Simulation Result 1: C~Exp(0.2)

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Table 1: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $Exp(0.2)$.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (73.37, 76.47)	100.00	0.00 (73.43, 75.96)	100.00	0.00 (73.70, 75.66)	100.00
		HZ_O	1.23 (73.98, 77.95)	100.00	1.71 (74.42, 78.49)	100.00	2.29 (74.98, 79.11)	100.00
		Prop	0.70 (73.00, 77.95)	64.29	0.17 (72.29, 77.52)	60.58	-0.52 (71.19, 77.01)	55.43
	30	HZ_P	0.00 (73.57, 75.96)	100.00	0.00 (73.54, 75.58)	100.00	0.00 (73.76, 75.31)	100.00
		HZ_O	1.01 (74.21, 77.38)	100.00	1.59 (74.46, 77.82)	100.00	2.42 (75.26, 78.54)	100.00
		Prop	0.38 (73.54, 77.07)	73.32	0.05 (72.59, 76.81)	69.34	-0.21 (72.05, 76.48)	65.82
	50	HZ_P	0.00 (73.78, 75.58)	100.00	0.00 (73.73, 75.38)	100.00	0.00 (73.86, 75.12)	100.00
		HZ_O	1.08 (74.64, 76.92)	100.00	1.66 (75.03, 77.29)	100.00	2.26 (75.57, 78.06)	100.00
		Prop	0.41 (73.56, 76.57)	81.30	0.04 (73.06, 76.21)	77.10	-0.41 (72.29, 76.02)	72.82
	100	HZ_P	0.00 (73.87, 75.17)	100.00	0.00 (73.96, 75.05)	100.00	0.00 (73.93, 74.82)	100.00
		HZ_O	0.99 (74.75, 76.31)	100.00	1.59 (75.32, 76.94)	100.00	2.37 (75.93, 77.53)	100.00
		Prop	0.30 (73.79, 76.08)	90.50	0.11 (73.50, 76.19)	85.70	-0.25 (72.88, 75.45)	83.57
50-300	20	HZ_P	0.00 (74.36, 76.98)	100.00	0.00 (74.38, 76.70)	100.00	0.00 (74.88, 76.46)	100.00
		HZ_O	0.48 (74.27, 77.90)	100.00	0.94 (74.12, 78.36)	100.00	1.19 (73.45, 78.80)	100.00
		Prop	-0.26 (72.79, 77.47)	59.10	-0.28 (72.37, 77.44)	57.93	-1.58 (34.90, 76.56)	43.91
	30	HZ_P	0.00 (74.51, 76.76)	100.00	0.00 (74.63, 76.40)	100.00	0.00 (75.01, 76.32)	100.00
		HZ_O	0.59 (74.81, 77.68)	100.00	0.95 (74.76, 77.95)	100.00	1.37 (74.96, 78.57)	100.00
		Prop	0.19 (74.13, 77.40)	71.74	0.04 (73.74, 77.39)	64.99	-0.65 (72.04, 76.86)	51.42
	50	HZ_P	0.00 (74.80, 76.45)	100.00	0.00 (74.97, 76.19)	100.00	0.00 (75.05, 76.07)	100.00
		HZ_O	0.55 (75.05, 77.21)	100.00	0.93 (75.50, 77.50)	100.00	1.40 (75.60, 78.06)	100.00
		Prop	0.14 (74.65, 77.09)	77.10	0.07 (74.47, 76.91)	70.04	-0.31 (73.77, 76.67)	58.74
	100	HZ_P	0.00 (75.00, 76.08)	100.00	0.00 (75.09, 75.98)	100.00	0.00 (75.14, 75.83)	100.00
		HZ_O	0.62 (75.49, 76.86)	100.00	0.91 (75.75, 77.19)	100.00	1.45 (76.15, 77.61)	100.00
		Prop	0.33 (75.10, 76.68)	84.00	0.18 (74.86, 76.59)	74.17	-0.23 (74.41, 76.28)	59.43

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 2: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $Exp(0.2)$.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (56.66, 58.69)	99.49	0.00 (56.92, 58.64)	98.99	0.00 (57.06, 58.42)	99.90
		HZ_O	1.79 (58.40, 60.64)	98.99	2.94 (59.44, 61.89)	98.99	4.26 (60.70, 63.20)	99.08
		Prop	1.40 (57.81, 60.32)	85.41	2.06 (58.01, 61.36)	85.37	3.11 (57.71, 62.38)	84.54
	30	HZ_P	0.00 (56.95, 58.56)	99.70	0.00 (57.03, 58.42)	100.00	0.00 (57.24, 58.27)	99.90
		HZ_O	1.84 (58.67, 60.63)	99.50	2.87 (59.74, 61.60)	99.40	4.12 (60.92, 62.90)	99.18
		Prop	1.41 (57.99, 60.25)	90.46	2.12 (58.13, 61.22)	87.86	2.99 (57.48, 62.24)	88.93
	50	HZ_P	0.00 (57.09, 58.33)	100.00	0.00 (57.17, 58.24)	99.90	0.00 (57.32, 58.15)	100.00
		HZ_O	1.85 (58.88, 60.38)	99.80	2.94 (59.98, 61.41)	99.70	4.27 (61.22, 62.73)	99.90
		Prop	1.46 (58.26, 60.06)	95.20	2.14 (57.76, 61.02)	93.98	3.36 (57.42, 62.21)	92.17
	100	HZ_P	0.00 (57.31, 58.19)	100.00	0.00 (57.36, 58.10)	100.00	0.00 (57.44, 58.02)	100.00
		HZ_O	1.92 (59.13, 60.14)	100.00	2.96 (60.14, 61.21)	100.00	4.26 (61.44, 62.53)	100.00
		Prop	1.76 (58.77, 60.04)	97.70	2.05 (57.40, 60.80)	92.57	3.58 (57.36, 62.15)	94.68
50-300	20	HZ_P	0.00 (57.08, 58.64)	99.90	0.00 (57.31, 58.54)	100.00	0.00 (57.50, 58.38)	100.00
		HZ_O	1.36 (58.30, 60.06)	99.28	2.18 (59.24, 60.90)	99.69	3.12 (60.11, 61.97)	99.47
		Prop	0.64 (57.51, 59.59)	69.46	1.32 (57.66, 60.30)	76.50	2.20 (57.98, 61.52)	77.95
	30	HZ_P	0.00 (57.24, 58.59)	100.00	0.00 (57.37, 58.37)	100.00	0.00 (57.52, 58.33)	100.00
		HZ_O	1.38 (58.57, 60.05)	99.69	2.21 (59.43, 60.81)	100.00	3.14 (60.28, 61.81)	99.48
		Prop	0.52 (57.63, 59.30)	74.15	1.31 (57.70, 60.28)	77.48	2.48 (57.79, 61.47)	83.95
	50	HZ_P	0.00 (57.47, 58.41)	100.00	0.00 (57.51, 58.35)	100.00	0.00 (57.60, 58.23)	100.00
		HZ_O	1.39 (58.82, 59.91)	100.00	2.16 (59.55, 60.68)	100.00	3.17 (60.50, 61.64)	100.00
		Prop	0.36 (57.62, 59.06)	77.25	0.82 (57.54, 59.99)	81.10	2.48 (57.75, 61.32)	88.59
	100	HZ_P	0.00 (57.56, 58.21)	100.00	0.00 (57.61, 58.18)	100.00	0.00 (57.68, 58.15)	100.00
		HZ_O	1.38 (58.92, 59.64)	100.00	2.20 (59.71, 60.53)	100.00	3.11 (60.66, 61.49)	100.00
		Prop	0.11 (57.53, 58.50)	82.10	0.35 (57.38, 59.89)	80.72	2.74 (57.74, 61.23)	89.15

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 3: Summary of the estimated SAUC for Biomarker1 when the true censoring is distributed as $U(1,4)$, but a misspecified exponential distribution is fitted.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (73.48, 76.43)	100.00	0.00 (73.73, 76.04)	100.00	0.00 (74.04, 75.88)	100.00
		HZ_O	1.17 (73.95, 78.07)	100.00	1.77 (74.56, 78.61)	100.00	2.43 (75.36, 79.45)	100.00
		Prop	0.90 (73.28, 78.24)	44.29	-0.02 (72.18, 77.24)	37.63	-1.23 (71.52, 76.57)	33.30
	30	HZ_P	0.00 (73.87, 76.18)	100.00	0.00 (73.98, 75.91)	100.00	0.00 (74.06, 75.67)	100.00
		HZ_O	1.16 (74.70, 77.56)	100.00	1.78 (75.20, 78.12)	100.00	2.30 (75.59, 78.78)	100.00
		Prop	0.79 (74.04, 77.93)	50.65	0.38 (73.05, 77.64)	43.42	-0.86 (71.70, 76.56)	38.27
	50	HZ_P	0.00 (73.91, 75.77)	100.00	0.00 (74.04, 75.59)	100.00	0.00 (74.21, 75.36)	100.00
		HZ_O	0.99 (74.76, 77.00)	100.00	1.41 (74.92, 77.35)	100.00	2.10 (75.75, 78.01)	100.00
		Prop	0.70 (74.16, 77.11)	58.50	-0.20 (72.94, 76.28)	50.70	-0.98 (72.19, 75.81)	47.47
	100	HZ_P	0.00 (74.14, 75.41)	100.00	0.00 (74.27, 75.28)	100.00	0.00 (74.30, 75.19)	100.00
		HZ_O	1.00 (74.98, 76.59)	100.00	1.55 (75.54, 77.10)	100.00	2.24 (76.15, 77.74)	100.00
		Prop	0.57 (74.31, 76.49)	72.00	0.06 (73.67, 76.21)	61.36	-0.71 (72.78, 75.27)	58.02
50-300	20	HZ_P	0.00 (74.67, 77.08)	100.00	0.00 (74.78, 76.91)	100.00	0.00 (74.92, 76.53)	100.00
		HZ_O	0.68 (74.75, 78.17)	100.00	0.83 (73.77, 78.49)	100.00	1.31 (72.90, 79.02)	100.00
		Prop	-0.23 (73.77, 78.09)	29.59	-0.45 (71.23, 77.53)	25.47	-1.86 (68.21, 76.20)	14.98
	30	HZ_P	0.00 (74.65, 76.79)	100.00	0.00 (74.88, 76.55)	100.00	0.00 (75.11, 76.29)	100.00
		HZ_O	0.74 (74.80, 77.96)	100.00	0.91 (74.39, 78.15)	100.00	1.29 (74.54, 78.77)	100.00
		Prop	0.20 (74.48, 77.57)	33.40	-0.37 (73.38, 77.19)	29.75	-0.47 (73.32, 76.79)	14.52
	50	HZ_P	0.00 (74.90, 76.48)	100.00	0.00 (75.17, 76.43)	100.00	0.00 (75.32, 76.24)	100.00
		HZ_O	0.59 (75.19, 77.37)	100.00	0.97 (75.39, 77.95)	100.00	1.13 (75.30, 78.26)	100.00
		Prop	0.35 (75.08, 77.17)	38.94	0.40 (74.57, 77.05)	35.48	-0.55 (74.08, 76.32)	20.68
	100	HZ_P	0.00 (75.23, 76.31)	100.00	0.00 (75.31, 76.17)	100.00	0.00 (75.40, 76.05)	100.00
		HZ_O	0.52 (75.51, 76.99)	100.00	0.81 (75.76, 77.31)	100.00	1.37 (76.23, 77.90)	100.00
		Prop	0.20 (75.35, 76.81)	52.00	0.06 (74.98, 76.60)	42.16	-0.57 (74.33, 76.08)	20.37

Median with 25th and 75th empirical quartiles (Q1, Q3) of the SAUC at $t = 2$ are reported. N denotes the number of the published studies. Prop denotes the proposed sensitivity analysis method; HZ_P denotes the HZ model using the population (published and unpublished) studies; HZ_O denotes the HZ model using only the observed (published) studies. CR denotes the proportion of successfully convergenced estimates among 1000 repetition. All the entries are multiplied by 100.

Table 4: Summary of the estimated SAUC for Biomarker2 when the true censoring is distributed as $U(1, 4)$, but a misspecified exponential distribution is fitted.

			$p = 0.7$		$p = 0.5$		$p = 0.3$	
Patients	N	Method	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR	Median (Q1, Q3)	CR
50-150	20	HZ_P	0.00 (56.83, 58.67)	99.29	0.00 (56.95, 58.63)	99.60	0.00 (57.16, 58.39)	99.80
		HZ_O	2.05 (58.64, 60.87)	99.09	3.29 (59.91, 62.16)	99.20	4.67 (61.29, 63.66)	99.09
		Prop	1.52 (57.75, 60.66)	67.34	2.62 (58.28, 61.82)	69.24	3.96 (58.34, 63.26)	72.61
	30	HZ_P	0.00 (56.99, 58.42)	99.50	0.00 (57.14, 58.40)	99.90	0.00 (57.29, 58.32)	100.00
		HZ_O	2.07 (58.98, 60.71)	99.19	3.29 (60.16, 61.92)	99.90	4.70 (61.65, 63.44)	99.29
		Prop	1.51 (57.82, 60.37)	70.84	2.59 (57.96, 61.62)	70.91	4.17 (57.95, 63.13)	79.72
	50	HZ_P	0.00 (57.27, 58.43)	99.80	0.00 (57.34, 58.29)	100.00	0.00 (57.38, 58.16)	100.00
		HZ_O	2.06 (59.30, 60.62)	100.00	3.26 (60.49, 61.76)	100.00	4.64 (61.72, 63.12)	99.90
		Prop	1.42 (58.01, 60.29)	75.78	2.49 (57.68, 61.41)	79.22	4.34 (59.17, 62.99)	82.71
	100	HZ_P	0.00 (57.37, 58.21)	100.00	0.00 (57.47, 58.17)	100.00	0.00 (57.54, 58.08)	100.00
		HZ_O	2.04 (59.38, 60.32)	100.00	3.32 (60.64, 61.59)	99.80	4.64 (61.98, 62.94)	99.90
		Prop	1.44 (57.80, 60.11)	75.88	2.72 (57.56, 61.35)	80.62	4.50 (60.99, 62.88)	91.06
50-300	20	HZ_P	0.00 (57.28, 58.74)	99.69	0.00 (57.33, 58.50)	99.80	0.00 (57.50, 58.45)	99.90
		HZ_O	1.50 (58.67, 60.37)	99.49	2.41 (59.48, 61.10)	99.39	3.39 (60.49, 62.25)	99.48
		Prop	0.93 (57.62, 60.18)	49.59	1.54 (57.87, 60.72)	51.78	3.07 (58.97, 62.20)	60.87
	30	HZ_P	0.00 (57.37, 58.56)	99.80	0.00 (57.43, 58.41)	100.00	0.00 (57.58, 58.30)	100.00
		HZ_O	1.52 (58.84, 60.14)	99.90	2.45 (59.66, 61.00)	99.59	3.42 (60.65, 61.98)	99.90
		Prop	0.66 (57.57, 59.73)	51.17	1.17 (57.54, 60.63)	55.91	3.10 (58.17, 61.82)	72.50
	50	HZ_P	0.00 (57.50, 58.43)	100.00	0.00 (57.51, 58.30)	100.00	0.00 (57.66, 58.22)	100.00
		HZ_O	1.53 (58.96, 59.99)	100.00	2.42 (59.83, 60.86)	100.00	3.42 (60.79, 61.83)	100.00
		Prop	0.37 (57.55, 59.30)	49.03	0.54 (57.37, 60.18)	55.02	2.93 (57.34, 61.72)	74.42
	100	HZ_P	0.00 (57.63, 58.24)	100.00	0.00 (57.68, 58.18)	100.00	0.00 (57.73, 58.13)	100.00
		HZ_O	1.54 (59.11, 59.83)	100.00	2.41 (59.99, 60.72)	100.00	3.47 (61.02, 61.75)	100.00
		Prop	0.12 (57.61, 58.57)	47.39	0.10 (57.36, 59.58)	53.71	3.30 (57.98, 61.70)	77.08

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