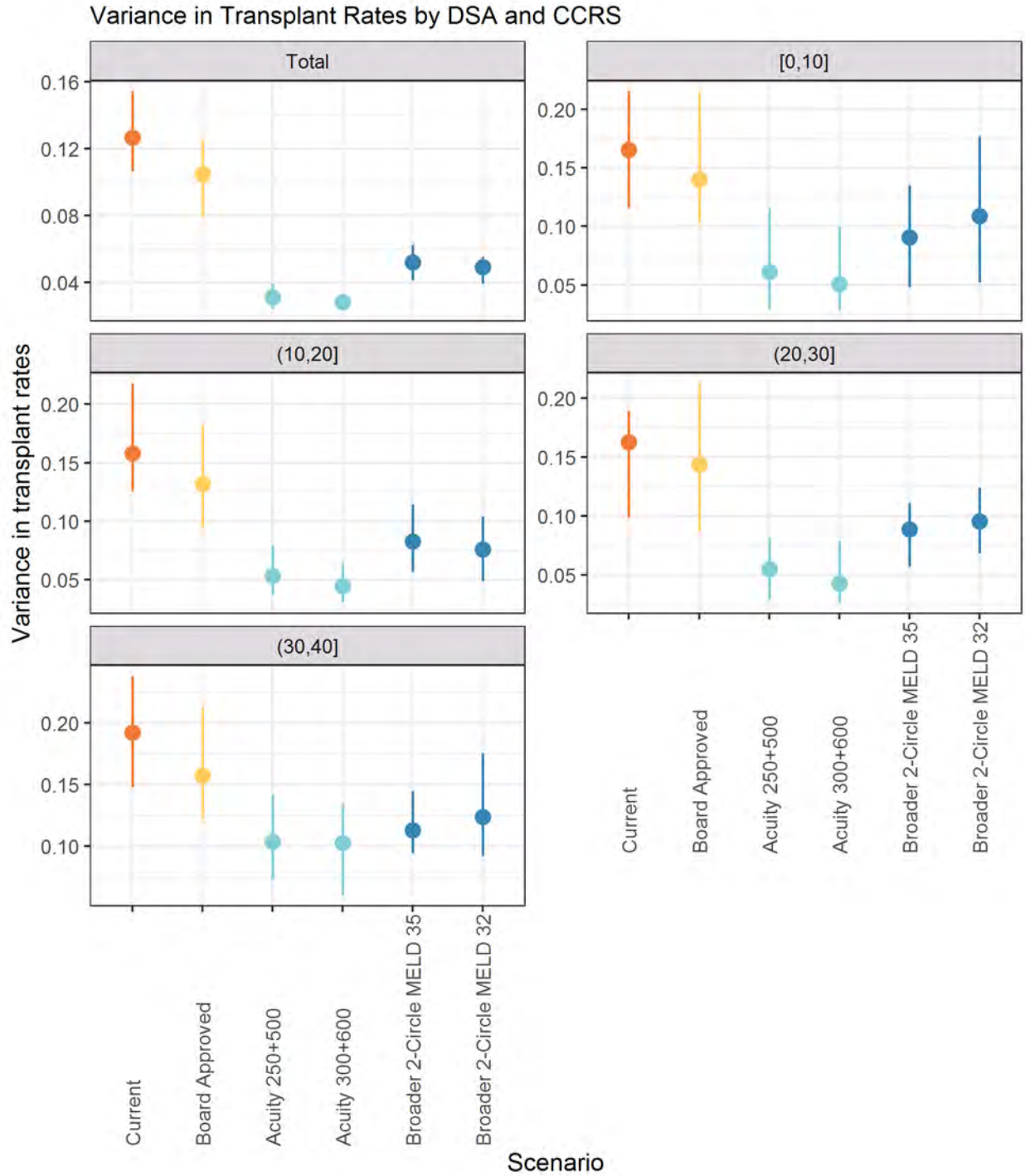


Figure 288 Variance in Transplant Rates by DSA and CCRS. Transplant rates were capped at the 99th percentile of all DSA and CCRS groups (5 transplants per patient-year) before calculating the variance.

Waitlist Mortality

Waitlist Mortality Rates

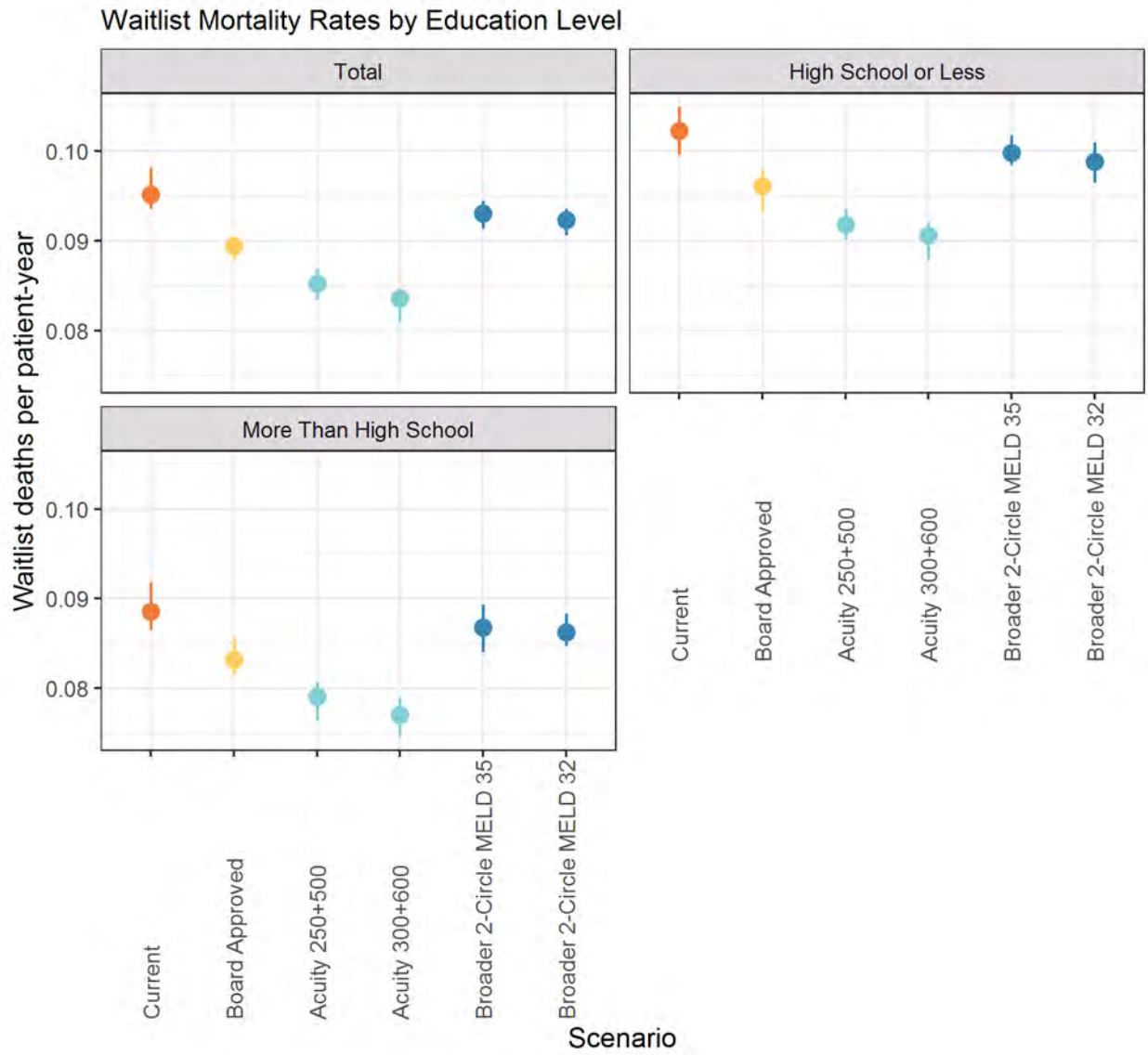


Figure 289 Waitlist Mortality Rates by Education Level

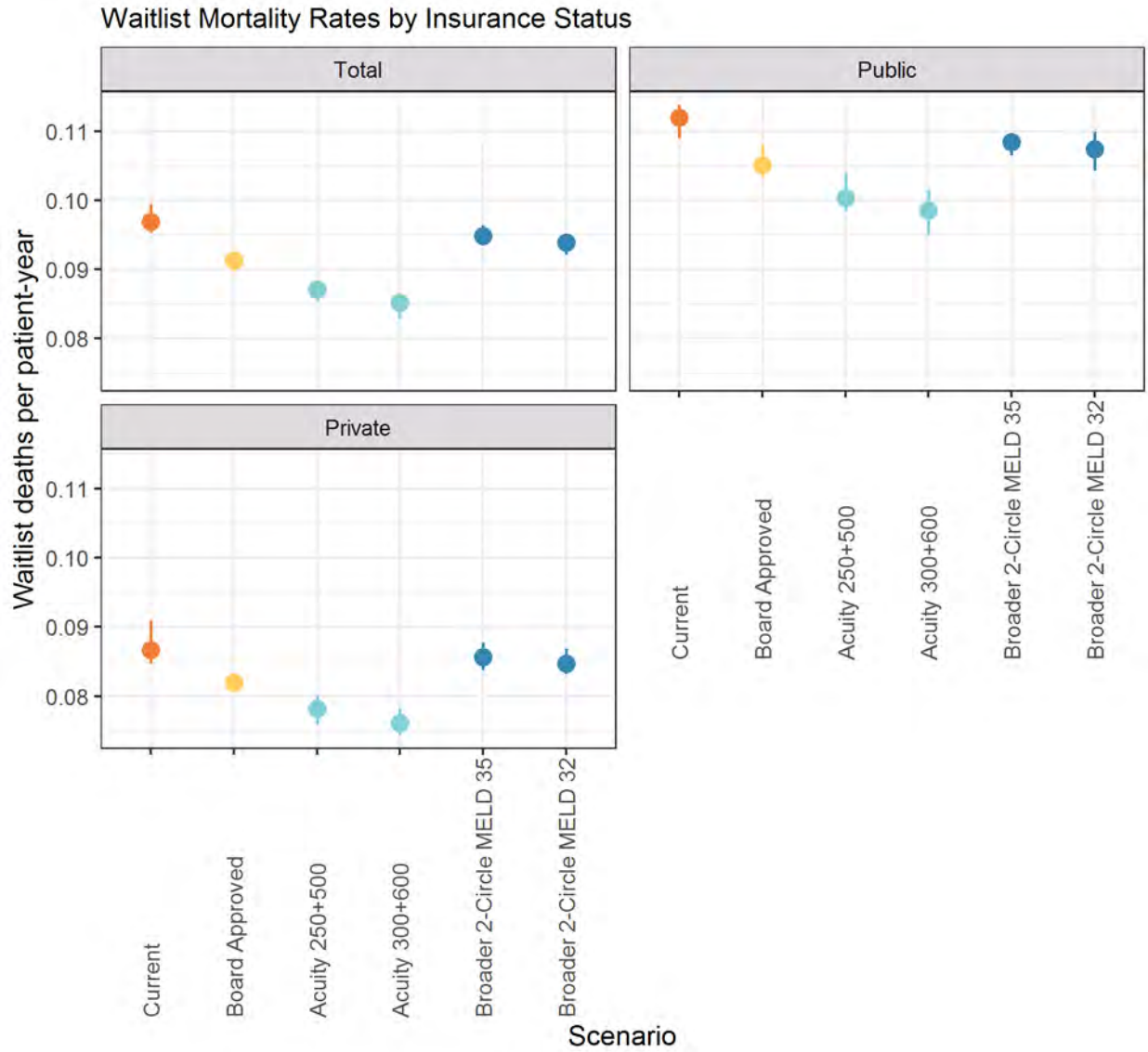


Figure 290 Waitlist Mortality Rates by Insurance Status

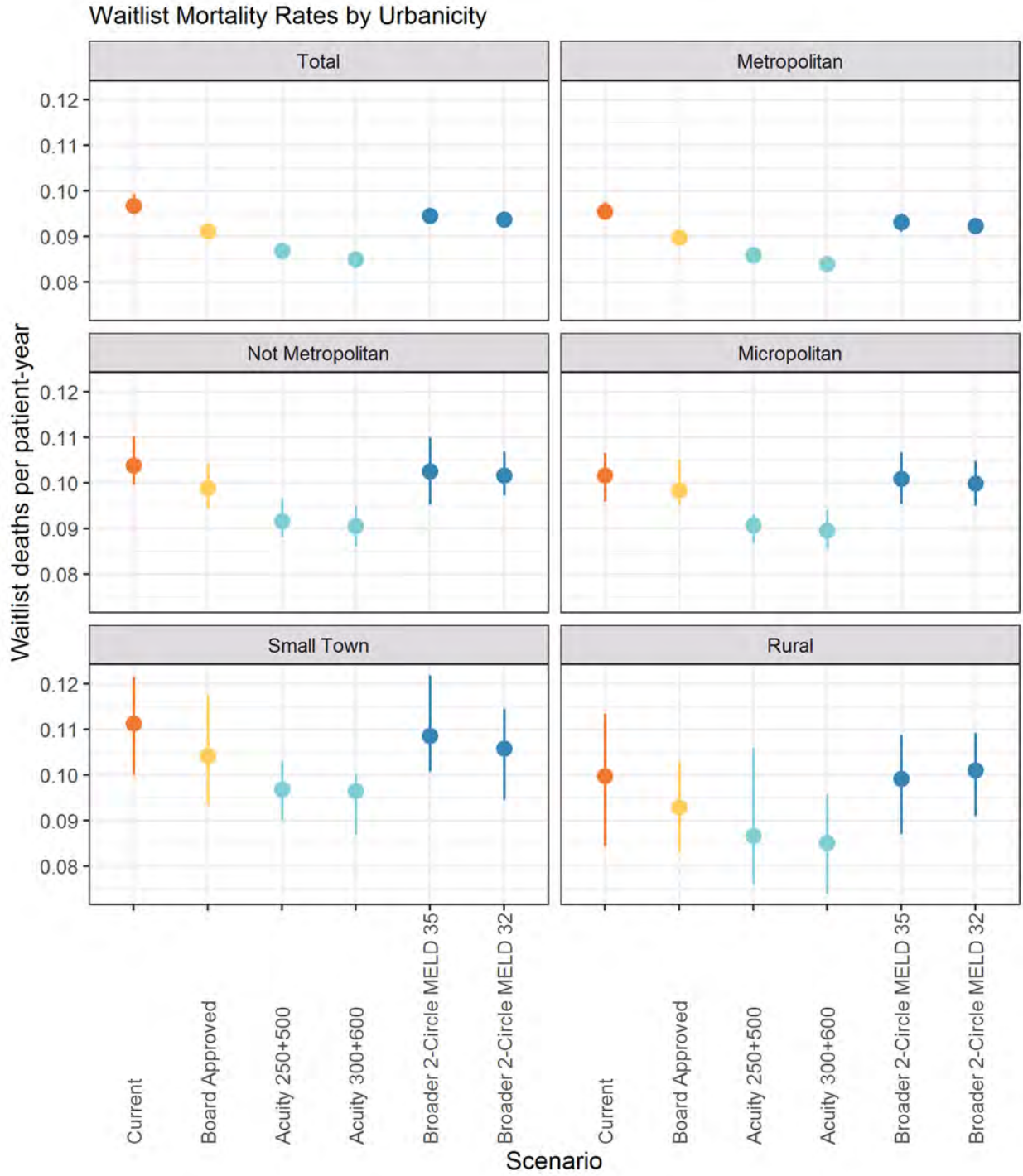


Figure 291 Waitlist Mortality Rates by Urbanicity

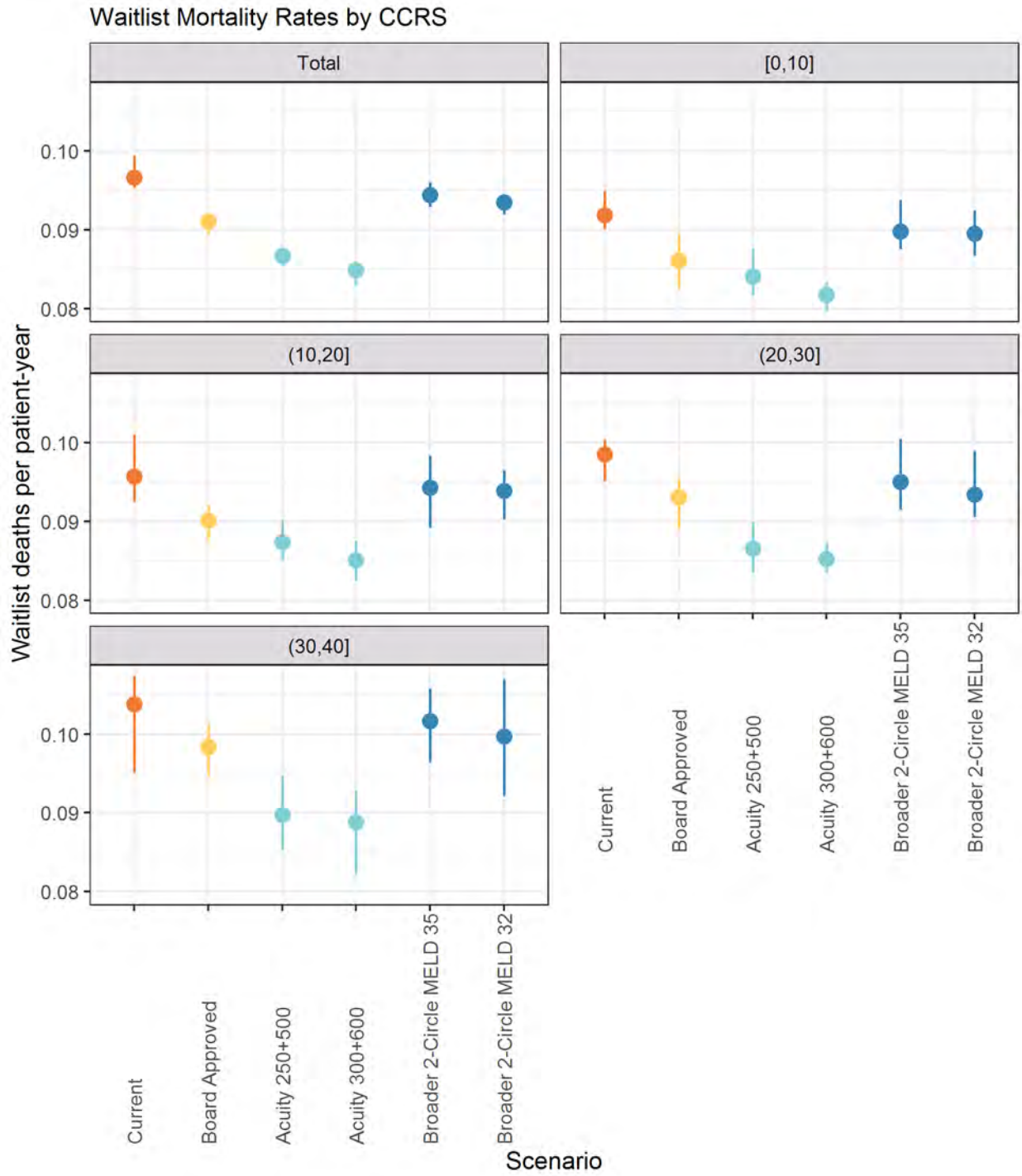


Figure 292 Waitlist Mortality Rates by CCRS

Waitlist Mortality Counts

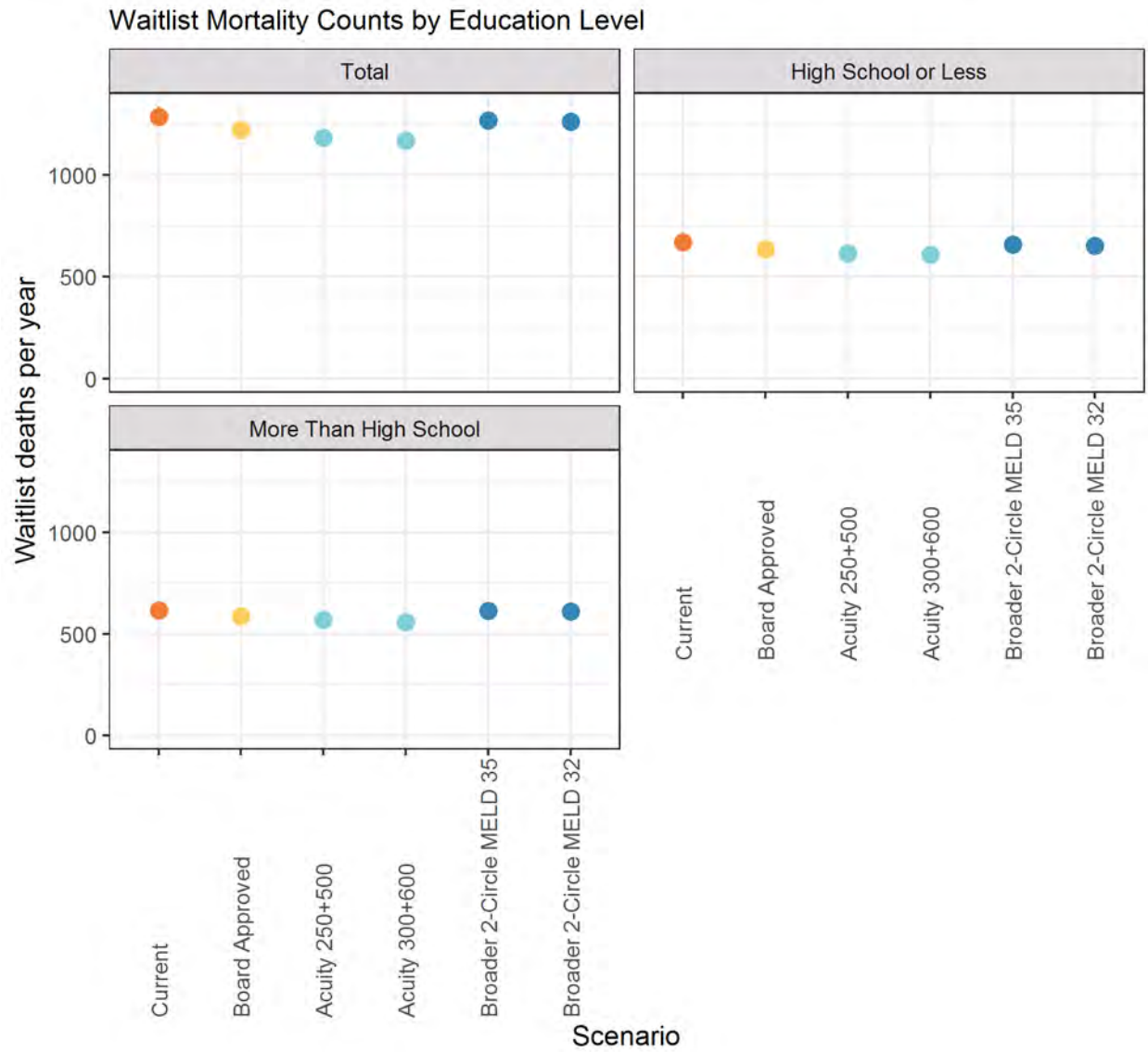


Figure 293 Waitlist Mortality Counts by Education Level

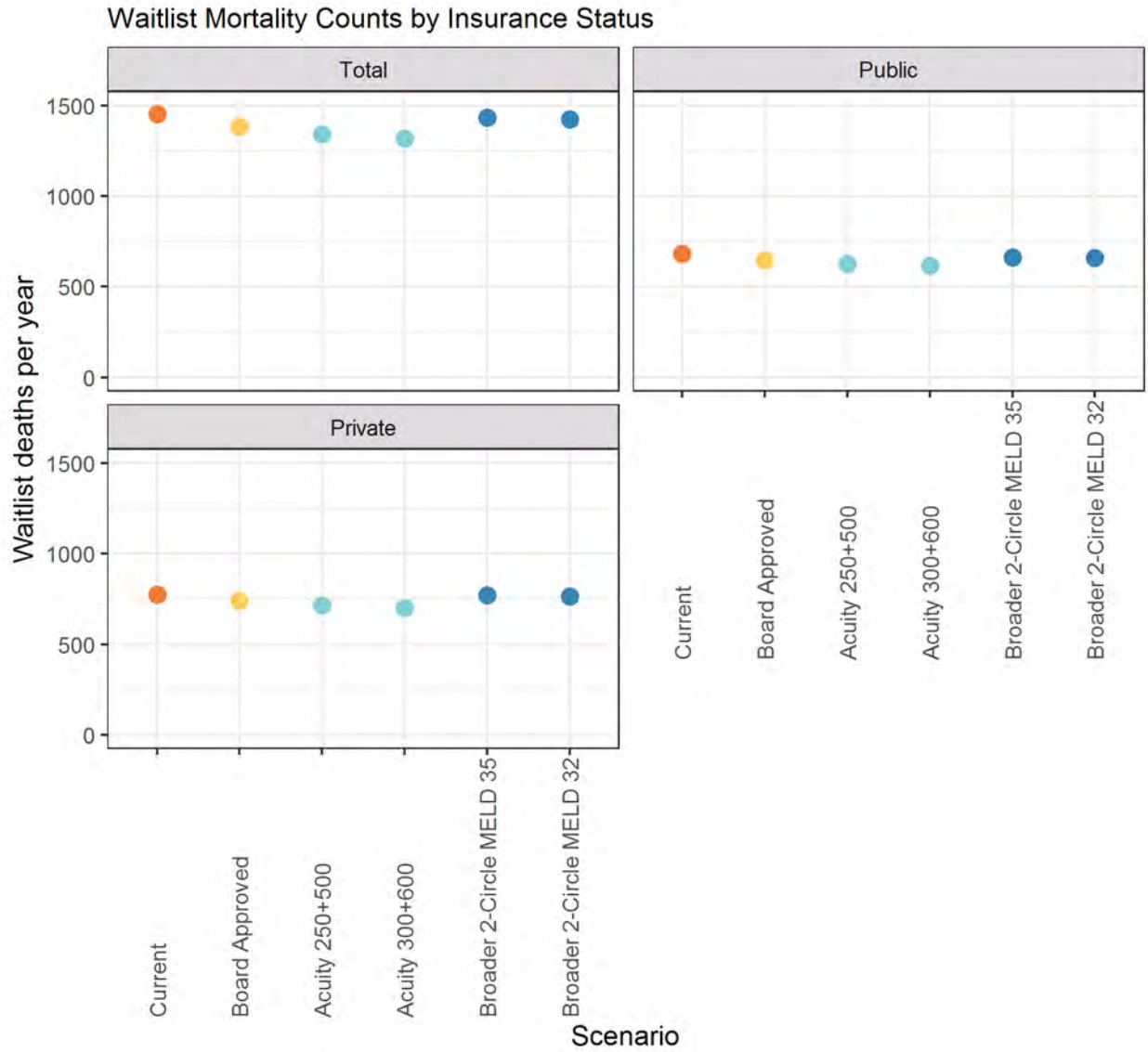


Figure 294 Waitlist Mortality Counts by Insurance Status

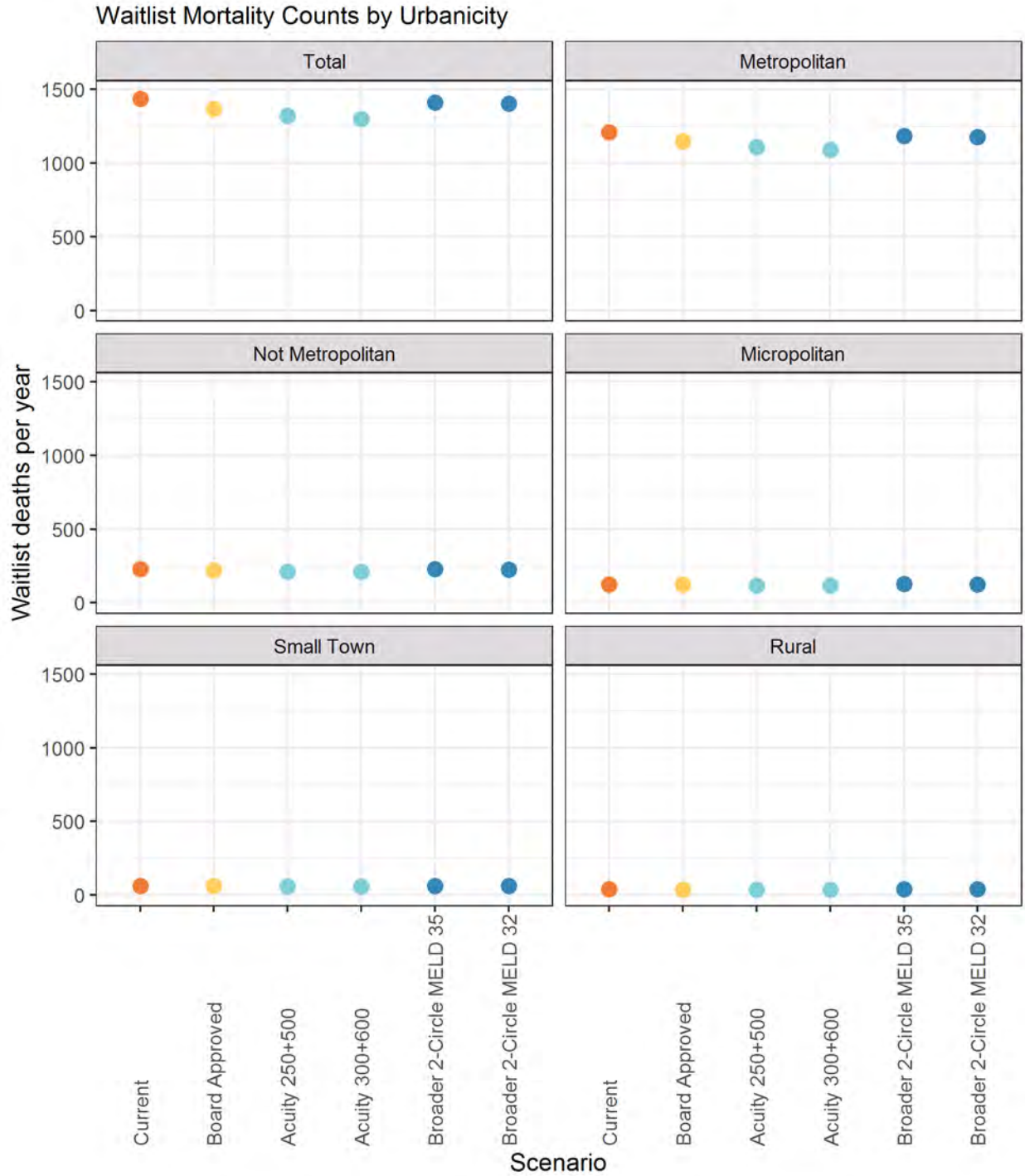


Figure 295 Waitlist Mortality Counts by Urbanicity

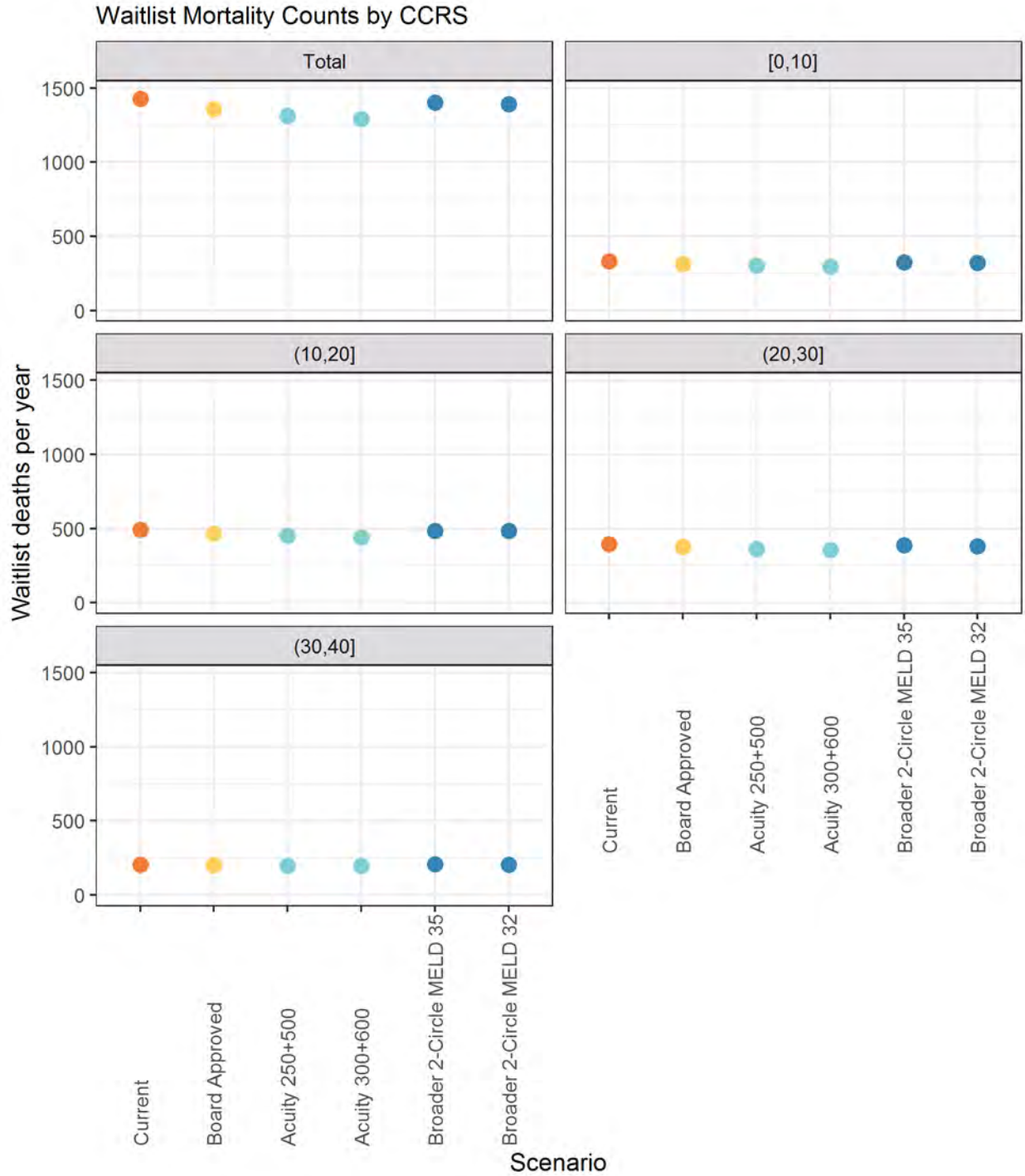


Figure 296 Waitlist Mortality Counts by CCRS

Variance in Waitlist Mortality Rates

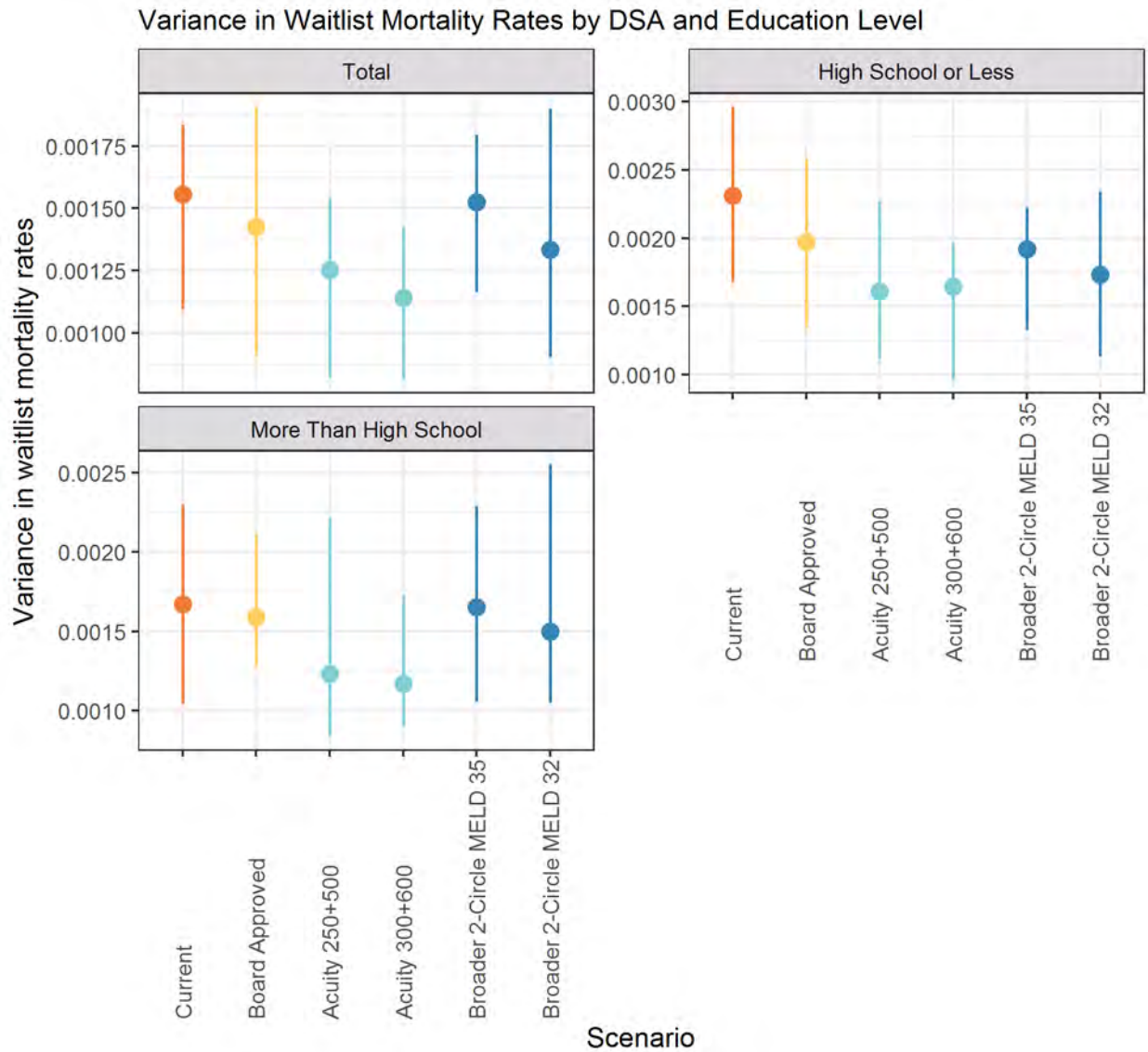


Figure 297 Variance in Waitlist Mortality Rates by DSA and Education Level. Waitlist mortality rates were capped at the 99th percentile of all DSA and Education Level groups (0.6 waitlist deaths per patient-year) before calculating the variance.

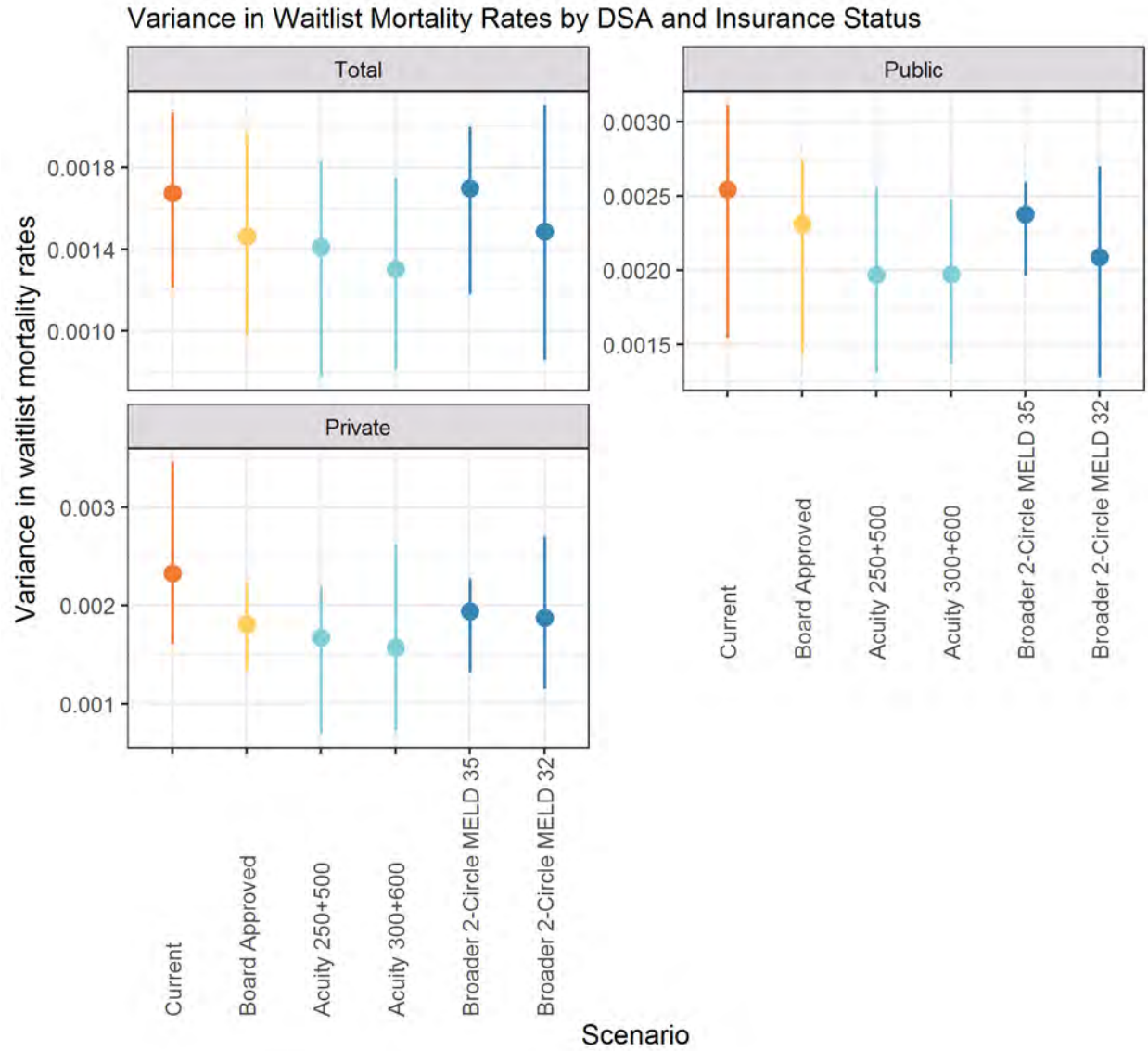


Figure 298 Variance in Waitlist Mortality Rates by DSA and Insurance Status. Waitlist mortality rates were capped at the 99th percentile of all DSA and Insurance Status groups (0.3 waitlist deaths per patient-year) before calculating the variance.

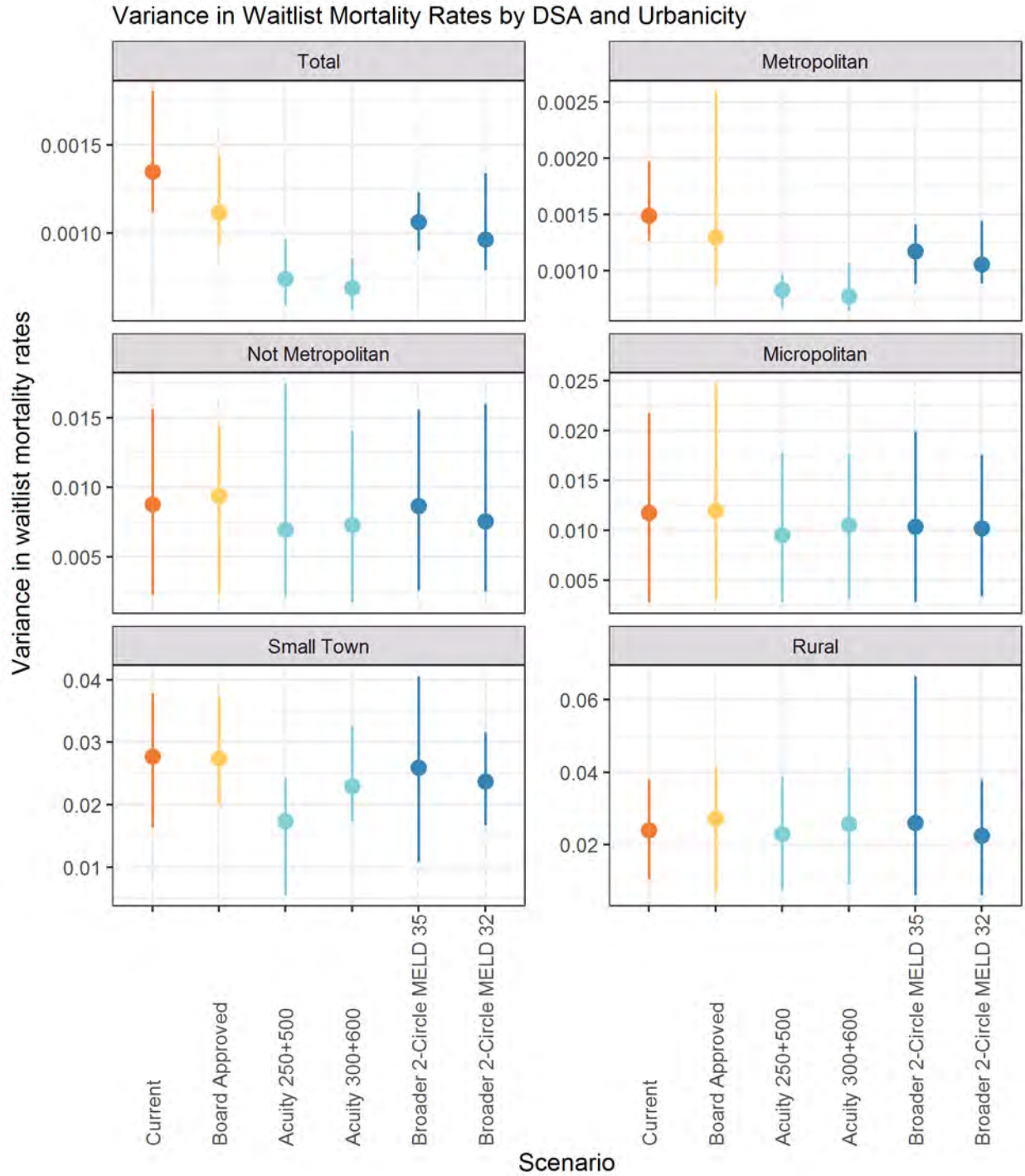


Figure 299 Variance in Waitlist Mortality Rates by DSA and Urbanicity. Waitlist mortality rates were capped at the 99th percentile of all DSA and Urbanicity groups (1.7 waitlist deaths per patient-year) before calculating the variance.

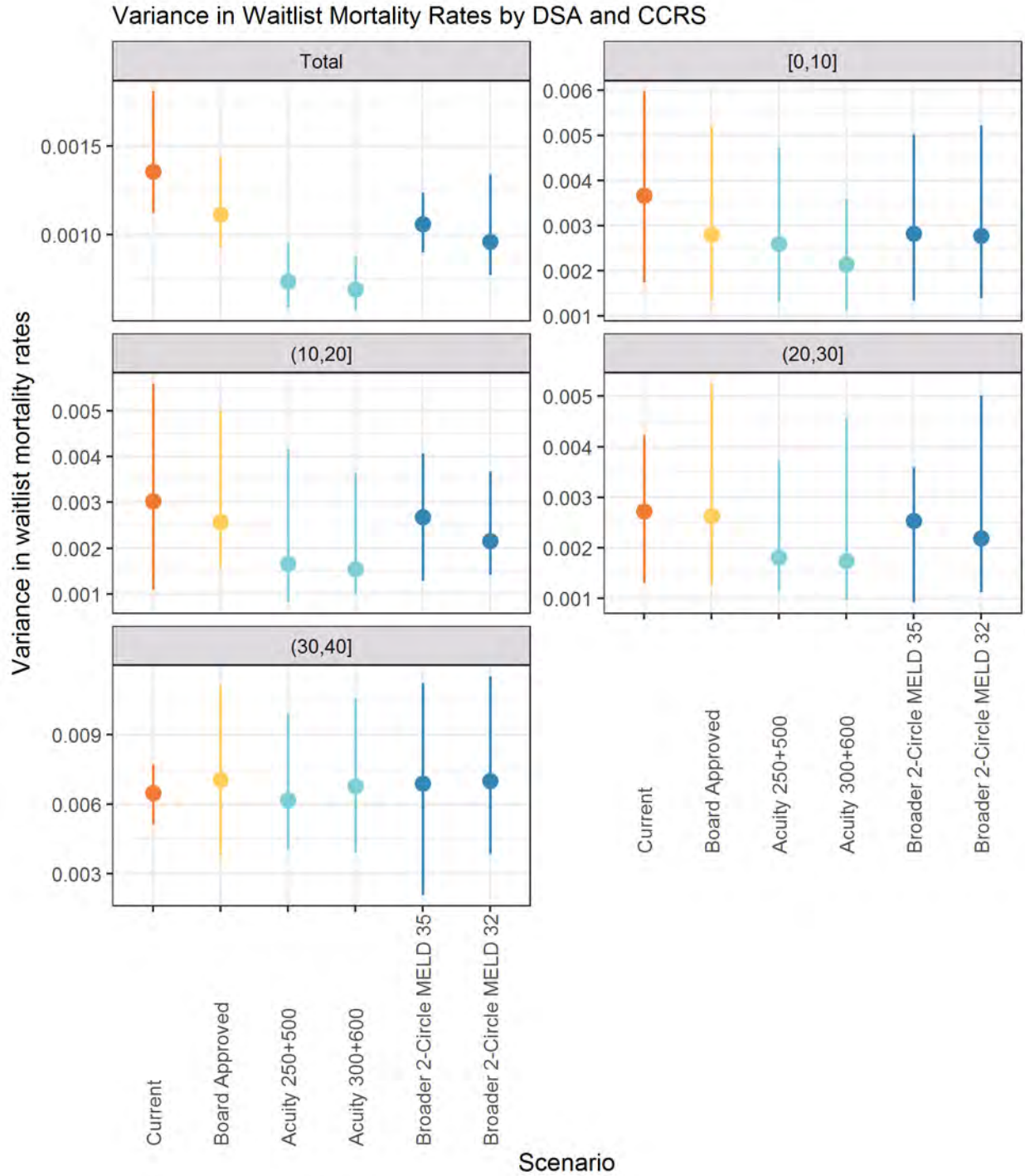


Figure 300 Variance in Waitlist Mortality Rates by DSA and CCRS. Waitlist mortality rates were capped at the 99th percentile of all DSA and CCRS groups (0.7 waitlist deaths per patient-year) before calculating the variance.

Posttransplant Mortality

Posttransplant Mortality Rates

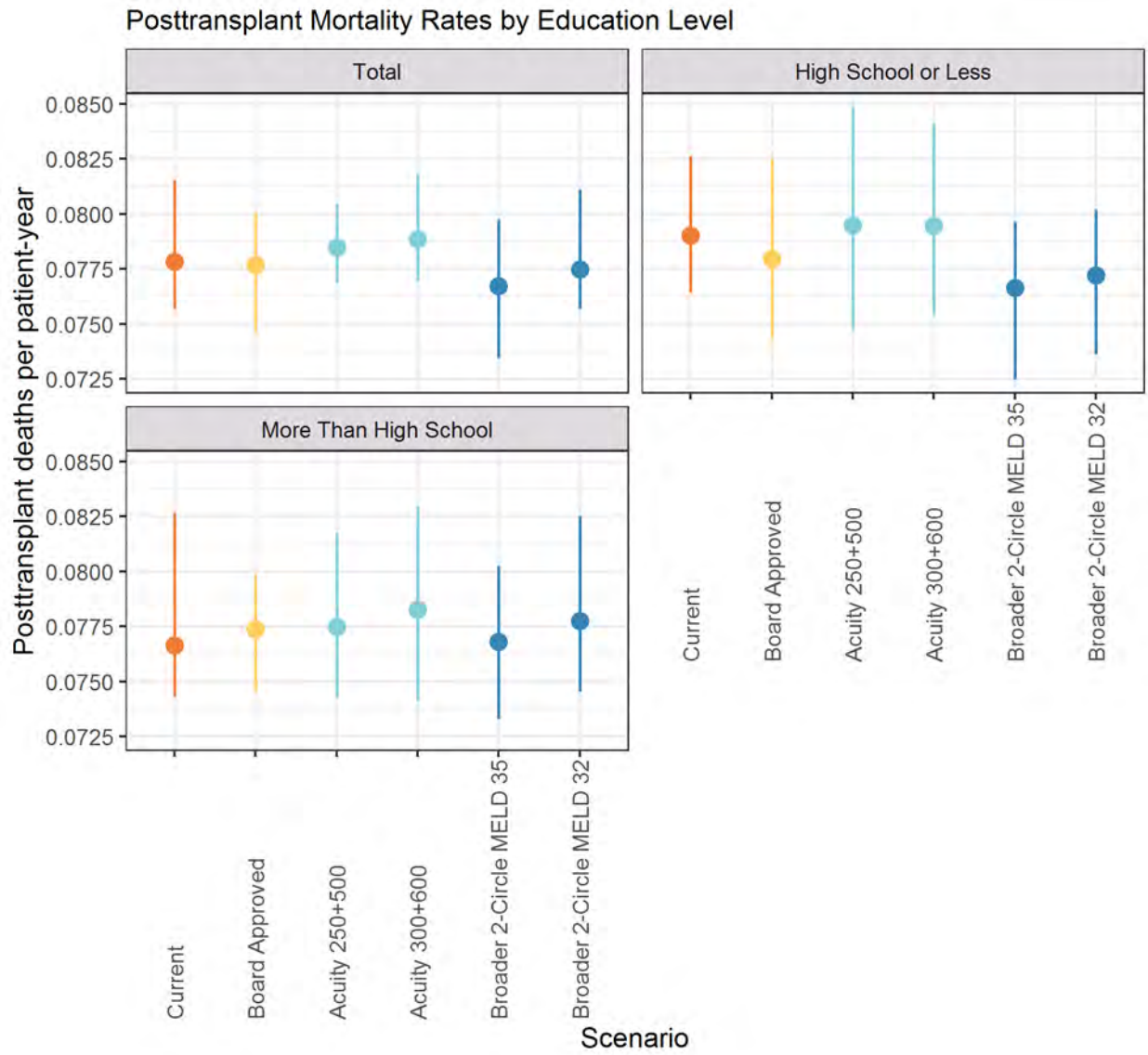


Figure 301 Posttransplant Mortality Rates by Education Level

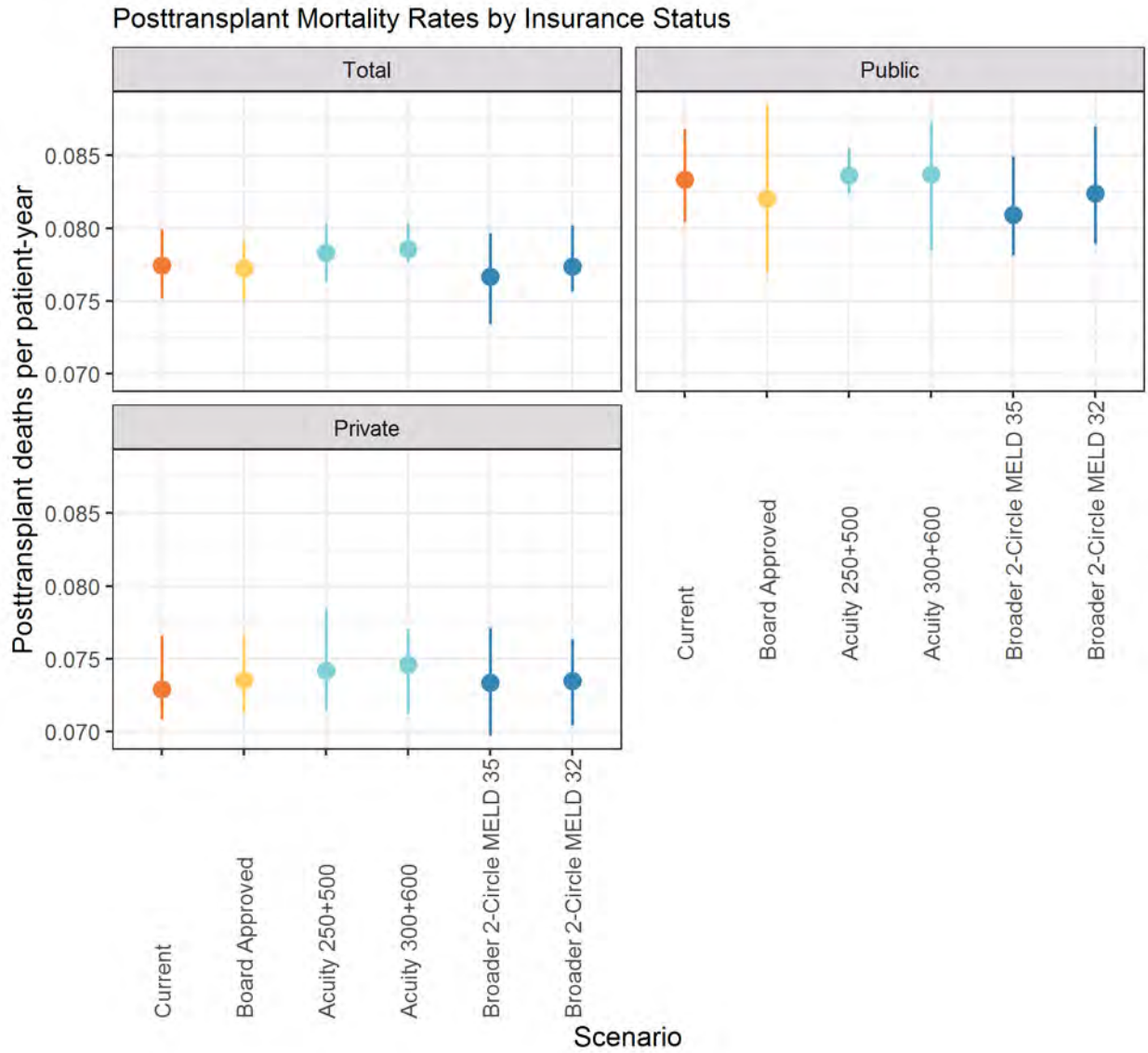


Figure 302 Posttransplant Mortality Rates by Insurance Status

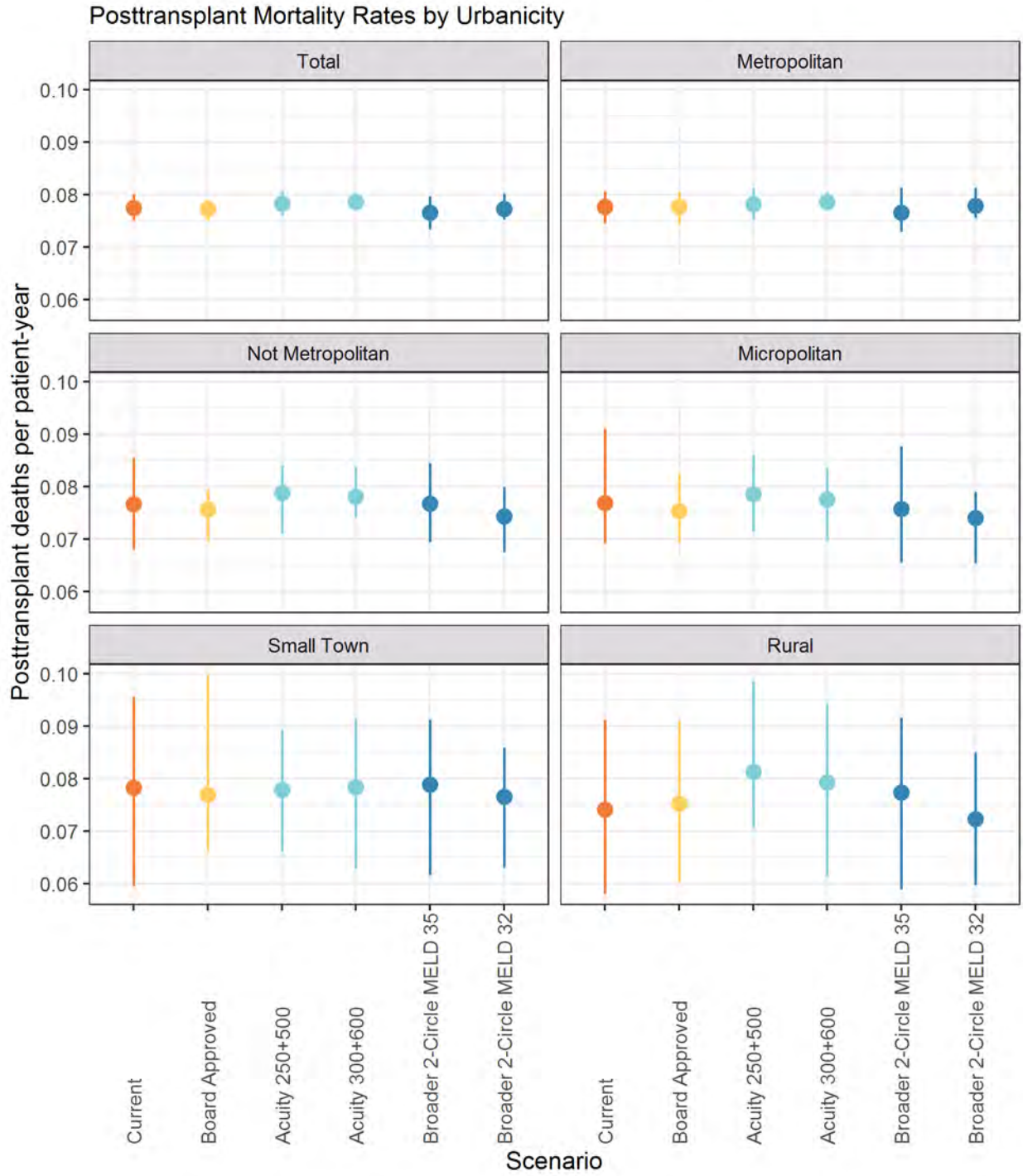


Figure 303 Posttransplant Mortality Rates by Urbanicity

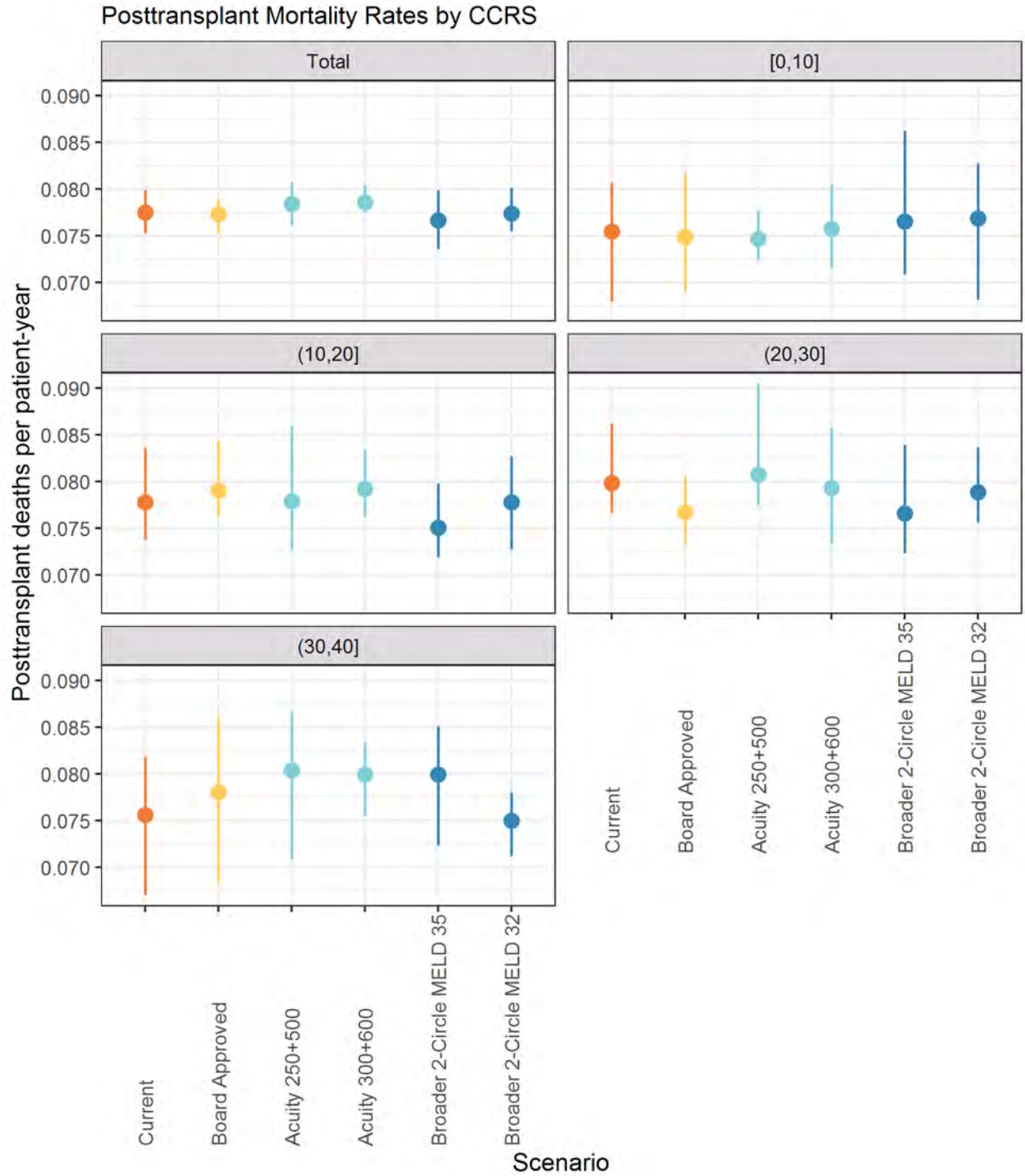


Figure 304 Posttransplant Mortality Rates by CCRS

Posttransplant Mortality Counts

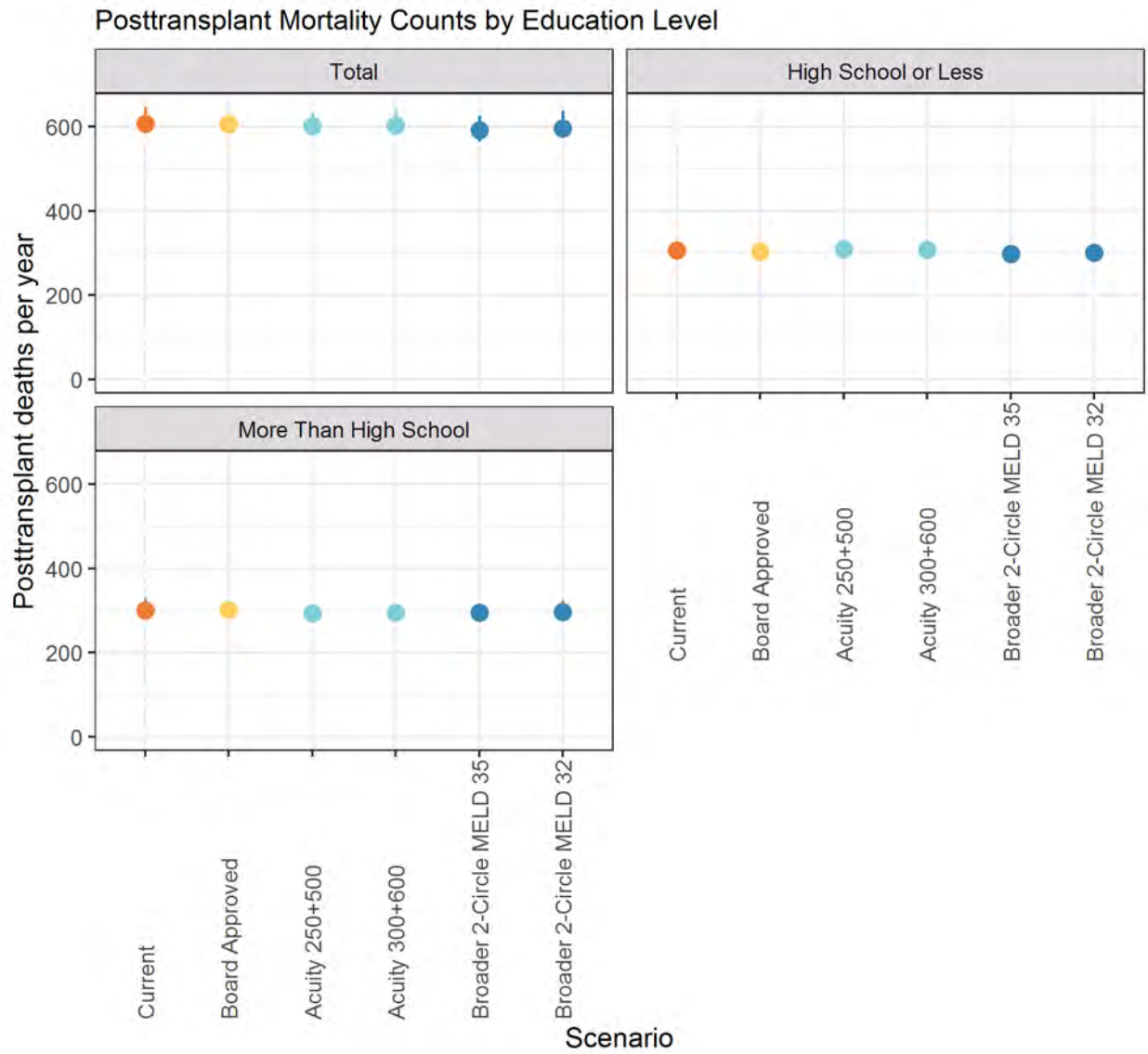


Figure 305 Posttransplant Mortality Counts by Education Level

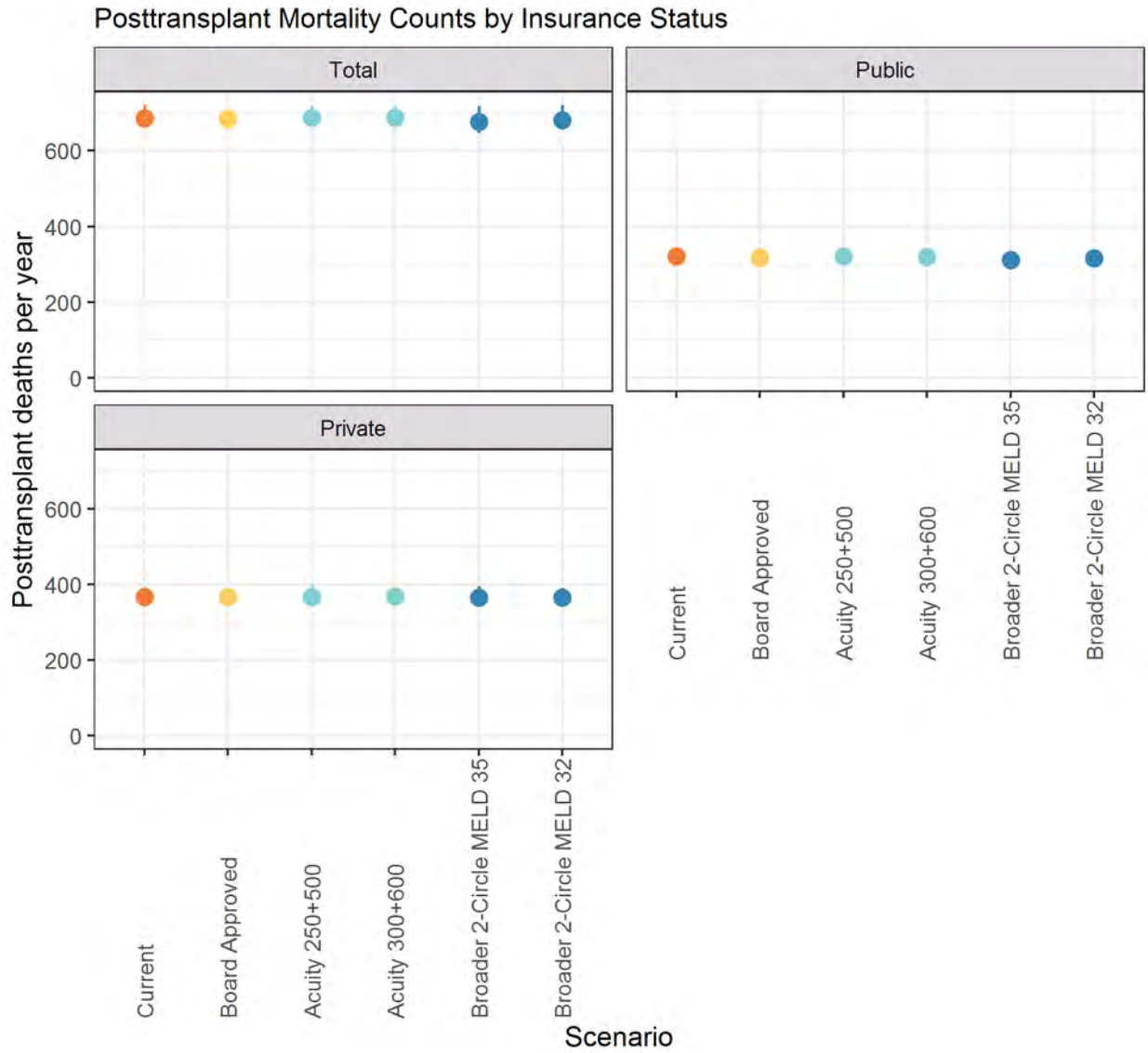


Figure 306 Posttransplant Mortality Counts by Insurance Status

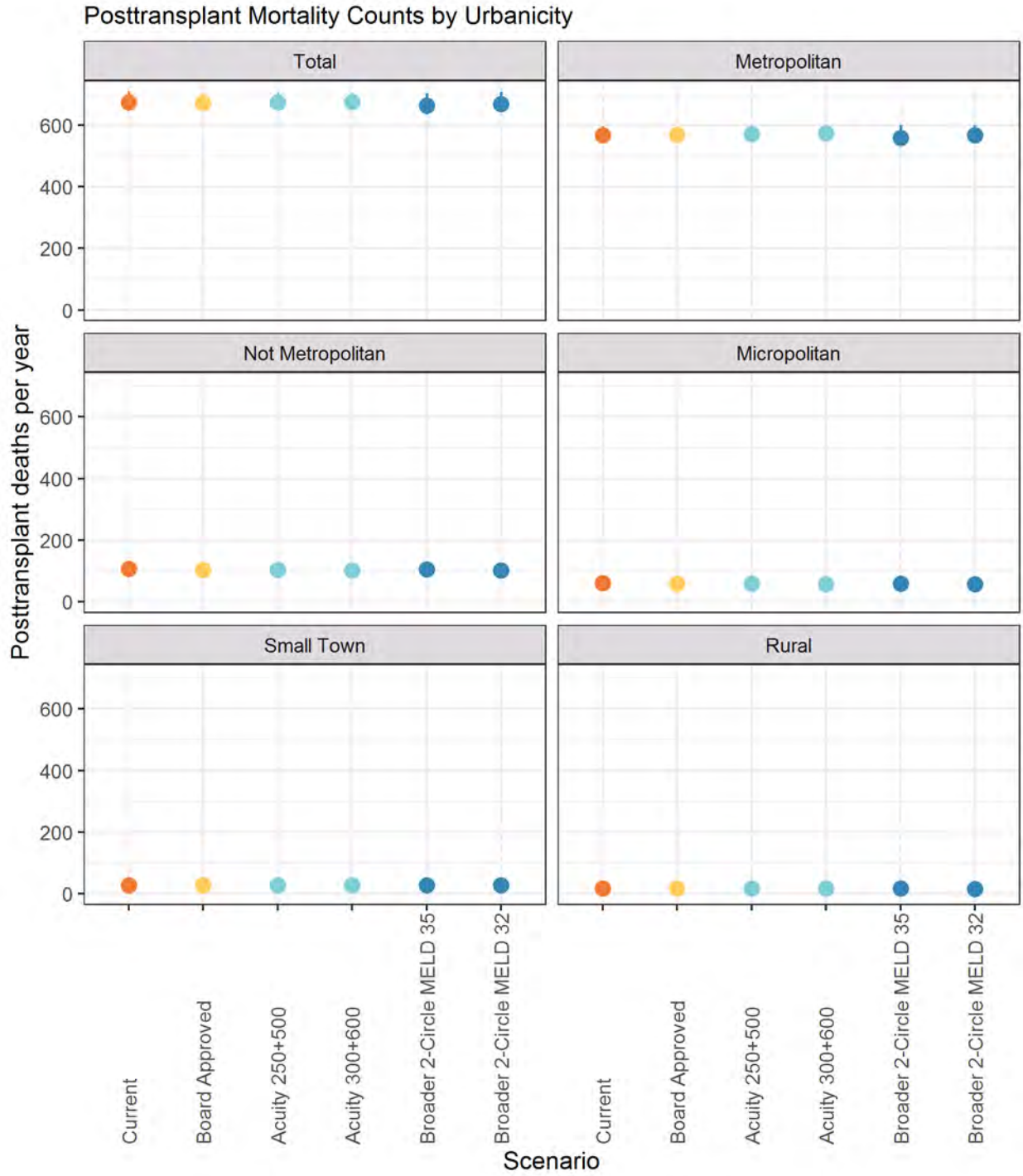


Figure 307 Posttransplant Mortality Counts by Urbanicity

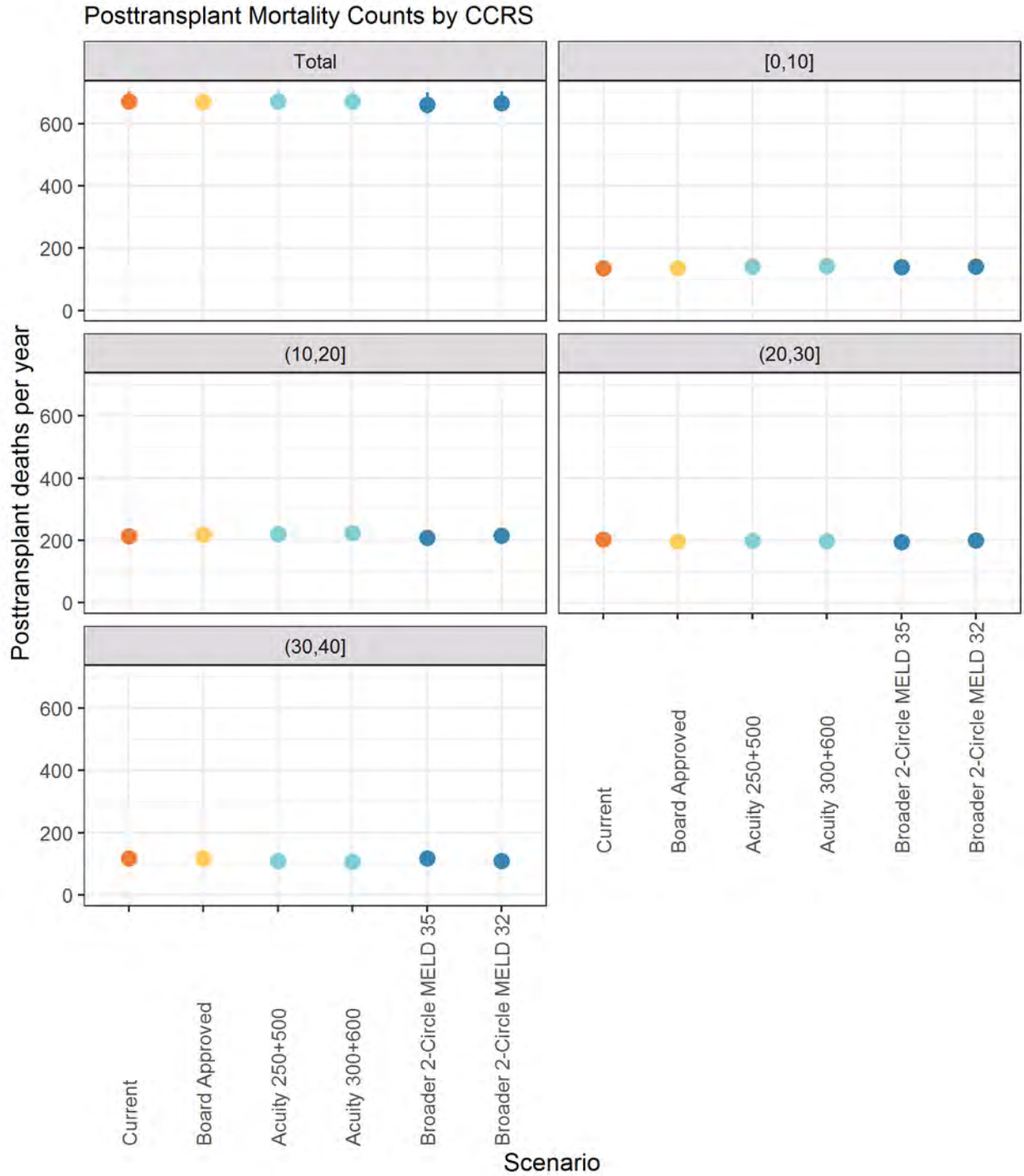


Figure 308 Posttransplant Mortality Counts by CCRS

Appendix D: Policy and Scientific Concepts

This section provides a brief overview of policy concepts used in conversations regarding liver redistribution and in this report.

Area of Distribution

Distribution indicates the geographic area within which available donor organs are distributed. For the current liver allocation policy organs are distributed within the DSA, the OPTN region, and nationally. See [OPTN Policy 9.6.E - 9.6.G](#) for more detail.

The scenarios being examined in this report allocate to three sizes of concentric circles (small, medium, large) around the donor's center and nationally.

Allocation

Allocation indicates the process by which available donor organs are distributed. For liver transplant, organs are generally allocated by model for end-stage liver disease (MELD) and pediatric end-stage liver disease (PELD) scores and by blood type and waiting time. See [OPTN Policy 9](#) for more detail.

Simulation modeling

One method used for policy evaluation is simulation modeling. Simulation modeling uses data and software to simulate the functioning of the nationwide liver transplant system. Patients are listed on the waiting list, donor organs arrive, and transplants occur, just as in real life. Policy conditions can be modified within the simulations, allowing us to examine the probable outcomes of various policy scenarios in a way that is close to real life without putting patients at risk.

The software tool that SRTR uses to conduct simulation modeling of the US liver transplant system is the liver simulated allocation model (LSAM). The LSAM is a discrete-event simulation of the liver allocation system, which simulates the allocation of donated livers to waitlisted candidates by drawing on historical patient data including candidate listing, candidate status changes, and organ donations.

Appendix E: Allocation Sequences

Acuity Circles

The following allocation sequences are used for the 'Acuity Circles' allocation framework, with the two scenarios having different sized circles.

Scenario 3 radii:

- Small Circle: 150nm
- Medium Circle: 250nm
- Large Circle: 500nm

Scenario 4 radii:

- Small Circle: 150nm
- Medium Circle: 300nm
- Large Circle: 600nm

Allocation of Livers from Non-DCD Deceased Donors at Least 18 Years Old and Less than 70 Years Old:

1. Large Circle: Adult or pediatric status 1A
2. Large Circle: Pediatric status 1B
3. Small Circle: MELD/PELD \geq 37
4. Medium Circle: MELD/PELD \geq 37
5. Large Circle: MELD/PELD \geq 37
6. Small Circle: MELD/PELD in [33, 37)
7. Medium Circle: MELD/PELD in [33, 37)
8. Large Circle: MELD/PELD in [33, 37)
9. Small Circle: MELD/PELD in [29, 33)
10. Medium Circle: MELD/PELD in [29, 33)
11. Large Circle: MELD/PELD in [29, 33)
12. Small Circle: MELD/PELD in [15, 29)
13. Medium Circle: MELD/PELD in [15, 29)
14. Large Circle: MELD/PELD in [15, 29)
15. National: Adult or Pediatric Status 1A
16. National: Pediatric Status 1B
17. National: MELD/PELD \geq 15
18. Small Circle: MELD/PELD $<$ 15
19. Medium Circle: MELD/PELD $<$ 15
20. Large Circle: MELD/PELD $<$ 15
21. National: MELD/PELD $<$ 15

Allocation of Livers from Non-DCD Deceased Donors 11 to 17 Years Old

1. Large Circle: Pediatric status 1A
2. Large Circle: Adult status 1A
3. Large Circle: Pediatric status 1B
4. Large Circle: Any PELD
5. Large Circle: Any MELD and 12 to 17 years old
6. Nation: Pediatric status 1A
7. Nation: Adult status 1A
8. Nation: Pediatric status 1B
9. Nation: Any PELD
10. Nation: Any MELD and 12 to 17 years old
11. Large Circle: Any MELD and at least 18 years old
12. Nation: Any MELD and at least 18 years old

Allocation of Livers from Non-DCD Deceased Donors Less than 11 Years Old

1. Large Circle: Pediatric status 1A
2. Nation: Pediatric status 1A and 0 to 11 years old
3. Large Circle: Adult status 1A
4. Large Circle: Pediatric status 1B
5. Large Circle: Any PELD

6. Large Circle: Any MELD and 12 to 17 years old
7. Nation: Pediatric status 1A and 12 to 17 years old
8. Nation: Adult status 1A
9. Nation: Pediatric status 1B and 0 to 17 years old
10. Nation: Any PELD
11. Nation: Any MELD and 12 to 17 years old
12. Large Circle: Any MELD and at least 18 years old
13. Nation: Any MELD and at least 18 years old

Allocation of Livers from DCD Donors or Donors at Least 70 Years Old

1. Large Circle: Adult or Pediatric status 1A
2. Large Circle: Pediatric status 1B
3. Small Circle: MELD/PELD \geq 15
4. Medium Circle: MELD/PELD \geq 15
5. Large Circle: MELD/PELD \geq 15
6. Nation: Adult or Pediatric status 1A
7. Nation: Pediatric status 1B
8. Nation: MELD/PELD \geq 15
9. Small Circle: MELD/PELD $<$ 15
10. Medium Circle: MELD/PELD $<$ 15
11. Large Circle: MELD/PELD $<$ 15
12. Nation: MELD/PELD $<$ 15

Broader 2-Circle Distribution

The following allocation sequences are used for the 'Broader 2-Circle Distribution' allocation framework, with the two scenarios having different MELD/PELD sharing thresholds.

- Scenario 5 MELD/PELD Threshold: 35
- Scenario 6 MELD/PELD Threshold: 32

Scenario 5 & 6 radii:

- Small Circle: 150nm
- Medium Circle: 250nm
- Large Circle: 500nm

Allocation of Livers from Non-DCD Deceased Donors at Least 18 Years Old and Less than 70 Years Old

1. Large Circle: Adult or pediatric status 1A
2. Large Circle: Pediatric status 1B
3. Medium Circle: MELD/PELD \geq THRESHOLD
4. Small Circle: MELD/PELD in [15, THRESHOLD)
5. Medium Circle: MELD/PELD in [15, THRESHOLD)
6. Large Circle: MELD/PELD \geq 15

7. Nation: Adult or Pediatric Status 1A
8. Nation: Pediatric Status 1B
9. Nation: MELD/PELD \geq 15
10. Small Circle: MELD/PELD $<$ 15
11. Medium Circle: MELD/PELD $<$ 15
12. Large Circle: MELD/PELD $<$ 15
13. Nation: MELD/PELD $<$ 15

Allocation of Livers from Non-DCD Deceased Donors 11 to 17 Years Old

1. Large Circle: Pediatric status 1A
2. Large Circle: Adult status 1A
3. Large Circle: Pediatric status 1B
4. Large Circle: Any PELD
5. Large Circle: Any MELD and 12 to 17 years old
6. Nation: Pediatric status 1A
7. Nation: Adult status 1A
8. Nation: Pediatric status 1B
9. Nation: Any PELD
10. Nation: Any MELD and 12 to 17 years old
11. Large Circle: Any MELD and at least 18 years old
12. Nation: Any MELD and at least 18 years old

Allocation of Livers from Non-DCD Deceased Donors Less than 11 Years Old

1. Large Circle: Pediatric status 1A
2. Nation: Pediatric status 1A and 0 to 11 years old
3. Large Circle: Adult status 1A
4. Large Circle: Pediatric status 1B
5. Large Circle: Any PELD
6. Large Circle: Any MELD and 12 to 17 years old
7. Nation: Pediatric status 1A and 12 to 17 years old
8. Nation: Adult status 1A
9. Nation: Pediatric status 1B and 0 to 17 years old
10. Nation: Any PELD
11. Nation: Any MELD and 12 to 17 years old
12. Large Circle: Any MELD and at least 18 years old
13. Nation: Any MELD and at least 18 years old

Allocation of Livers from DCD Donors or Donors at Least 70 Years Old

1. Large Circle: Adult or Pediatric status 1A
2. Large Circle: Pediatric status 1B
3. Small Circle: MELD/PELD \geq 15
4. Large Circle: MELD/PELD \geq 15

5. Nation: Adult or Pediatric status 1A
6. Nation: Pediatric status 1B
7. Nation: MELD/PELD \geq 15
8. Small Circle: MELD/PELD $<$ 15
9. Large Circle: MELD/PELD $<$ 15
10. Nation: MELD/PELD $<$ 15