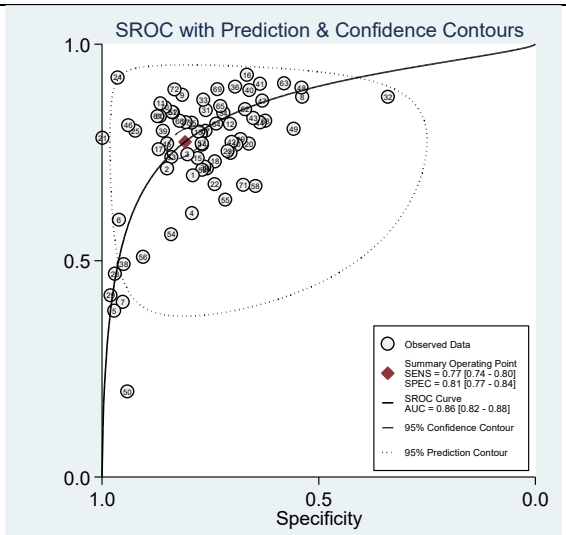
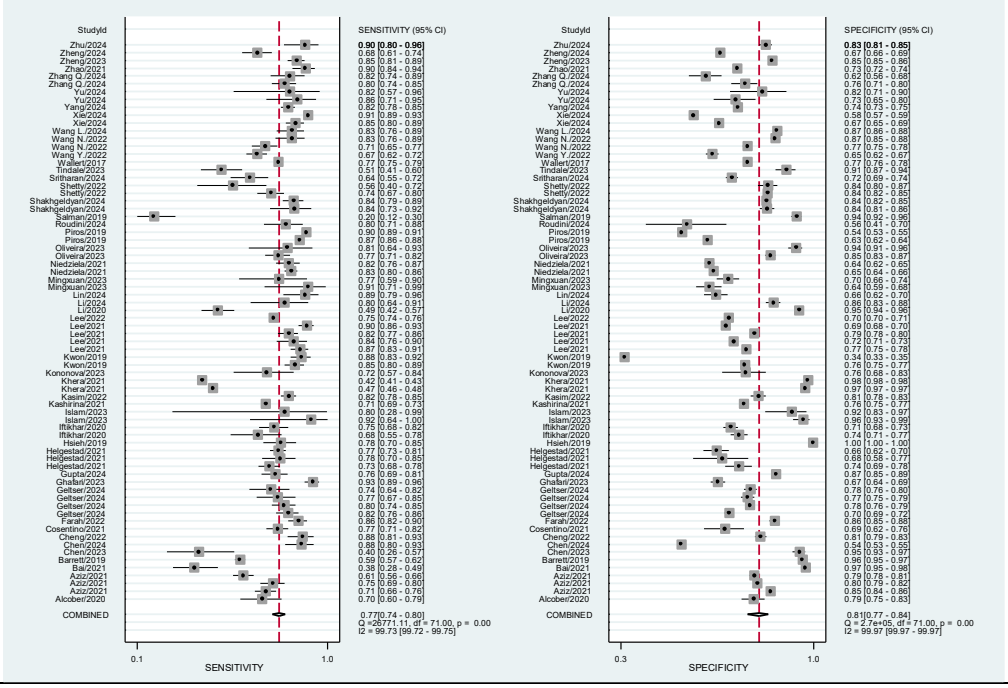
A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.77 [0.74 - 0.80]
SPEC = 0.81 [0.77 - 0.84]
SROC Curve
AUC = 0.86 [0.82 - 0.88]
95% Confidence Contour
95% Prediction Contour

B


Studyid
SENSITIVITY (95% CI)
0.90 [0.80 - 0.96]
COMBINED
0.77[0.74 - 0.80]
Q =26771.11, df = 71.00, p = 0.00
I2 = 99.73 [99.72 - 99.75]
0.1
1.0
SENSITIVITY
Studyid
SPECIFICITY (95% CI)
0.83 [0.81 - 0.85]
COMBINED
0.81[0.77 - 0.84]
Q = 2.7e+05, df = 71.00, p = 0.00
I2 = 99.97 [99.97 - 99.97]
0.3
1.0
SPECIFICITY

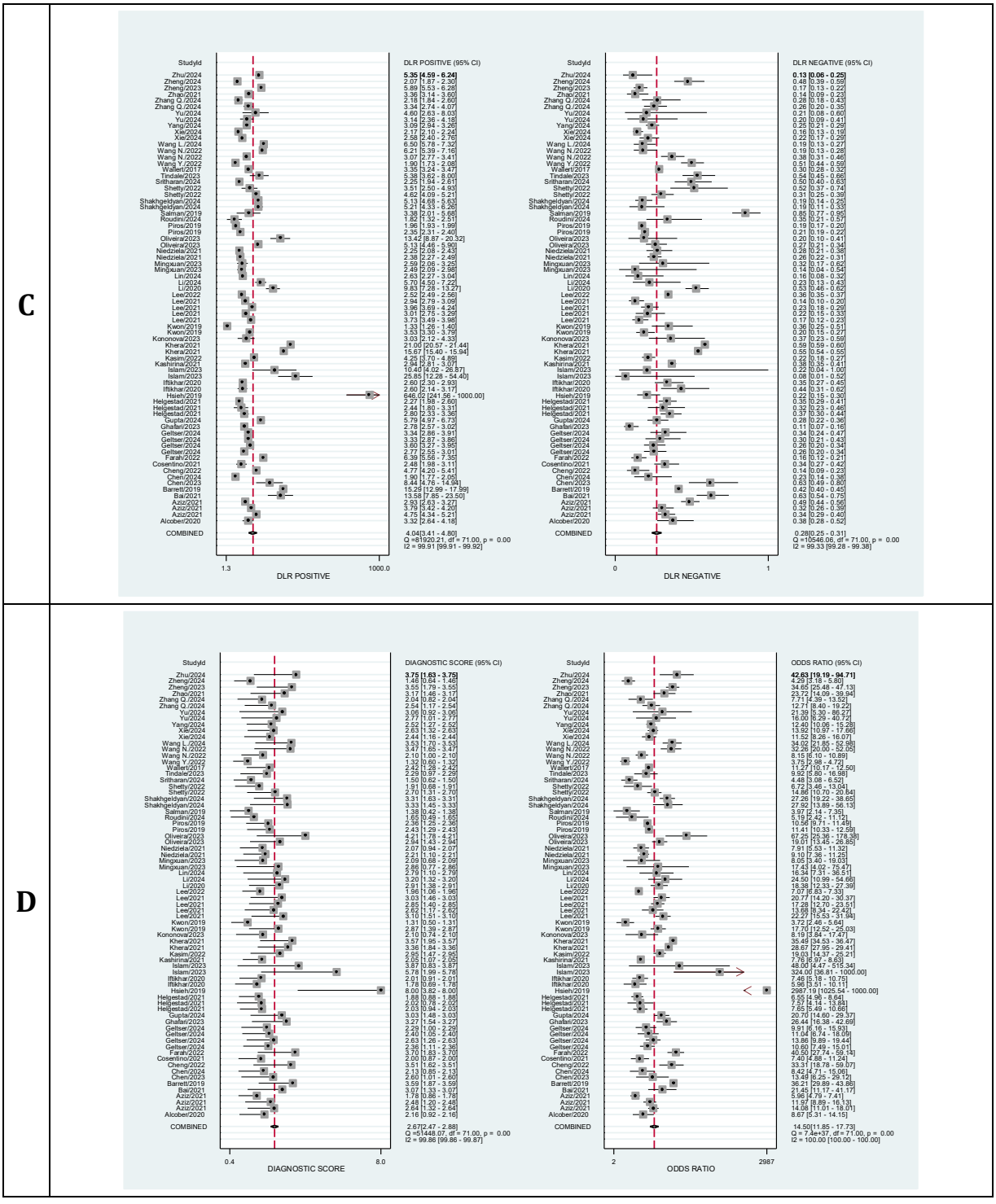
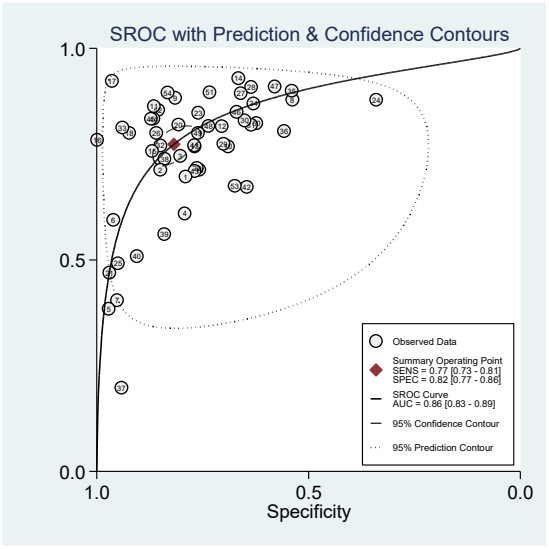
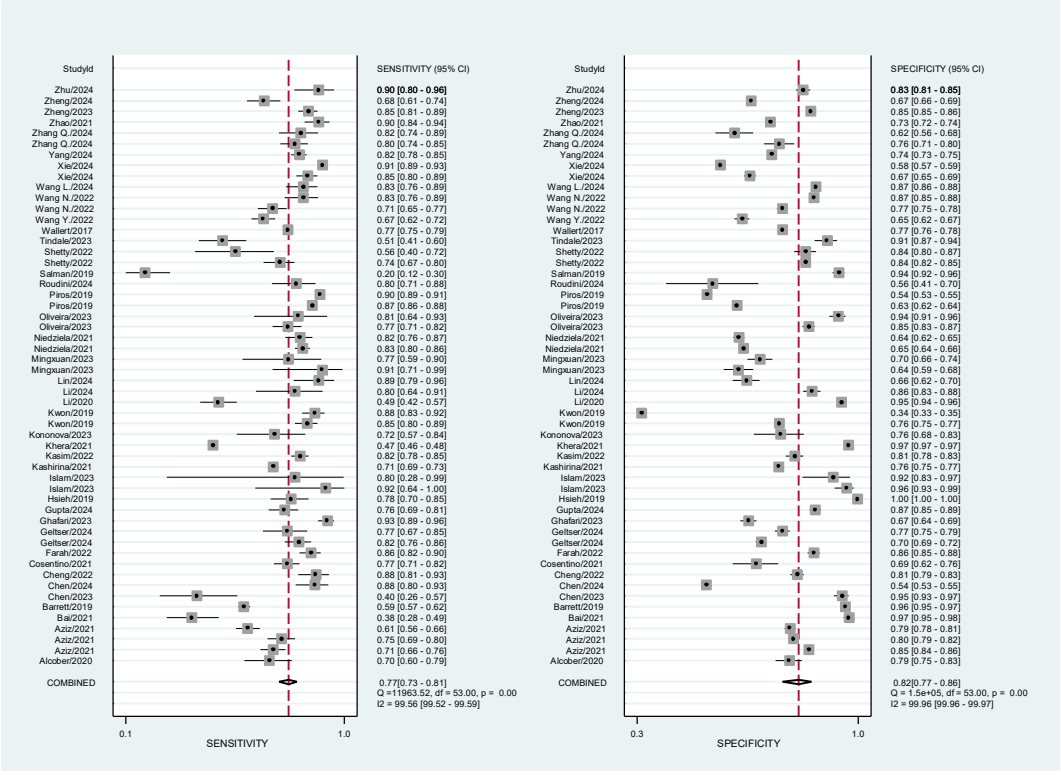


Figure S1: Diagnostic accuracy of the Logistic Regression models predicting mortality in MI patients. **A:** SROC curve showing overall sensitivity and specificity. **B:** DSS chart summarizing sensitivity and specificity with 95% CI. **C:** DLR plot showing positive and negative likelihood ratios with 95% CI. **D:** DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.77 [0.73 - 0.81]
SPEC = 0.82 [0.77 - 0.86]
SROC Curve
AUC = 0.86 [0.83 - 0.89]
95% Confidence Contour
95% Prediction Contour

B


Studyld
SENSITIVITY (95% CI)
Zhu/2024 0.90 [0.80 - 0.96]
Zheng/2024 0.68 [0.61 - 0.74]
Zheng/2023 0.85 [0.81 - 0.89]
Zhao/2021 0.90 [0.84 - 0.94]
Zhang Q./2024 0.82 [0.74 - 0.89]
Zhang Q./2024 0.80 [0.74 - 0.85]
Yang/2024 0.82 [0.78 - 0.85]
Xie/2024 0.91 [0.89 - 0.93]
Xie/2024 0.85 [0.80 - 0.89]
Wang L./2024 0.83 [0.76 - 0.89]
Wang N./2022 0.83 [0.76 - 0.89]
Wang N./2022 0.71 [0.65 - 0.77]
Wang Y./2022 0.67 [0.62 - 0.72]
Wallert/2017 0.77 [0.75 - 0.79]
Tindale/2023 0.51 [0.41 - 0.60]
Shetty/2022 0.56 [0.40 - 0.72]
Shetty/2022 0.74 [0.67 - 0.80]
Salman/2019 0.20 [0.12 - 0.30]
Roudini/2024 0.80 [0.71 - 0.88]
Piros/2019 0.90 [0.89 - 0.91]
Piros/2019 0.87 [0.86 - 0.88]
Oliveira/2023 0.81 [0.64 - 0.93]
Oliveira/2023 0.77 [0.71 - 0.82]
Niedziela/2021 0.82 [0.76 - 0.87]
Niedziela/2021 0.83 [0.80 - 0.86]
Mingxuan/2023 0.77 [0.59 - 0.90]
Mingxuan/2023 0.91 [0.71 - 0.99]
Lin/2024 0.89 [0.79 - 0.96]
Li/2024 0.80 [0.64 - 0.91]
Li/2020 0.49 [0.42 - 0.57]
Kwon/2019 0.88 [0.83 - 0.92]
Kwon/2019 0.85 [0.80 - 0.89]
Kononova/2023 0.72 [0.57 - 0.84]
Khera/2021 0.47 [0.46 - 0.48]
Kasim/2022 0.82 [0.78 - 0.85]
Kashirina/2021 0.71 [0.69 - 0.73]
Islam/2023 0.80 [0.28 - 0.99]
Islam/2023 0.92 [0.64 - 1.00]
Hsieh/2019 0.78 [0.70 - 0.85]
Gupta/2024 0.76 [0.69 - 0.81]
Ghafari/2023 0.93 [0.89 - 0.96]
Geltser/2024 0.77 [0.67 - 0.85]
Geltser/2024 0.82 [0.76 - 0.86]
Farah/2022 0.86 [0.82 - 0.90]
Cosentino/2021 0.77 [0.71 - 0.82]
Cheng/2022 0.88 [0.81 - 0.93]
Chen/2024 0.88 [0.80 - 0.93]
Chen/2023 0.40 [0.26 - 0.57]
Barrett/2019 0.59 [0.57 - 0.62]
Bai/2021 0.38 [0.28 - 0.49]
Aziz/2021 0.61 [0.56 - 0.66]
Aziz/2021 0.75 [0.69 - 0.80]
Aziz/2021 0.71 [0.66 - 0.76]
Alcober/2020 0.70 [0.60 - 0.79]
COMBINED 0.77[0.73 - 0.81]
Q =11963.52, df = 53.00, p = 0.00
I2 = 99.56 [99.52 - 99.59]
0.1
1.0
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Zhu/2024 0.83 [0.81 - 0.85]
Zheng/2024 0.67 [0.66 - 0.69]
Zheng/2023 0.85 [0.85 - 0.86]
Zhao/2021 0.73 [0.72 - 0.74]
Zhang Q./2024 0.62 [0.56 - 0.68]
Zhang Q./2024 0.76 [0.71 - 0.80]
Yang/2024 0.74 [0.73 - 0.75]
Xie/2024 0.58 [0.57 - 0.59]
Xie/2024 0.67 [0.65 - 0.69]
Wang L./2024 0.87 [0.86 - 0.88]
Wang N./2022 0.87 [0.85 - 0.88]
Wang N./2022 0.77 [0.75 - 0.78]
Wang Y./2022 0.65 [0.62 - 0.67]
Wallert/2017 0.77 [0.76 - 0.78]
Tindale/2023 0.91 [0.87 - 0.94]
Shetty/2022 0.84 [0.80 - 0.87]
Shetty/2022 0.84 [0.82 - 0.85]
Salman/2019 0.94 [0.92 - 0.96]
Roudini/2024 0.56 [0.41 - 0.70]
Piros/2019 0.54 [0.53 - 0.55]
Piros/2019 0.63 [0.62 - 0.64]
Oliveira/2023 0.94 [0.91 - 0.96]
Oliveira/2023 0.85 [0.83 - 0.87]
Niedziela/2021 0.64 [0.62 - 0.65]
Niedziela/2021 0.65 [0.64 - 0.66]
Mingxuan/2023 0.70 [0.66 - 0.74]
Mingxuan/2023 0.64 [0.59 - 0.68]
Lin/2024 0.66 [0.62 - 0.70]
Li/2024 0.86 [0.83 - 0.88]
Li/2020 0.95 [0.94 - 0.96]
Kwon/2019 0.34 [0.33 - 0.35]
Kwon/2019 0.76 [0.75 - 0.77]
Kononova/2023 0.76 [0.68 - 0.83]
Khera/2021 0.97 [0.97 - 0.97]
Kasim/2022 0.81 [0.78 - 0.83]
Kashirina/2021 0.76 [0.75 - 0.77]
Islam/2023 0.92 [0.83 - 0.97]
Islam/2023 0.96 [0.93 - 0.99]
Hsieh/2019 1.00 [1.00 - 1.00]
Gupta/2024 0.87 [0.85 - 0.89]
Ghafari/2023 0.67 [0.64 - 0.69]
Geltser/2024 0.77 [0.75 - 0.79]
Geltser/2024 0.70 [0.69 - 0.72]
Farah/2022 0.86 [0.85 - 0.88]
Cosentino/2021 0.69 [0.62 - 0.76]
Cheng/2022 0.81 [0.79 - 0.83]
Chen/2024 0.54 [0.53 - 0.55]
Chen/2023 0.95 [0.93 - 0.97]
Barrett/2019 0.96 [0.95 - 0.97]
Bai/2021 0.97 [0.95 - 0.98]
Aziz/2021 0.79 [0.78 - 0.81]
Aziz/2021 0.80 [0.79 - 0.82]
Aziz/2021 0.85 [0.84 - 0.86]
Alcober/2020 0.79 [0.75 - 0.83]
COMBINED 0.82[0.77 - 0.86]
Q = 1.5e+05, df = 53.00, p = 0.00
I2 = 99.96 [99.96 - 99.97]
0.3
1.0
SPECIFICITY

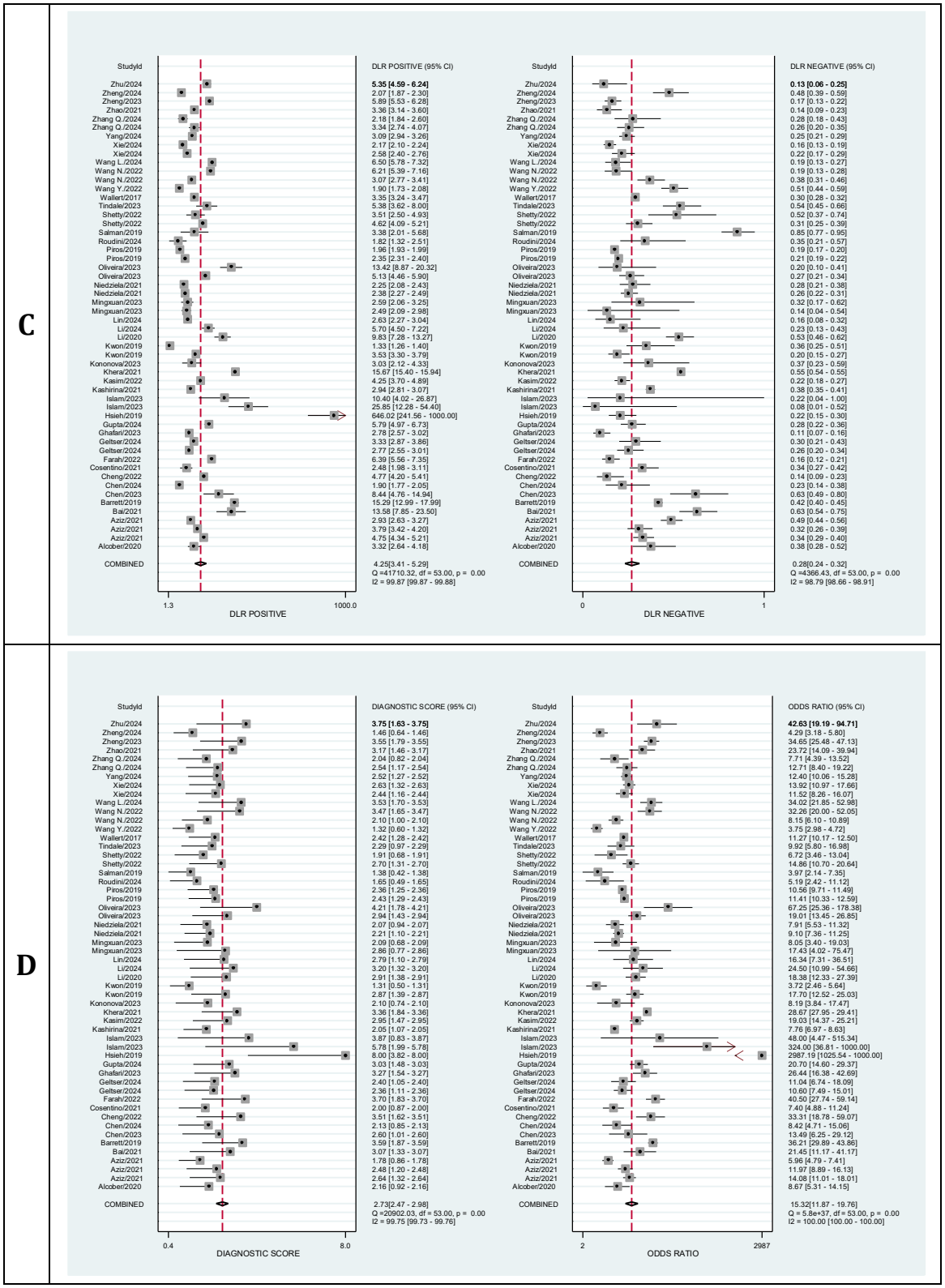
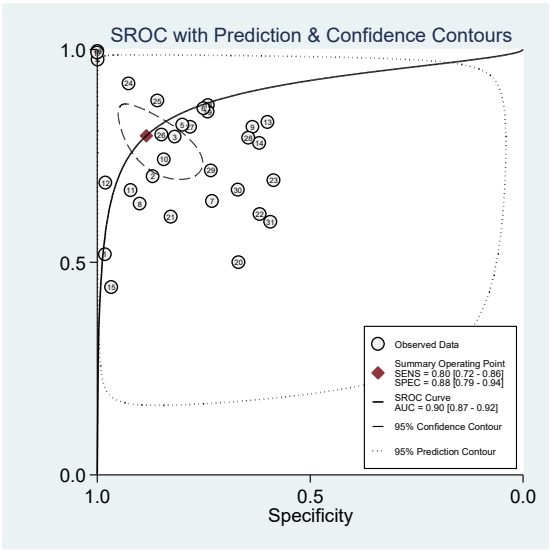


Figure S2: Diagnostic accuracy of the Pure Logistic Regression model predicting mortality in MI patients. **A:** SROC curve showing overall sensitivity and specificity. **B:** DSS chart summarizing sensitivity and specificity with 95% CI. **C:** DLR plot showing positive and negative likelihood ratios with 95% CI. **D:** DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.80 [0.72 - 0.86]
SPEC = 0.88 [0.79 - 0.94]
SROC Curve
AUC = 0.90 [0.87 - 0.92]
95% Confidence Contour
95% Prediction Contour

B

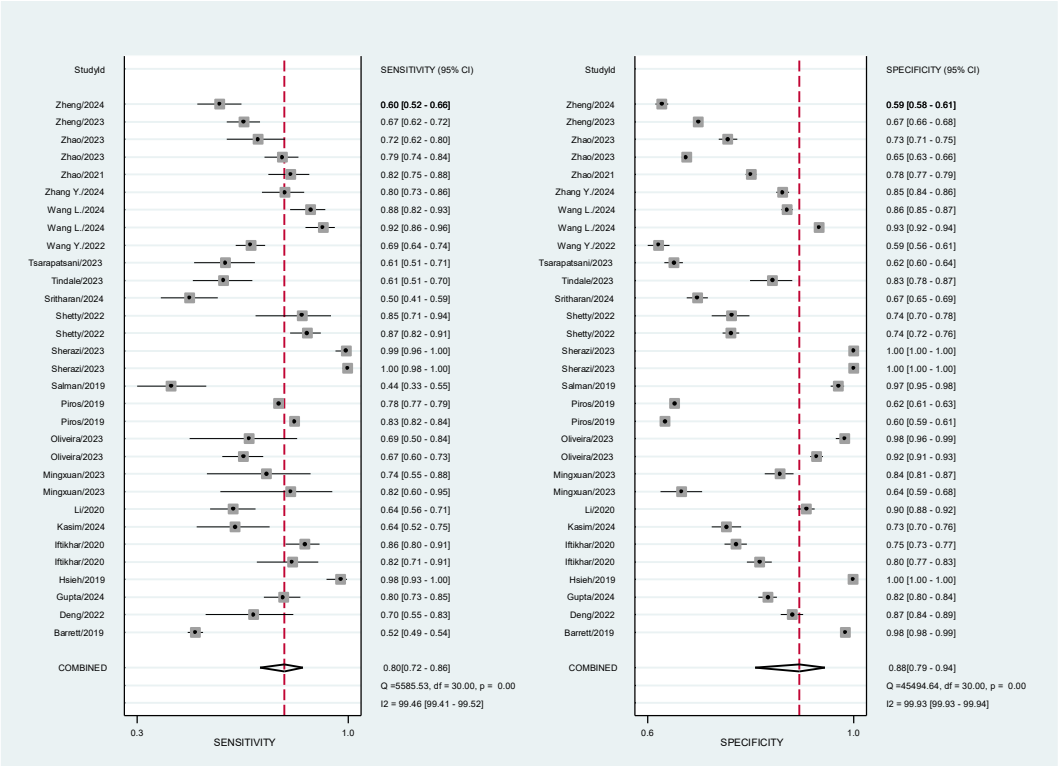
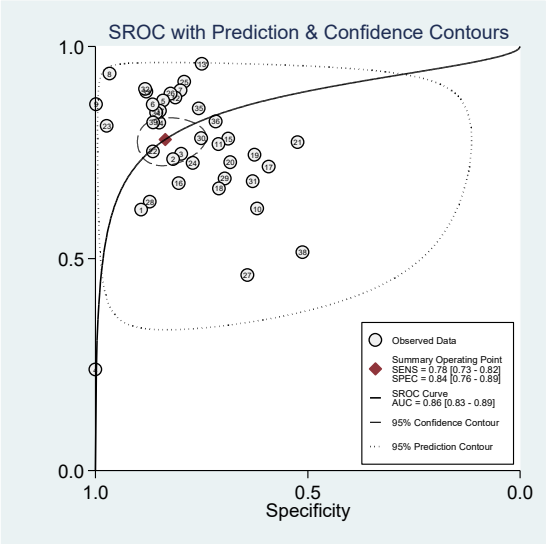
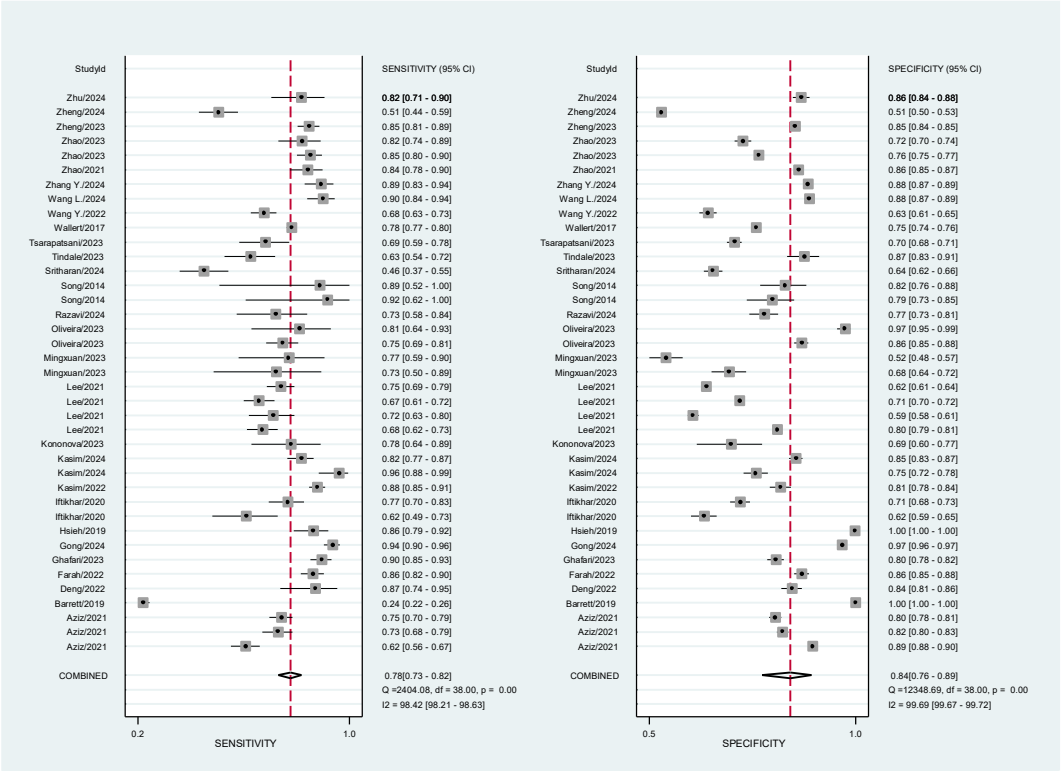

Studyld
SENSITIVITY (95% CI)
Zheng/2024 0.60 [0.52 - 0.66]
Zheng/2023 0.67 [0.62 - 0.72]
Zhao/2023 0.72 [0.62 - 0.80]
Zhao/2023 0.79 [0.74 - 0.84]
Zhao/2021 0.82 [0.75 - 0.88]
Zhang Y./2024 0.80 [0.73 - 0.86]
Wang L./2024 0.88 [0.82 - 0.93]
Wang L./2024 0.92 [0.86 - 0.96]
Wang Y./2022 0.69 [0.64 - 0.74]
Tsarapatsani/2023 0.61 [0.51 - 0.71]
Tindale/2023 0.61 [0.51 - 0.70]
Sritharan/2024 0.50 [0.41 - 0.59]
Shetty/2022 0.85 [0.71 - 0.94]
Shetty/2022 0.87 [0.82 - 0.91]
Sherazi/2023 0.99 [0.96 - 1.00]
Sherazi/2023 1.00 [0.98 - 1.00]
Salman/2019 0.44 [0.33 - 0.55]
Piros/2019 0.78 [0.77 - 0.79]
Piros/2019 0.83 [0.82 - 0.84]
Oliveira/2023 0.69 [0.50 - 0.84]
Oliveira/2023 0.67 [0.60 - 0.73]
Mingxuan/2023 0.74 [0.55 - 0.88]
Mingxuan/2023 0.82 [0.60 - 0.95]
Li/2020 0.64 [0.56 - 0.71]
Kasim/2024 0.64 [0.52 - 0.75]
Iftikhar/2020 0.86 [0.80 - 0.91]
Iftikhar/2020 0.82 [0.71 - 0.91]
Hsieh/2019 0.98 [0.93 - 1.00]
Gupta/2024 0.80 [0.73 - 0.85]
Deng/2022 0.70 [0.55 - 0.83]
Barrett/2019 0.52 [0.49 - 0.54]
COMBINED 0.80[0.72 - 0.86]
Q =5585.53, df = 30.00, p = 0.00
I2 = 99.46 [99.41 - 99.52]
0.3
1.0
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Zheng/2024 0.59 [0.58 - 0.61]
Zheng/2023 0.67 [0.66 - 0.68]
Zhao/2023 0.73 [0.71 - 0.75]
Zhao/2023 0.65 [0.63 - 0.66]
Zhao/2021 0.78 [0.77 - 0.79]
Zhang Y./2024 0.85 [0.84 - 0.86]
Wang L./2024 0.86 [0.85 - 0.87]
Wang L./2024 0.93 [0.92 - 0.94]
Wang Y./2022 0.59 [0.56 - 0.61]
Tsarapatsani/2023 0.62 [0.60 - 0.64]
Tindale/2023 0.83 [0.78 - 0.87]
Sritharan/2024 0.67 [0.65 - 0.69]
Shetty/2022 0.74 [0.70 - 0.78]
Shetty/2022 0.74 [0.72 - 0.76]
Sherazi/2023 1.00 [1.00 - 1.00]
Sherazi/2023 1.00 [1.00 - 1.00]
Salman/2019 0.97 [0.95 - 0.98]
Piros/2019 0.62 [0.61 - 0.63]
Piros/2019 0.60 [0.59 - 0.61]
Oliveira/2023 0.98 [0.96 - 0.99]
Oliveira/2023 0.92 [0.91 - 0.93]
Mingxuan/2023 0.84 [0.81 - 0.87]
Mingxuan/2023 0.64 [0.59 - 0.68]
Li/2020 0.90 [0.88 - 0.92]
Kasim/2024 0.73 [0.70 - 0.76]
Iftikhar/2020 0.75 [0.73 - 0.77]
Iftikhar/2020 0.80 [0.77 - 0.83]
Hsieh/2019 1.00 [1.00 - 1.00]
Gupta/2024 0.82 [0.80 - 0.84]
Deng/2022 0.87 [0.84 - 0.89]
Barrett/2019 0.98 [0.98 - 0.99]
COMBINED 0.88[0.79 - 0.94]
Q =45494.64, df = 30.00, p = 0.00
I2 = 99.93 [99.93 - 99.94]
0.6
1.0
SPECIFICITY

Figure S3: Diagnostic accuracy of the Single Decision Tree-based models predicting mortality in MI patients. **A:** SROC curve showing overall sensitivity and specificity. **B:** DSS chart summarizing sensitivity and specificity with 95% CI. **C:** DLR plot showing positive and negative likelihood ratios with 95% CI. **D:** DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.78 [0.73 - 0.82]
SPEC = 0.84 [0.76 - 0.89]
SROC Curve
AUC = 0.86 [0.83 - 0.89]
95% Confidence Contour
95% Prediction Contour

B


Studyld
SENSITIVITY (95% CI)
Zhu/2024 0.82 [0.71 - 0.90]
Zheng/2024 0.51 [0.44 - 0.59]
Zheng/2023 0.85 [0.81 - 0.89]
Zhao/2023 0.82 [0.74 - 0.89]
Zhao/2023 0.85 [0.80 - 0.90]
Zhao/2021 0.84 [0.78 - 0.90]
Zhang Y./2024 0.89 [0.83 - 0.94]
Wang L./2024 0.90 [0.84 - 0.94]
Wang Y./2022 0.68 [0.63 - 0.73]
Wallert/2017 0.78 [0.77 - 0.80]
Tsarapatsani/2023 0.69 [0.59 - 0.78]
Tindale/2023 0.63 [0.54 - 0.72]
Sritharan/2024 0.46 [0.37 - 0.55]
Song/2014 0.89 [0.52 - 1.00]
Song/2014 0.92 [0.62 - 1.00]
Razavi/2024 0.73 [0.58 - 0.84]
Oliveira/2023 0.81 [0.64 - 0.93]
Oliveira/2023 0.75 [0.69 - 0.81]
Mingxuan/2023 0.77 [0.59 - 0.90]
Mingxuan/2023 0.73 [0.50 - 0.89]
Lee/2021 0.75 [0.69 - 0.79]
Lee/2021 0.67 [0.61 - 0.72]
Lee/2021 0.72 [0.63 - 0.80]
Lee/2021 0.68 [0.62 - 0.73]
Kononova/2023 0.78 [0.64 - 0.89]
Kasim/2024 0.82 [0.77 - 0.87]
Kasim/2024 0.96 [0.88 - 0.99]
Kasim/2022 0.88 [0.85 - 0.91]
Iftikhar/2020 0.77 [0.70 - 0.83]
Iftikhar/2020 0.62 [0.49 - 0.73]
Hsieh/2019 0.86 [0.79 - 0.92]
Gong/2024 0.94 [0.90 - 0.96]
Ghafari/2023 0.90 [0.85 - 0.93]
Farah/2022 0.86 [0.82 - 0.90]
Deng/2022 0.87 [0.74 - 0.95]
Barrett/2019 0.24 [0.22 - 0.26]
Aziz/2021 0.75 [0.70 - 0.79]
Aziz/2021 0.73 [0.68 - 0.79]
Aziz/2021 0.62 [0.56 - 0.67]
COMBINED 0.78[0.73 - 0.82]
Q =2404.08, df = 38.00, p = 0.00
I2 = 98.42 [98.21 - 98.63]
0.2
1.0
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Zhu/2024 0.86 [0.84 - 0.88]
Zheng/2024 0.51 [0.50 - 0.53]
Zheng/2023 0.85 [0.84 - 0.85]
Zhao/2023 0.72 [0.70 - 0.74]
Zhao/2023 0.76 [0.75 - 0.77]
Zhao/2021 0.86 [0.85 - 0.87]
Zhang Y./2024 0.88 [0.87 - 0.89]
Wang L./2024 0.88 [0.87 - 0.89]
Wang Y./2022 0.63 [0.61 - 0.65]
Wallert/2017 0.75 [0.74 - 0.76]
Tsarapatsani/2023 0.70 [0.68 - 0.71]
Tindale/2023 0.87 [0.83 - 0.91]
Sritharan/2024 0.64 [0.62 - 0.66]
Song/2014 0.82 [0.76 - 0.88]
Song/2014 0.79 [0.73 - 0.85]
Razavi/2024 0.77 [0.73 - 0.81]
Oliveira/2023 0.97 [0.95 - 0.99]
Oliveira/2023 0.86 [0.85 - 0.88]
Mingxuan/2023 0.52 [0.48 - 0.57]
Mingxuan/2023 0.68 [0.64 - 0.72]
Lee/2021 0.62 [0.61 - 0.64]
Lee/2021 0.71 [0.70 - 0.72]
Lee/2021 0.59 [0.58 - 0.61]
Lee/2021 0.80 [0.79 - 0.81]
Kononova/2023 0.69 [0.60 - 0.77]
Kasim/2024 0.85 [0.83 - 0.87]
Kasim/2024 0.75 [0.72 - 0.78]
Kasim/2022 0.81 [0.78 - 0.84]
Iftikhar/2020 0.71 [0.68 - 0.73]
Iftikhar/2020 0.62 [0.59 - 0.65]
Hsieh/2019 1.00 [1.00 - 1.00]
Gong/2024 0.97 [0.96 - 0.97]
Ghafari/2023 0.80 [0.78 - 0.82]
Farah/2022 0.86 [0.85 - 0.88]
Deng/2022 0.84 [0.81 - 0.86]
Barrett/2019 1.00 [1.00 - 1.00]
Aziz/2021 0.80 [0.78 - 0.81]
Aziz/2021 0.82 [0.80 - 0.83]
Aziz/2021 0.89 [0.88 - 0.90]
COMBINED 0.84[0.76 - 0.89]
Q =12348.69, df = 38.00, p = 0.00
I2 = 99.69 [99.67 - 99.72]
0.5
1.0
SPECIFICITY

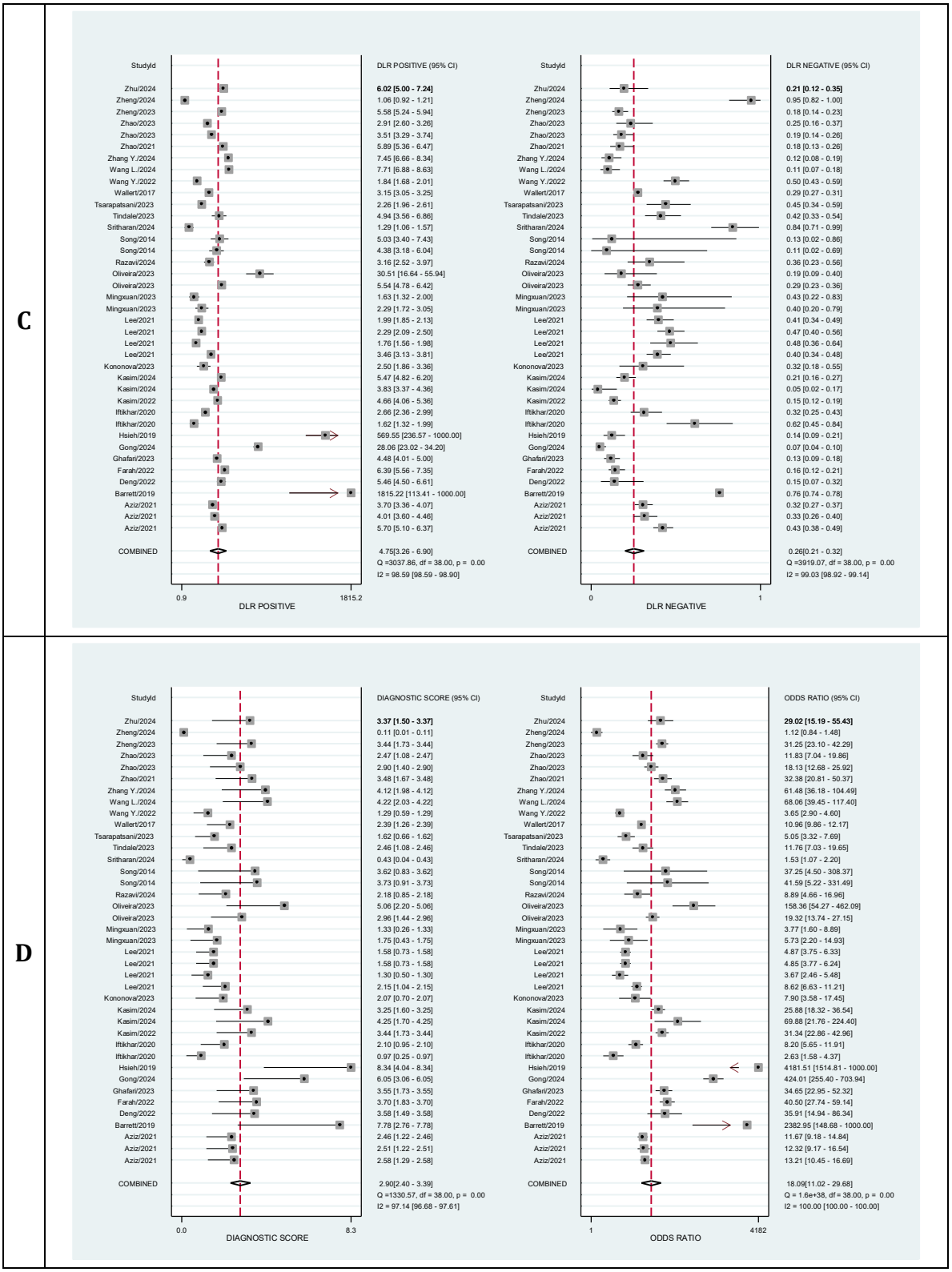
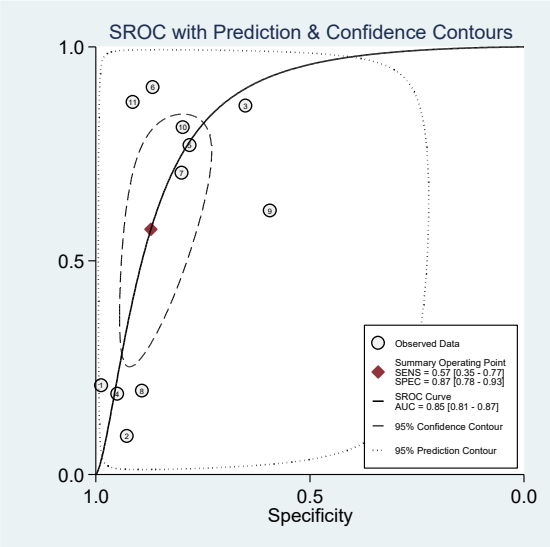
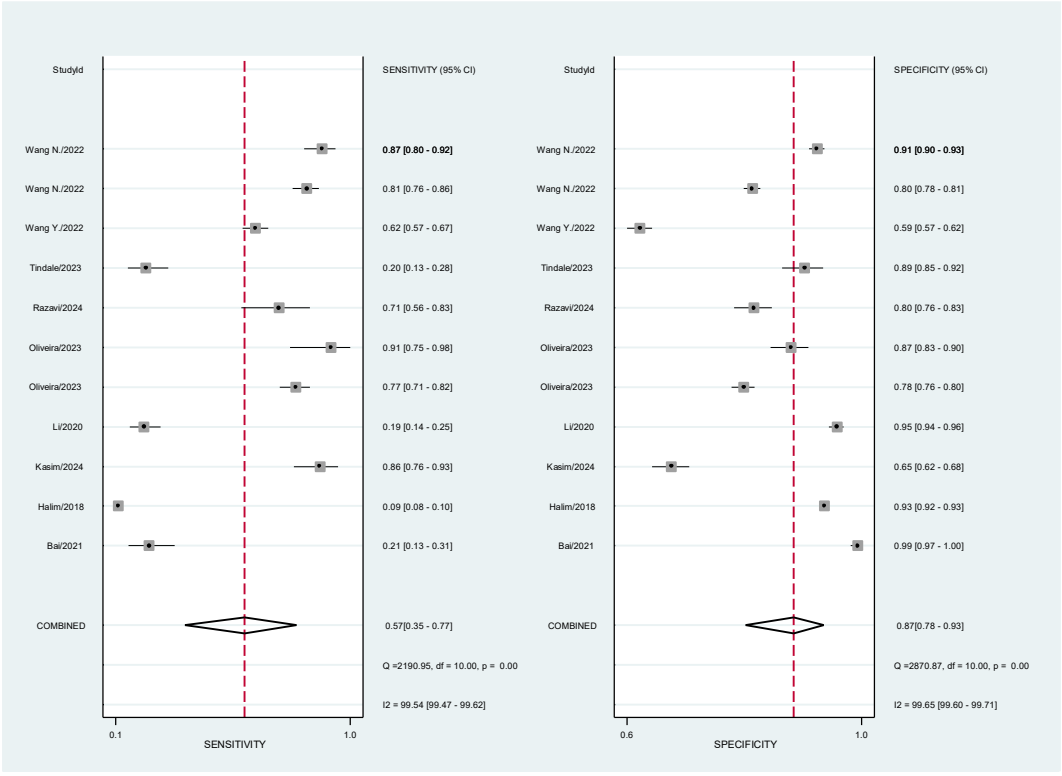


Figure S4: Diagnostic accuracy of the Support Vector Machines predicting mortality in MI patients. **A:** SROC curve showing overall sensitivity and specificity. **B:** DSS chart summarizing sensitivity and specificity with 95% CI. **C:** DLR plot showing positive and negative likelihood ratios with 95% CI. **D:** DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.57 [0.35 - 0.77]
SPEC = 0.87 [0.78 - 0.93]
SROC Curve
AUC = 0.85 [0.81 - 0.87]
95% Confidence Contour
95% Prediction Contour

B


StudyId
SENSITIVITY (95% CI)
Wang N./2022 0.87 [0.80 - 0.92]
Wang N./2022 0.81 [0.76 - 0.86]
Wang Y./2022 0.62 [0.57 - 0.67]
Tindale/2023 0.20 [0.13 - 0.28]
Razavi/2024 0.71 [0.56 - 0.83]
Oliveira/2023 0.91 [0.75 - 0.98]
Oliveira/2023 0.77 [0.71 - 0.82]
Li/2020 0.19 [0.14 - 0.25]
Kasim/2024 0.86 [0.76 - 0.93]
Halim/2018 0.09 [0.08 - 0.10]
Bai/2021 0.21 [0.13 - 0.31]
COMBINED 0.57[0.35 - 0.77]
Q =2190.95, df = 10.00, p = 0.00
I2 = 99.54 [99.47 - 99.62]
0.1
1.0
SENSITIVITY
StudyId
SPECIFICITY (95% CI)
Wang N./2022 0.91 [0.90 - 0.93]
Wang N./2022 0.80 [0.78 - 0.81]
Wang Y./2022 0.59 [0.57 - 0.62]
Tindale/2023 0.89 [0.85 - 0.92]
Razavi/2024 0.80 [0.76 - 0.83]
Oliveira/2023 0.87 [0.83 - 0.90]
Oliveira/2023 0.78 [0.76 - 0.80]
Li/2020 0.95 [0.94 - 0.96]
Kasim/2024 0.65 [0.62 - 0.68]
Halim/2018 0.93 [0.92 - 0.93]
Bai/2021 0.99 [0.97 - 1.00]
COMBINED 0.87[0.78 - 0.93]
Q =2870.87, df = 10.00, p = 0.00
I2 = 99.65 [99.60 - 99.71]
0.6
1.0
SPECIFICITY

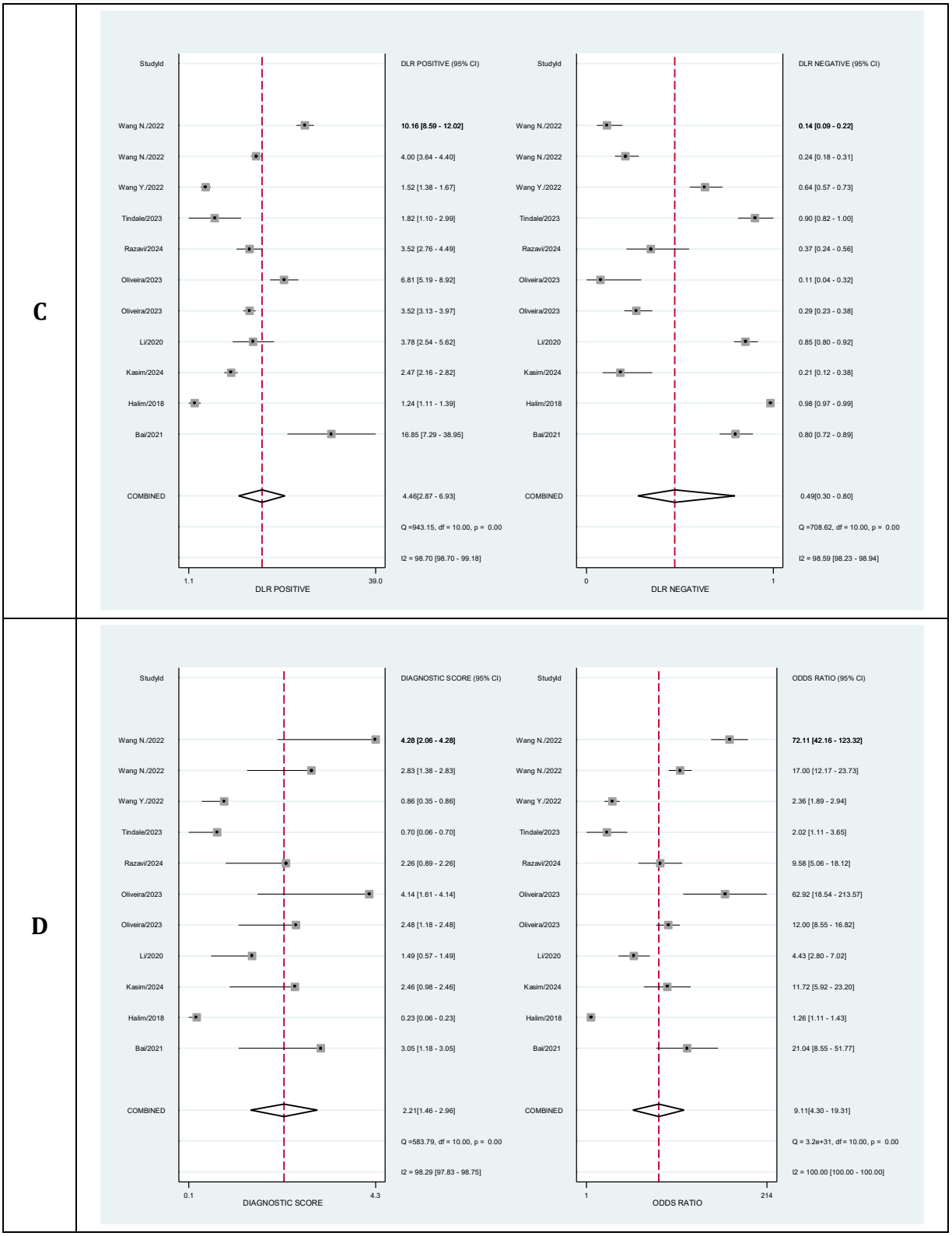
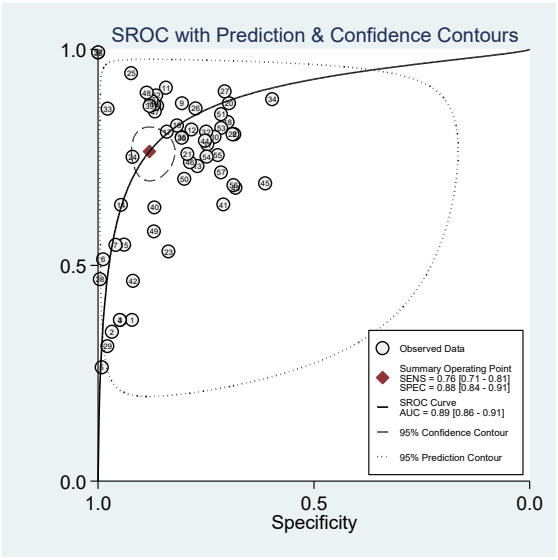
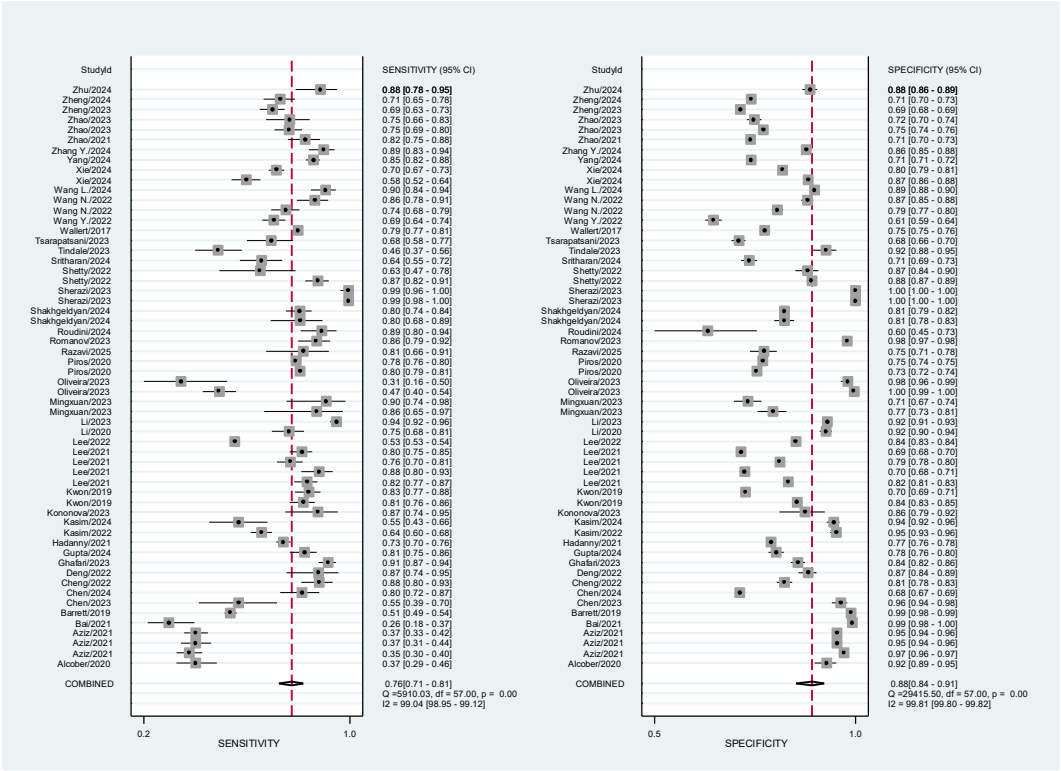


Figure S5: Diagnostic accuracy of the kNN model predicting mortality in MI patients.
(A) SROC curve showing overall sensitivity and specificity.
(B) DSS chart summarizing sensitivity and specificity with 95% CI.
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.
(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.76 [0.71 - 0.81]
SPEC = 0.88 [0.84 - 0.91]
SROC Curve
AUC = 0.89 [0.86 - 0.91]
95% Confidence Contour
95% Prediction Contour

B


StudyId
SENSITIVITY (95% CI)
Zhu/2024 0.88 [0.78 - 0.95]
Zheng/2024 0.71 [0.65 - 0.78]
Zheng/2023 0.69 [0.63 - 0.73]
Zhao/2023 0.75 [0.66 - 0.83]
Zhao/2023 0.75 [0.69 - 0.80]
Zhao/2021 0.82 [0.75 - 0.88]
Zhang Y./2024 0.89 [0.83 - 0.94]
Yang/2024 0.85 [0.82 - 0.88]
Xie/2024 0.70 [0.67 - 0.73]
Xie/2024 0.58 [0.52 - 0.64]
Wang L./2024 0.90 [0.84 - 0.94]
Wang N./2022 0.86 [0.78 - 0.91]
Wang N./2022 0.74 [0.68 - 0.79]
Wang Y./2022 0.69 [0.64 - 0.74]
Wallert/2017 0.79 [0.77 - 0.81]
Tsarapatsani/2023 0.68 [0.58 - 0.77]
Tindale/2023 0.46 [0.37 - 0.56]
Sritharan/2024 0.64 [0.55 - 0.72]
Shetty/2022 0.63 [0.47 - 0.78]
Shetty/2022 0.87 [0.82 - 0.91]
Sherazi/2023 0.99 [0.96 - 1.00]
Sherazi/2023 0.99 [0.98 - 1.00]
Shakhgeldyan/2024 0.80 [0.74 - 0.84]
Shakhgeldyan/2024 0.80 [0.68 - 0.89]
Roudini/2024 0.89 [0.80 - 0.94]
Romanov/2023 0.86 [0.79 - 0.92]
Razavi/2025 0.81 [0.66 - 0.91]
Piros/2020 0.78 [0.76 - 0.80]
Piros/2020 0.80 [0.79 - 0.81]
Oliveira/2023 0.31 [0.16 - 0.50]
Oliveira/2023 0.47 [0.40 - 0.54]
Mingxuan/2023 0.90 [0.74 - 0.98]
Mingxuan/2023 0.86 [0.65 - 0.97]
Li/2023 0.94 [0.92 - 0.96]
Li/2020 0.75 [0.68 - 0.81]
Lee/2022 0.53 [0.53 - 0.54]
Lee/2021 0.80 [0.75 - 0.85]
Lee/2021 0.76 [0.70 - 0.81]
Lee/2021 0.88 [0.80 - 0.93]
Lee/2021 0.82 [0.77 - 0.87]
Kwon/2019 0.83 [0.77 - 0.88]
Kwon/2019 0.81 [0.76 - 0.86]
Kononova/2023 0.87 [0.74 - 0.95]
Kasim/2024 0.55 [0.43 - 0.66]
Kasim/2022 0.64 [0.60 - 0.68]
Hadanny/2021 0.73 [0.70 - 0.76]
Gupta/2024 0.81 [0.75 - 0.86]
Ghafari/2023 0.91 [0.87 - 0.94]
Deng/2022 0.87 [0.74 - 0.95]
Cheng/2022 0.88 [0.80 - 0.93]
Chen/2024 0.80 [0.72 - 0.87]
Chen/2023 0.55 [0.39 - 0.70]
Barrett/2019 0.51 [0.49 - 0.54]
Bai/2021 0.26 [0.18 - 0.37]
Aziz/2021 0.37 [0.33 - 0.42]
Aziz/2021 0.37 [0.31 - 0.44]
Aziz/2021 0.35 [0.30 - 0.40]
Alcober/2020 0.37 [0.29 - 0.46]
COMBINED 0.76[0.71 - 0.81]
Q =5910.03, df = 57.00, p = 0.00
I2 = 99.04 [98.95 - 99.12]
0.2
1.0
SENSITIVITY
StudyId
SPECIFICITY (95% CI)
Zhu/2024 0.88 [0.86 - 0.89]
Zheng/2024 0.71 [0.70 - 0.73]
Zheng/2023 0.69 [0.68 - 0.69]
Zhao/2023 0.72 [0.70 - 0.74]
Zhao/2023 0.75 [0.74 - 0.76]
Zhao/2021 0.71 [0.70 - 0.73]
Zhang Y./2024 0.86 [0.85 - 0.88]
Yang/2024 0.71 [0.71 - 0.72]
Xie/2024 0.80 [0.79 - 0.81]
Xie/2024 0.87 [0.86 - 0.88]
Wang L./2024 0.89 [0.88 - 0.90]
Wang N./2022 0.87 [0.85 - 0.88]
Wang N./2022 0.79 [0.77 - 0.80]
Wang Y./2022 0.61 [0.59 - 0.64]
Wallert/2017 0.75 [0.75 - 0.76]
Tsarapatsani/2023 0.68 [0.66 - 0.70]
Tindale/2023 0.92 [0.88 - 0.95]
Sritharan/2024 0.71 [0.69 - 0.73]
Shetty/2022 0.87 [0.84 - 0.90]
Shetty/2022 0.88 [0.87 - 0.89]
Sherazi/2023 1.00 [1.00 - 1.00]
Sherazi/2023 1.00 [1.00 - 1.00]
Shakhgeldyan/2024 0.81 [0.79 - 0.82]
Shakhgeldyan/2024 0.81 [0.78 - 0.83]
Roudini/2024 0.60 [0.45 - 0.73]
Romanov/2023 0.98 [0.97 - 0.98]
Razavi/2025 0.75 [0.71 - 0.78]
Piros/2020 0.75 [0.74 - 0.75]
Piros/2020 0.73 [0.72 - 0.74]
Oliveira/2023 0.98 [0.96 - 0.99]
Oliveira/2023 1.00 [0.99 - 1.00]
Mingxuan/2023 0.71 [0.67 - 0.74]
Mingxuan/2023 0.77 [0.73 - 0.81]
Li/2023 0.92 [0.91 - 0.93]
Li/2020 0.92 [0.90 - 0.94]
Lee/2022 0.84 [0.83 - 0.84]
Lee/2021 0.69 [0.68 - 0.70]
Lee/2021 0.79 [0.78 - 0.80]
Lee/2021 0.70 [0.68 - 0.71]
Lee/2021 0.82 [0.81 - 0.83]
Kwon/2019 0.70 [0.69 - 0.71]
Kwon/2019 0.84 [0.83 - 0.85]
Kononova/2023 0.86 [0.79 - 0.92]
Kasim/2024 0.94 [0.92 - 0.96]
Kasim/2022 0.95 [0.93 - 0.96]
Hadanny/2021 0.77 [0.76 - 0.78]
Gupta/2024 0.78 [0.76 - 0.80]
Ghafari/2023 0.84 [0.82 - 0.86]
Deng/2022 0.87 [0.84 - 0.89]
Cheng/2022 0.81 [0.78 - 0.83]
Chen/2024 0.68 [0.67 - 0.69]
Chen/2023 0.96 [0.94 - 0.98]
Barrett/2019 0.99 [0.98 - 0.99]
Bai/2021 0.99 [0.98 - 1.00]
Aziz/2021 0.95 [0.94 - 0.96]
Aziz/2021 0.95 [0.94 - 0.96]
Aziz/2021 0.97 [0.96 - 0.97]
Alcober/2020 0.92 [0.89 - 0.95]
COMBINED 0.88[0.84 - 0.91]
Q =29415.50, df = 57.00, p = 0.00
I2 = 99.81 [99.80 - 99.82]
0.5
1.0
SPECIFICITY

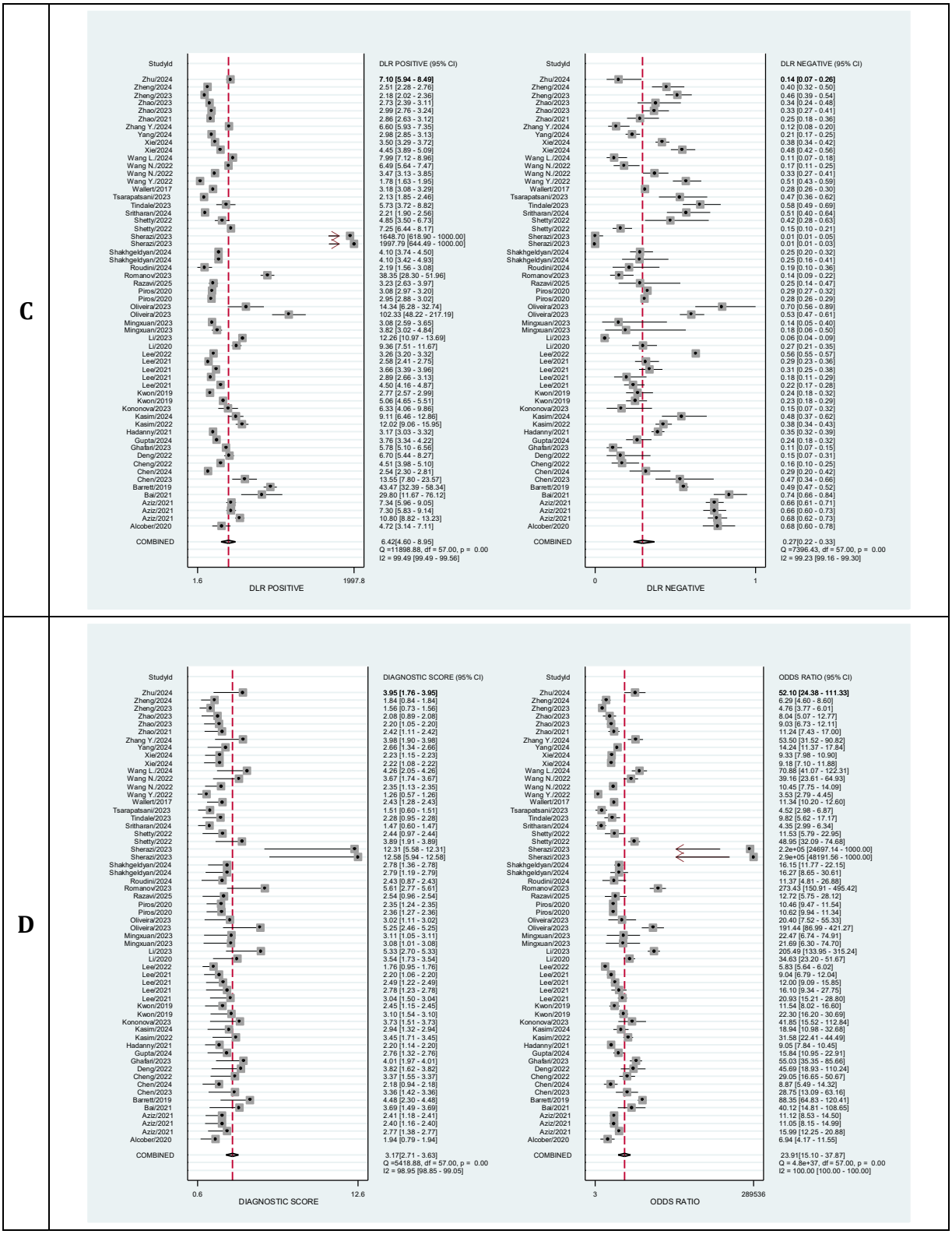


Figure S6: Diagnostic accuracy of the Random Forest model predicting mortality in MI patients.

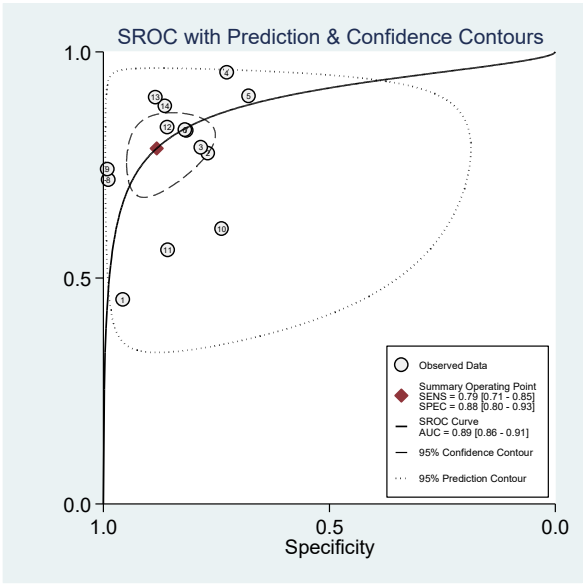
(A) SROC curve showing overall sensitivity and specificity.

(B) DSS chart summarizing sensitivity and specificity with 95% CI.

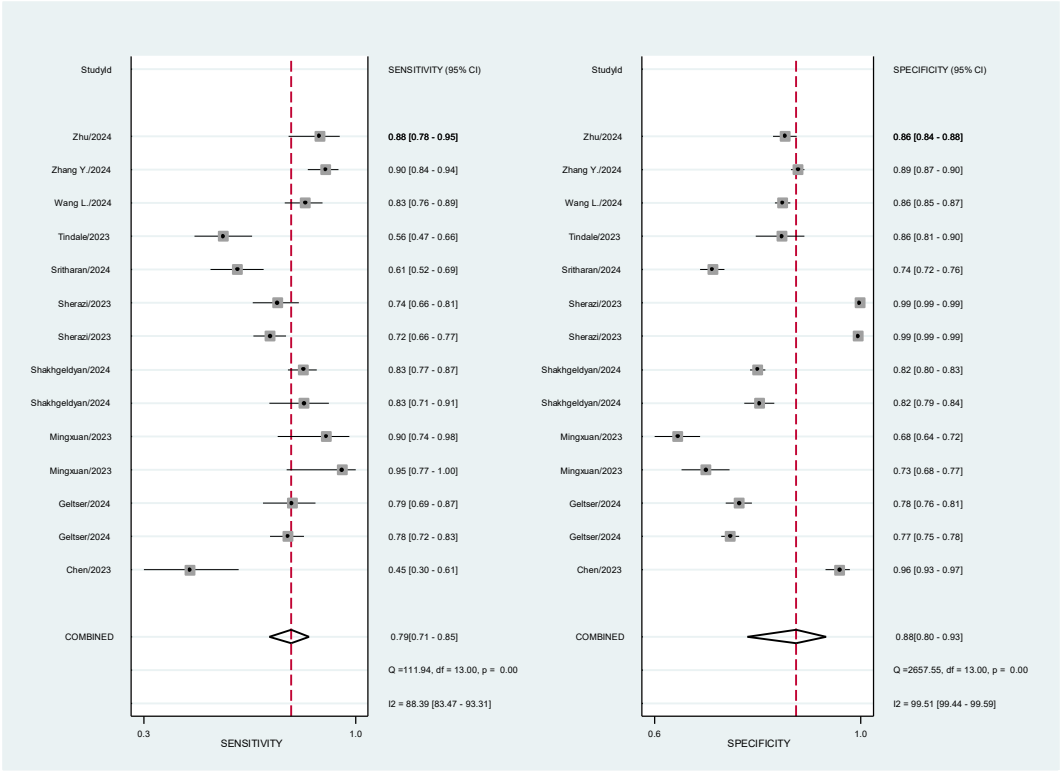
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.79 [0.71 - 0.85]
SPEC = 0.88 [0.80 - 0.93]
SROC Curve
AUC = 0.89 [0.86 - 0.91]
95% Confidence Contour
95% Prediction Contour

B


Studyid
SENSITIVITY (95% CI)
Zhu/2024 0.88 [0.78 - 0.95]
Zhang Y./2024 0.90 [0.84 - 0.94]
Wang L./2024 0.83 [0.76 - 0.89]
Tindale/2023 0.56 [0.47 - 0.66]
Sritharan/2024 0.61 [0.52 - 0.69]
Sherazi/2023 0.74 [0.66 - 0.81]
Sherazi/2023 0.72 [0.66 - 0.77]
Shakhgeldyan/2024 0.83 [0.77 - 0.87]
Shakhgeldyan/2024 0.83 [0.71 - 0.91]
Mingxuan/2023 0.90 [0.74 - 0.98]
Mingxuan/2023 0.95 [0.77 - 1.00]
Geltser/2024 0.79 [0.69 - 0.87]
Geltser/2024 0.78 [0.72 - 0.83]
Chen/2023 0.45 [0.30 - 0.61]
COMBINED 0.79[0.71 - 0.85]
Q =111.94, df = 13.00, p = 0.00
I2 = 88.39 [83.47 - 93.31]
0.3
1.0
SENSITIVITY
Studyid
SPECIFICITY (95% CI)
Zhu/2024 0.86 [0.84 - 0.88]
Zhang Y./2024 0.89 [0.87 - 0.90]
Wang L./2024 0.86 [0.85 - 0.87]
Tindale/2023 0.86 [0.81 - 0.90]
Sritharan/2024 0.74 [0.72 - 0.76]
Sherazi/2023 0.99 [0.99 - 0.99]
Sherazi/2023 0.99 [0.99 - 0.99]
Shakhgeldyan/2024 0.82 [0.80 - 0.83]
Shakhgeldyan/2024 0.82 [0.79 - 0.84]
Mingxuan/2023 0.68 [0.64 - 0.72]
Mingxuan/2023 0.73 [0.68 - 0.77]
Geltser/2024 0.78 [0.76 - 0.81]
Geltser/2024 0.77 [0.75 - 0.78]
Chen/2023 0.96 [0.93 - 0.97]
COMBINED 0.88[0.80 - 0.93]
Q =2657.55, df = 13.00, p = 0.00
I2 = 99.51 [99.44 - 99.59]
0.6
1.0
SPECIFICITY

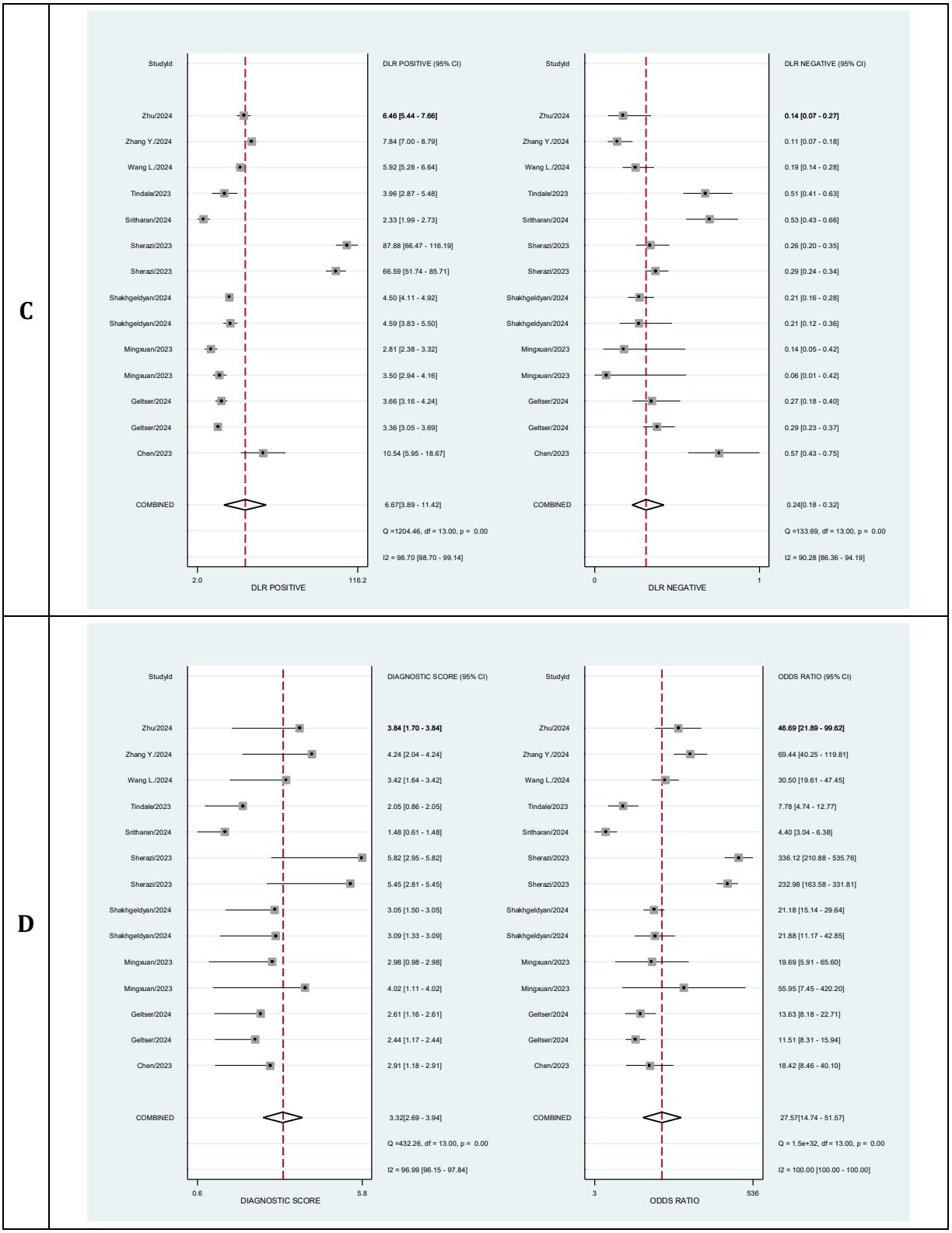


Figure S7: Diagnostic accuracy of the Classical GBM models predicting mortality in MI patients.

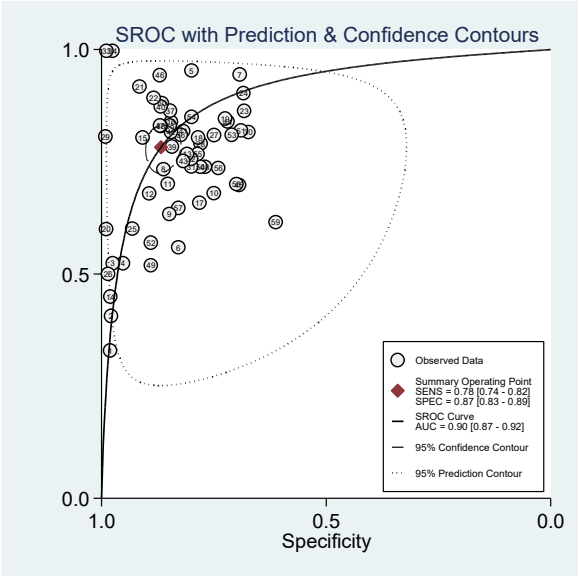
(A) SROC curve showing overall sensitivity and specificity.

(B) DSS chart summarizing sensitivity and specificity with 95% CI.

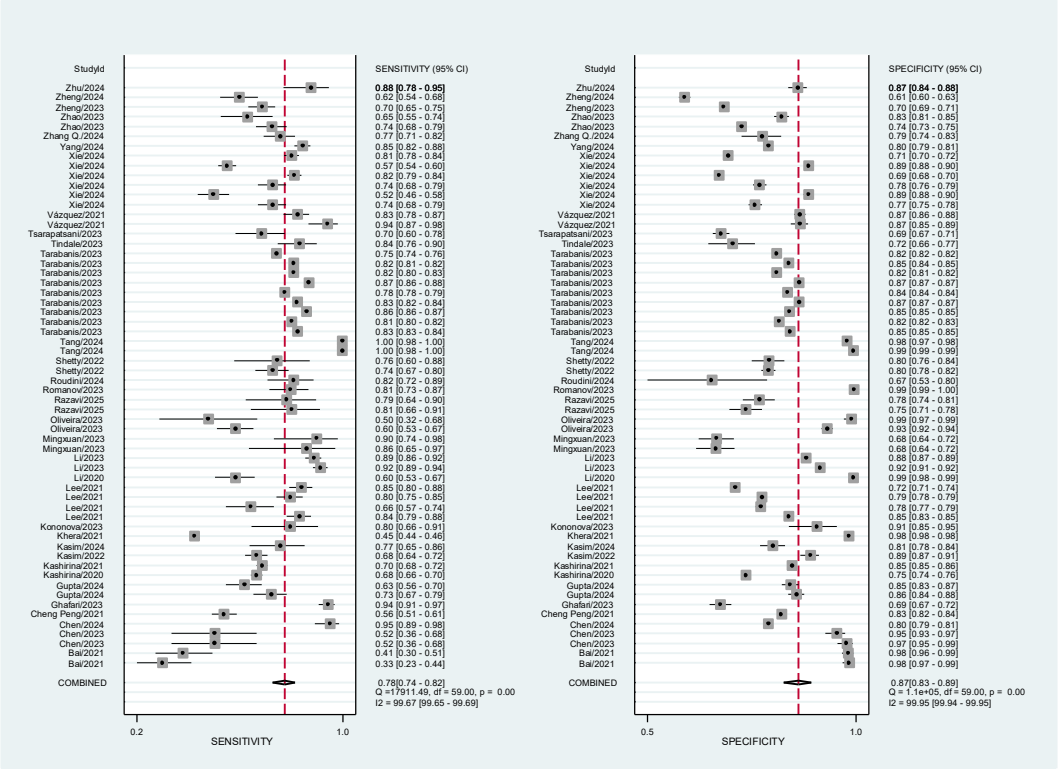
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.78 [0.74 - 0.82]
SPEC = 0.87 [0.83 - 0.89]
SROC Curve
AUC = 0.90 [0.87 - 0.92]
95% Confidence Contour
95% Prediction Contour

B


Studyid
SENSITIVITY (95% CI)
Zhu/2024 0.88 [0.78 - 0.95]
Zheng/2024 0.62 [0.54 - 0.68]
Zheng/2023 0.70 [0.65 - 0.75]
Zhao/2023 0.65 [0.55 - 0.74]
Zhao/2023 0.74 [0.68 - 0.79]
Zhang Q./2024 0.77 [0.71 - 0.82]
Yang/2024 0.85 [0.82 - 0.88]
Xie/2024 0.81 [0.78 - 0.84]
Xie/2024 0.57 [0.54 - 0.60]
Xie/2024 0.82 [0.79 - 0.84]
Xie/2024 0.74 [0.68 - 0.79]
Xie/2024 0.52 [0.46 - 0.58]
Xie/2024 0.74 [0.68 - 0.79]
Vázquez/2021 0.83 [0.78 - 0.87]
Vázquez/2021 0.94 [0.87 - 0.98]
Tsarapatsani/2023 0.70 [0.60 - 0.78]
Tindale/2023 0.84 [0.76 - 0.90]
Tarabanis/2023 0.75 [0.74 - 0.76]
Tarabanis/2023 0.82 [0.81 - 0.82]
Tarabanis/2023 0.82 [0.80 - 0.83]
Tarabanis/2023 0.87 [0.86 - 0.88]
Tarabanis/2023 0.78 [0.78 - 0.79]
Tarabanis/2023 0.83 [0.82 - 0.84]
Tarabanis/2023 0.86 [0.86 - 0.87]
Tarabanis/2023 0.81 [0.80 - 0.82]
Tarabanis/2023 0.83 [0.83 - 0.84]
Tang/2024 1.00 [0.98 - 1.00]
Tang/2024 1.00 [0.98 - 1.00]
Shetty/2022 0.76 [0.60 - 0.88]
Shetty/2022 0.74 [0.67 - 0.80]
Roudini/2024 0.82 [0.72 - 0.89]
Romanov/2023 0.81 [0.73 - 0.87]
Razavi/2025 0.79 [0.64 - 0.90]
Razavi/2025 0.81 [0.66 - 0.91]
Oliveira/2023 0.50 [0.32 - 0.68]
Oliveira/2023 0.60 [0.53 - 0.67]
Mingxuan/2023 0.90 [0.74 - 0.98]
Mingxuan/2023 0.86 [0.65 - 0.97]
Li/2023 0.89 [0.86 - 0.92]
Li/2023 0.92 [0.89 - 0.94]
Li/2020 0.60 [0.53 - 0.67]
Lee/2021 0.85 [0.80 - 0.88]
Lee/2021 0.80 [0.75 - 0.85]
Lee/2021 0.66 [0.57 - 0.74]
Lee/2021 0.84 [0.79 - 0.88]
Kononova/2023 0.80 [0.66 - 0.91]
Khera/2021 0.45 [0.44 - 0.46]
Kasim/2024 0.77 [0.65 - 0.86]
Kasim/2022 0.68 [0.64 - 0.72]
Kashirina/2021 0.70 [0.68 - 0.72]
Kashirina/2020 0.68 [0.66 - 0.70]
Gupta/2024 0.63 [0.56 - 0.70]
Gupta/2024 0.73 [0.67 - 0.79]
Ghafari/2023 0.94 [0.91 - 0.97]
Cheng Peng/2021 0.56 [0.51 - 0.61]
Chen/2024 0.95 [0.89 - 0.98]
Chen/2023 0.52 [0.36 - 0.68]
Chen/2023 0.52 [0.36 - 0.68]
Bai/2021 0.41 [0.30 - 0.51]
Bai/2021 0.33 [0.23 - 0.44]
COMBINED 0.78 [0.74 - 0.82]
Q =1791.49, df = 59.00, p = 0.00
I2 = 99.67 [99.65 - 99.69]
0.2
1.0
SENSITIVITY
Studyid
SPECIFICITY (95% CI)
Zhu/2024 0.87 [0.84 - 0.88]
Zheng/2024 0.61 [0.60 - 0.63]
Zheng/2023 0.70 [0.69 - 0.71]
Zhao/2023 0.83 [0.81 - 0.85]
Zhao/2023 0.74 [0.73 - 0.75]
Zhang Q./2024 0.79 [0.74 - 0.83]
Yang/2024 0.80 [0.79 - 0.81]
Xie/2024 0.71 [0.70 - 0.72]
Xie/2024 0.89 [0.88 - 0.90]
Xie/2024 0.69 [0.68 - 0.70]
Xie/2024 0.78 [0.76 - 0.79]
Xie/2024 0.89 [0.88 - 0.90]
Xie/2024 0.77 [0.75 - 0.78]
Vázquez/2021 0.87 [0.86 - 0.88]
Vázquez/2021 0.87 [0.85 - 0.89]
Tsarapatsani/2023 0.69 [0.67 - 0.71]
Tindale/2023 0.72 [0.66 - 0.77]
Tarabanis/2023 0.82 [0.82 - 0.82]
Tarabanis/2023 0.85 [0.84 - 0.85]
Tarabanis/2023 0.82 [0.81 - 0.82]
Tarabanis/2023 0.87 [0.87 - 0.87]
Tarabanis/2023 0.84 [0.84 - 0.84]
Tarabanis/2023 0.87 [0.87 - 0.87]
Tarabanis/2023 0.85 [0.85 - 0.85]
Tarabanis/2023 0.82 [0.82 - 0.83]
Tarabanis/2023 0.85 [0.85 - 0.85]
Tang/2024 0.98 [0.97 - 0.98]
Tang/2024 0.99 [0.99 - 0.99]
Shetty/2022 0.80 [0.76 - 0.84]
Shetty/2022 0.80 [0.78 - 0.82]
Roudini/2024 0.67 [0.53 - 0.80]
Romanov/2023 0.99 [0.99 - 1.00]
Razavi/2025 0.78 [0.74 - 0.81]
Razavi/2025 0.75 [0.71 - 0.78]
Oliveira/2023 0.99 [0.97 - 0.99]
Oliveira/2023 0.93 [0.92 - 0.94]
Mingxuan/2023 0.68 [0.64 - 0.72]
Mingxuan/2023 0.68 [0.64 - 0.72]
Li/2023 0.88 [0.87 - 0.89]
Li/2023 0.92 [0.91 - 0.92]
Li/2020 0.99 [0.98 - 0.99]
Lee/2021 0.72 [0.71 - 0.74]
Lee/2021 0.79 [0.78 - 0.79]
Lee/2021 0.78 [0.77 - 0.79]
Lee/2021 0.85 [0.83 - 0.85]
Kononova/2023 0.91 [0.85 - 0.95]
Khera/2021 0.98 [0.98 - 0.98]
Kasim/2024 0.81 [0.78 - 0.84]
Kasim/2022 0.89 [0.87 - 0.91]
Kashirina/2021 0.85 [0.85 - 0.86]
Kashirina/2020 0.75 [0.74 - 0.76]
Gupta/2024 0.85 [0.83 - 0.87]
Gupta/2024 0.86 [0.84 - 0.88]
Ghafari/2023 0.69 [0.67 - 0.72]
Cheng Peng/2021 0.83 [0.82 - 0.84]
Chen/2024 0.80 [0.79 - 0.81]
Chen/2023 0.95 [0.93 - 0.97]
Chen/2023 0.97 [0.95 - 0.99]
Bai/2021 0.98 [0.96 - 0.99]
Bai/2021 0.98 [0.97 - 0.99]
COMBINED 0.87 [0.83 - 0.89]
Q = 1.1e+05, df = 59.00, p = 0.00
I2 = 99.95 [99.94 - 99.95]
0.5
1.0
SPECIFICITY

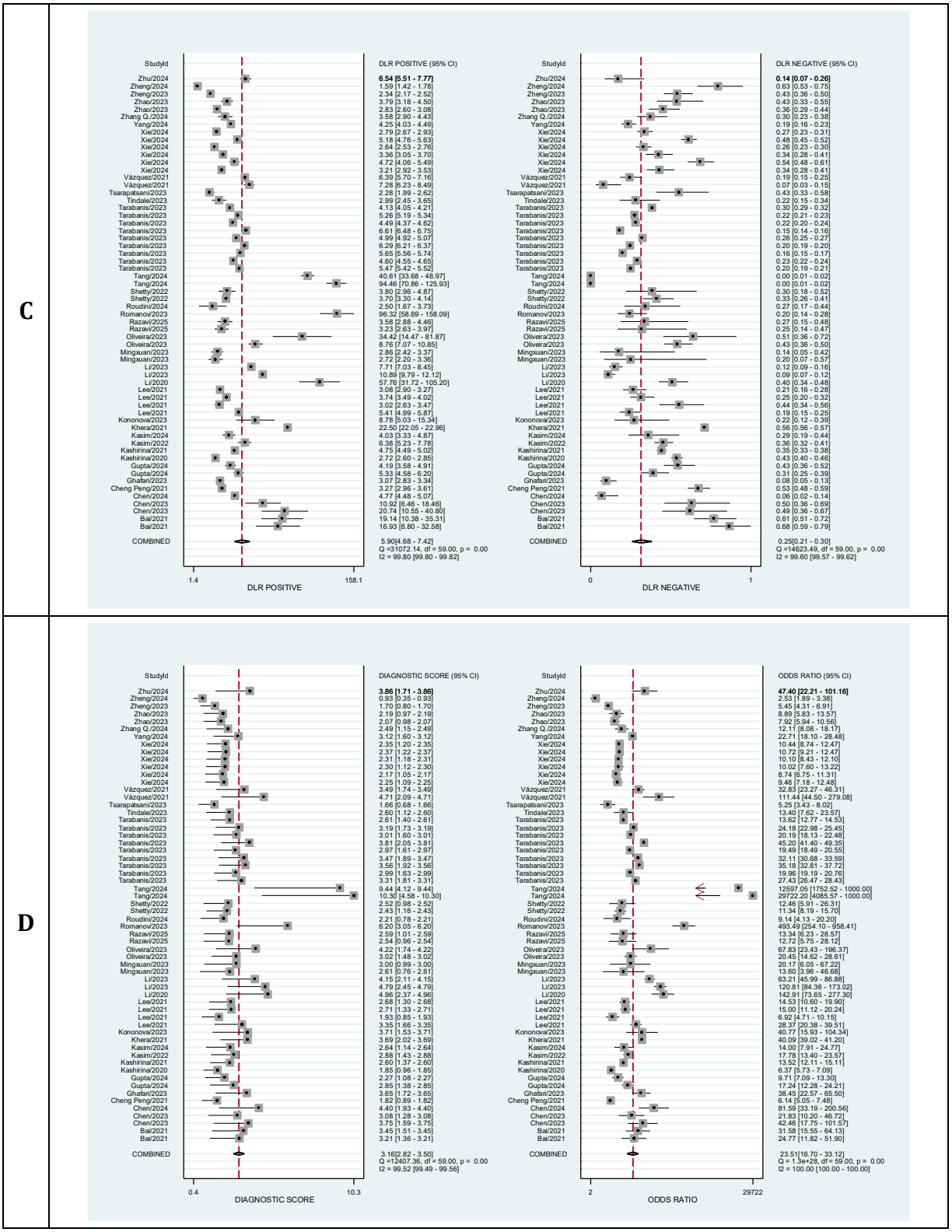


Figure S8. Diagnostic accuracy of the Advanced GBM models predicting mortality in MI patients.

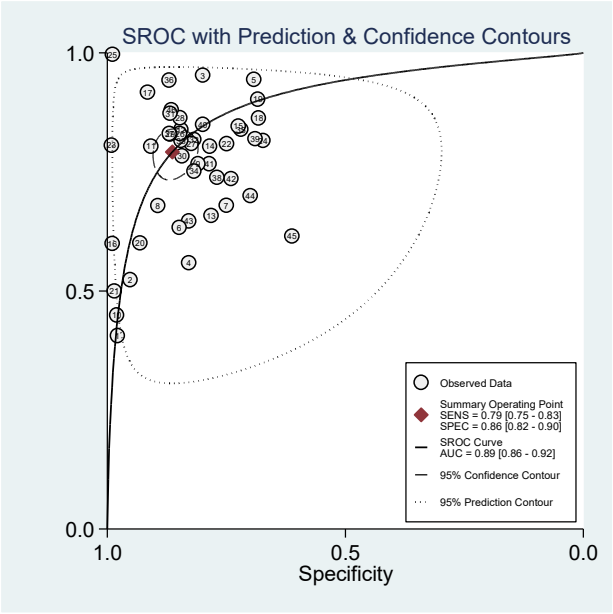
(A) SROC curve showing overall sensitivity and specificity.

(B) DSS chart summarizing sensitivity and specificity with 95% CI.

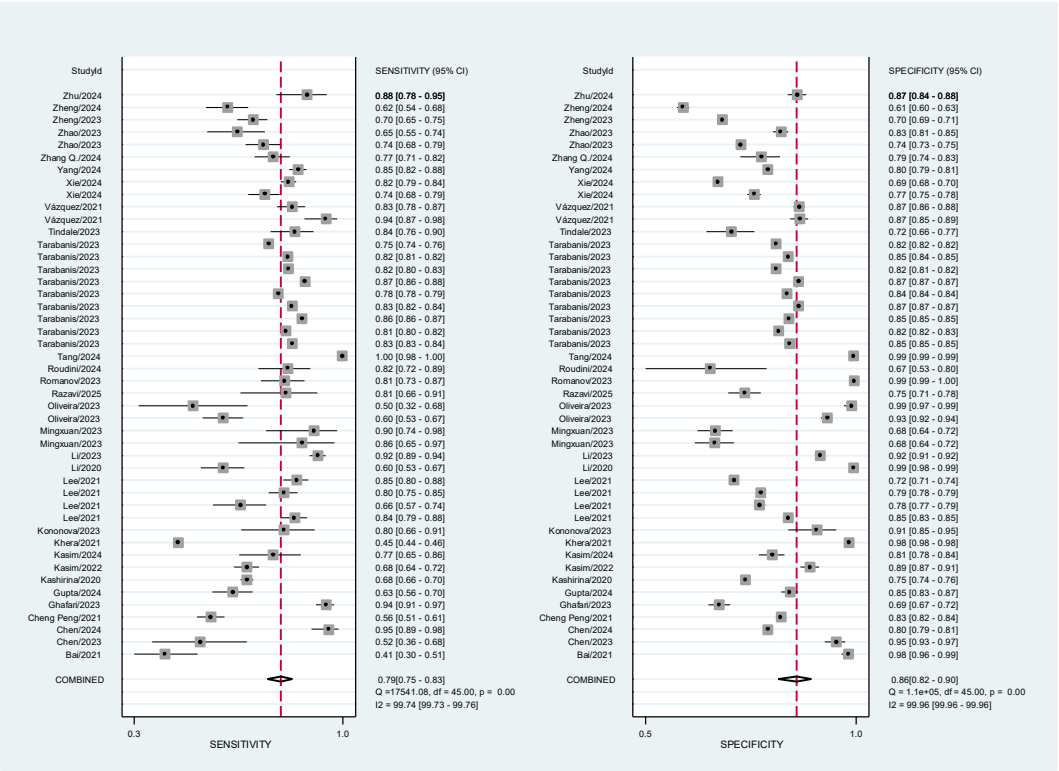
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.79 [0.75 - 0.83]
SPEC = 0.86 [0.82 - 0.90]
SROC Curve
AUC = 0.89 [0.86 - 0.92]
95% Confidence Contour
95% Prediction Contour

B


StudyId
SENSITIVITY (95% CI)
Zhu/2024 0.88 [0.78 - 0.95]
Zheng/2024 0.62 [0.54 - 0.68]
Zheng/2023 0.70 [0.65 - 0.75]
Zhao/2023 0.65 [0.55 - 0.74]
Zhao/2023 0.74 [0.68 - 0.79]
Zhang Q./2024 0.77 [0.71 - 0.82]
Yang/2024 0.85 [0.82 - 0.88]
Xie/2024 0.82 [0.79 - 0.84]
Xie/2024 0.74 [0.68 - 0.79]
Vázquez/2021 0.83 [0.78 - 0.87]
Vázquez/2021 0.94 [0.87 - 0.98]
Tindale/2023 0.84 [0.76 - 0.90]
Tarabanis/2023 0.75 [0.74 - 0.76]
Tarabanis/2023 0.82 [0.81 - 0.82]
Tarabanis/2023 0.82 [0.80 - 0.83]
Tarabanis/2023 0.87 [0.86 - 0.88]
Tarabanis/2023 0.78 [0.78 - 0.79]
Tarabanis/2023 0.83 [0.82 - 0.84]
Tarabanis/2023 0.86 [0.86 - 0.87]
Tarabanis/2023 0.81 [0.80 - 0.82]
Tarabanis/2023 0.83 [0.83 - 0.84]
Tang/2024 1.00 [0.98 - 1.00]
Roudini/2024 0.82 [0.72 - 0.89]
Romanov/2023 0.81 [0.73 - 0.87]
Razavi/2025 0.81 [0.66 - 0.91]
Oliveira/2023 0.50 [0.32 - 0.68]
Oliveira/2023 0.60 [0.53 - 0.67]
Mingxuan/2023 0.90 [0.74 - 0.98]
Mingxuan/2023 0.86 [0.65 - 0.97]
Li/2023 0.92 [0.89 - 0.94]
Li/2020 0.60 [0.53 - 0.67]
Lee/2021 0.85 [0.80 - 0.88]
Lee/2021 0.80 [0.75 - 0.85]
Lee/2021 0.66 [0.57 - 0.74]
Lee/2021 0.84 [0.79 - 0.88]
Kononova/2023 0.80 [0.66 - 0.91]
Khera/2021 0.45 [0.44 - 0.46]
Kasim/2024 0.77 [0.65 - 0.86]
Kasim/2022 0.68 [0.64 - 0.72]
Kashirina/2020 0.68 [0.66 - 0.70]
Gupta/2024 0.63 [0.56 - 0.70]
Ghafari/2023 0.94 [0.91 - 0.97]
Cheng Peng/2021 0.56 [0.51 - 0.61]
Chen/2024 0.95 [0.89 - 0.98]
Chen/2023 0.52 [0.36 - 0.68]
Bai/2021 0.41 [0.30 - 0.51]
COMBINED 0.79[0.75 - 0.83]
Q =17541.08, df = 45.00, p = 0.00
I2 = 99.74 [99.73 - 99.76]
0.3
1.0
SENSITIVITY
StudyId
SPECIFICITY (95% CI)
Zhu/2024 0.87 [0.84 - 0.88]
Zheng/2024 0.61 [0.60 - 0.63]
Zheng/2023 0.70 [0.69 - 0.71]
Zhao/2023 0.83 [0.81 - 0.85]
Zhao/2023 0.74 [0.73 - 0.75]
Zhang Q./2024 0.79 [0.74 - 0.83]
Yang/2024 0.80 [0.79 - 0.81]
Xie/2024 0.69 [0.68 - 0.70]
Xie/2024 0.77 [0.75 - 0.78]
Vázquez/2021 0.87 [0.86 - 0.88]
Vázquez/2021 0.87 [0.85 - 0.89]
Tindale/2023 0.72 [0.66 - 0.77]
Tarabanis/2023 0.82 [0.82 - 0.82]
Tarabanis/2023 0.85 [0.84 - 0.85]
Tarabanis/2023 0.82 [0.81 - 0.82]
Tarabanis/2023 0.87 [0.87 - 0.87]
Tarabanis/2023 0.84 [0.84 - 0.84]
Tarabanis/2023 0.87 [0.87 - 0.87]
Tarabanis/2023 0.85 [0.85 - 0.85]
Tarabanis/2023 0.82 [0.82 - 0.83]
Tarabanis/2023 0.85 [0.85 - 0.85]
Tang/2024 0.99 [0.99 - 0.99]
Roudini/2024 0.67 [0.53 - 0.80]
Romanov/2023 0.99 [0.99 - 1.00]
Razavi/2025 0.75 [0.71 - 0.78]
Oliveira/2023 0.99 [0.97 - 0.99]
Oliveira/2023 0.93 [0.92 - 0.94]
Mingxuan/2023 0.68 [0.64 - 0.72]
Mingxuan/2023 0.68 [0.64 - 0.72]
Li/2023 0.92 [0.91 - 0.92]
Li/2020 0.99 [0.98 - 0.99]
Lee/2021 0.72 [0.71 - 0.74]
Lee/2021 0.79 [0.78 - 0.79]
Lee/2021 0.78 [0.77 - 0.79]
Lee/2021 0.85 [0.83 - 0.85]
Kononova/2023 0.91 [0.85 - 0.95]
Khera/2021 0.98 [0.98 - 0.98]
Kasim/2024 0.81 [0.78 - 0.84]
Kasim/2022 0.89 [0.87 - 0.91]
Kashirina/2020 0.75 [0.74 - 0.76]
Gupta/2024 0.85 [0.83 - 0.87]
Ghafari/2023 0.69 [0.67 - 0.72]
Cheng Peng/2021 0.83 [0.82 - 0.84]
Chen/2024 0.80 [0.79 - 0.81]
Chen/2023 0.95 [0.93 - 0.97]
Bai/2021 0.98 [0.96 - 0.99]
COMBINED 0.86[0.82 - 0.90]
Q = 1.1e+05, df = 45.00, p = 0.00
I2 = 99.96 [99.96 - 99.96]
0.5
1.0
SPECIFICITY

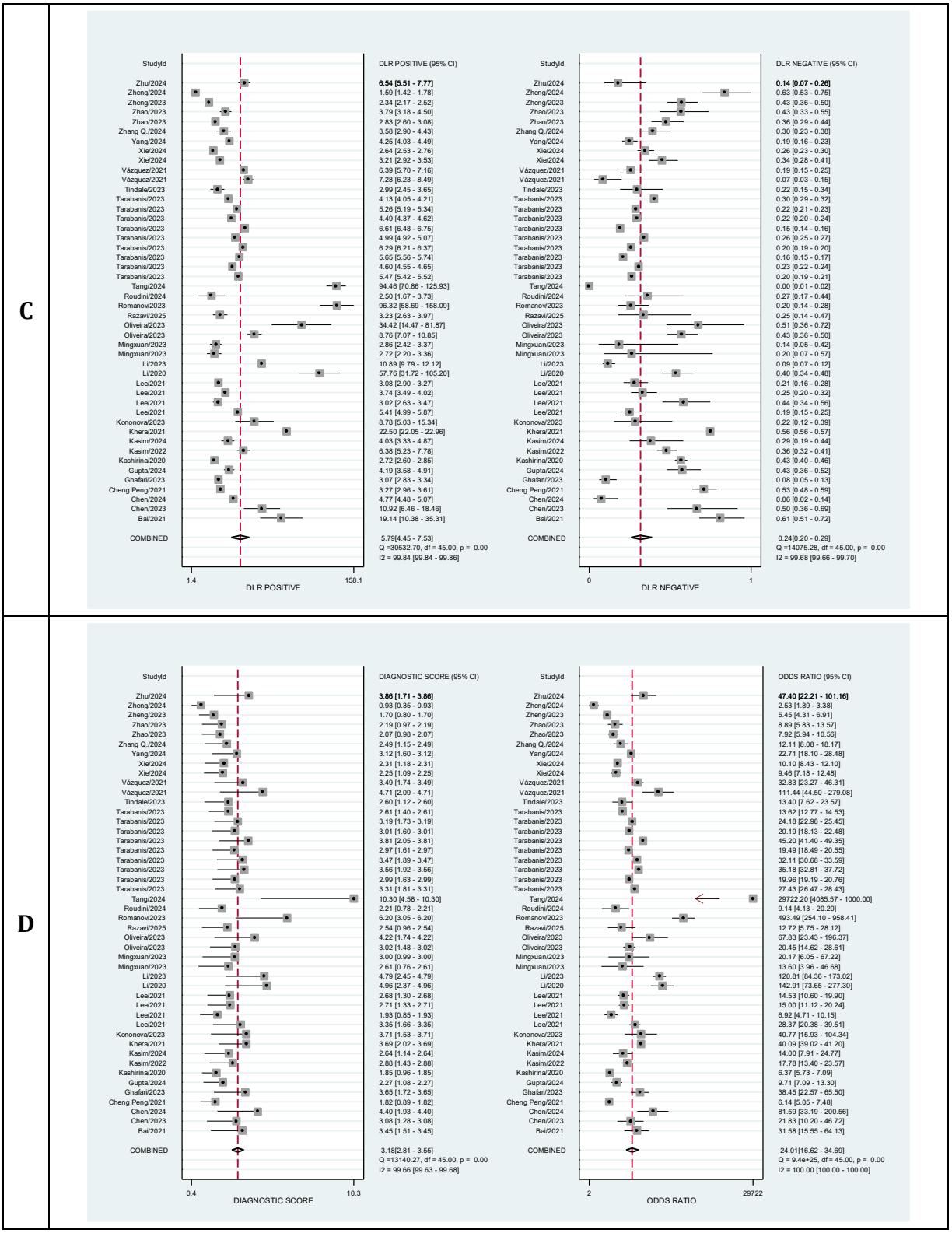
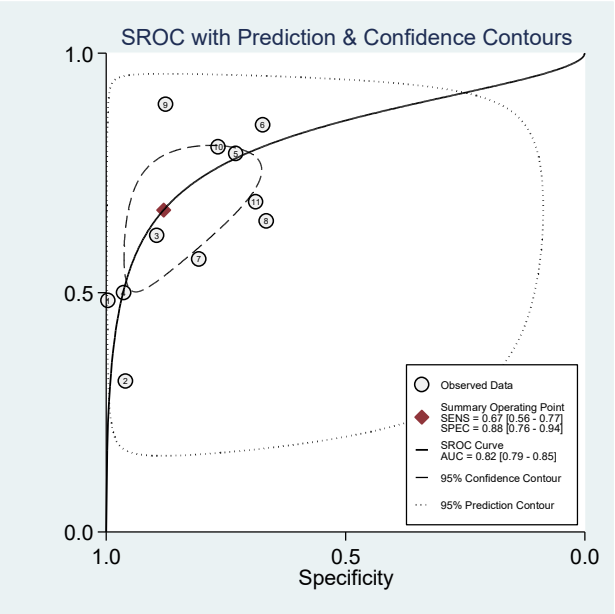
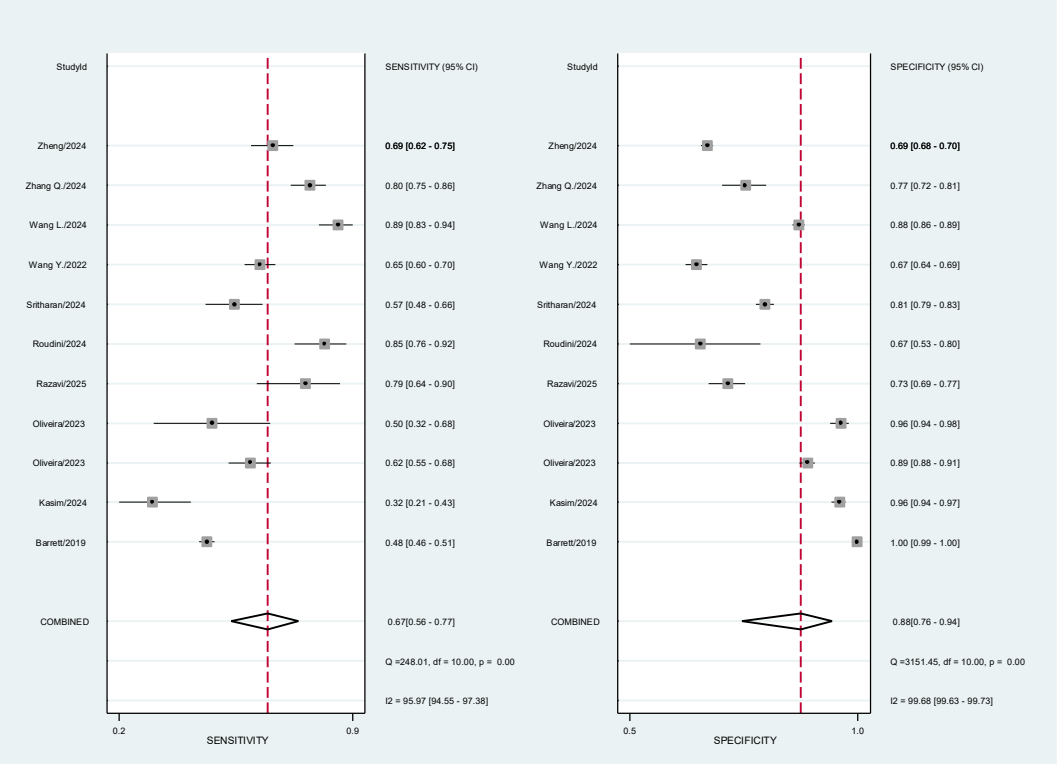


Figure S9. Diagnostic accuracy of the XGBoost model predicting mortality in MI patients.
(A) SROC curve showing overall sensitivity and specificity.
(B) DSS chart summarizing sensitivity and specificity with 95% CI.
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.
(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.67 [0.56 - 0.77]
SPEC = 0.88 [0.76 - 0.94]
SROC Curve
AUC = 0.82 [0.79 - 0.85]
95% Confidence Contour
95% Prediction Contour

B


Studyld
SENSITIVITY (95% CI)
Zheng/2024 0.69 [0.62 - 0.75]
Zhang Q./2024 0.80 [0.75 - 0.86]
Wang L./2024 0.89 [0.83 - 0.94]
Wang Y./2022 0.65 [0.60 - 0.70]
Sritharan/2024 0.57 [0.48 - 0.66]
Roudini/2024 0.85 [0.76 - 0.92]
Razavi/2025 0.79 [0.64 - 0.90]
Oliveira/2023 0.50 [0.32 - 0.68]
Oliveira/2023 0.62 [0.55 - 0.68]
Kasim/2024 0.32 [0.21 - 0.43]
Barrett/2019 0.48 [0.46 - 0.51]
COMBINED 0.67[0.56 - 0.77]
Q =248.01, df = 10.00, p = 0.00
I2 = 95.97 [94.55 - 97.38]
0.2
0.9
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Zheng/2024 0.69 [0.68 - 0.70]
Zhang Q./2024 0.77 [0.72 - 0.81]
Wang L./2024 0.88 [0.86 - 0.89]
Wang Y./2022 0.67 [0.64 - 0.69]
Sritharan/2024 0.81 [0.79 - 0.83]
Roudini/2024 0.67 [0.53 - 0.80]
Razavi/2025 0.73 [0.69 - 0.77]
Oliveira/2023 0.96 [0.94 - 0.98]
Oliveira/2023 0.89 [0.88 - 0.91]
Kasim/2024 0.96 [0.94 - 0.97]
Barrett/2019 1.00 [0.99 - 1.00]
COMBINED 0.88[0.76 - 0.94]
Q =3151.45, df = 10.00, p = 0.00
I2 = 99.68 [99.63 - 99.73]
0.5
1.0
SPECIFICITY

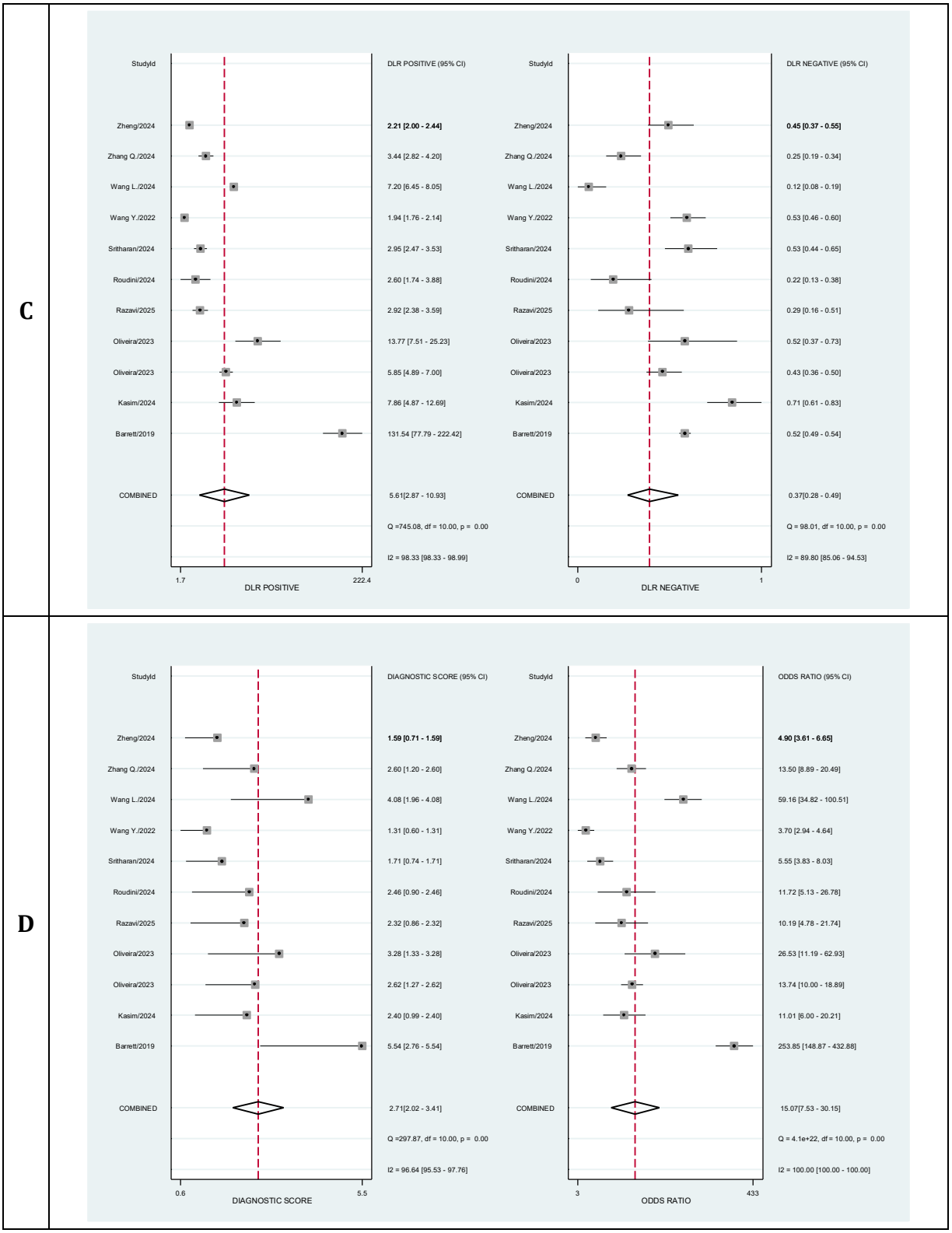


Figure S10. Diagnostic accuracy of the AdaBoost model predicting mortality in MI patients.

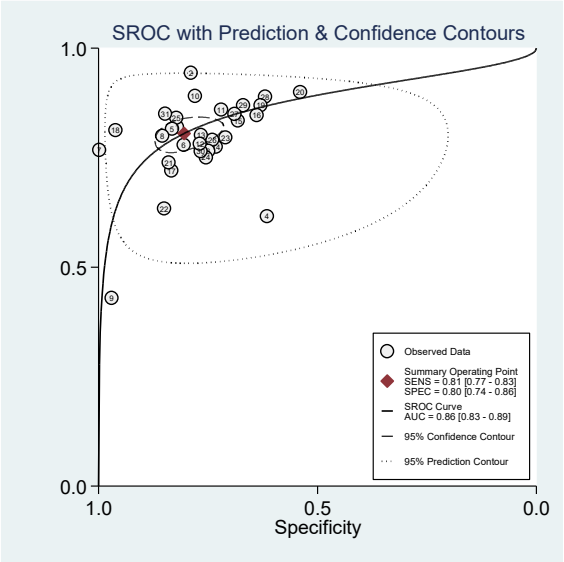
(A) SROC curve showing overall sensitivity and specificity.

(B) DSS chart summarizing sensitivity and specificity with 95% CI.

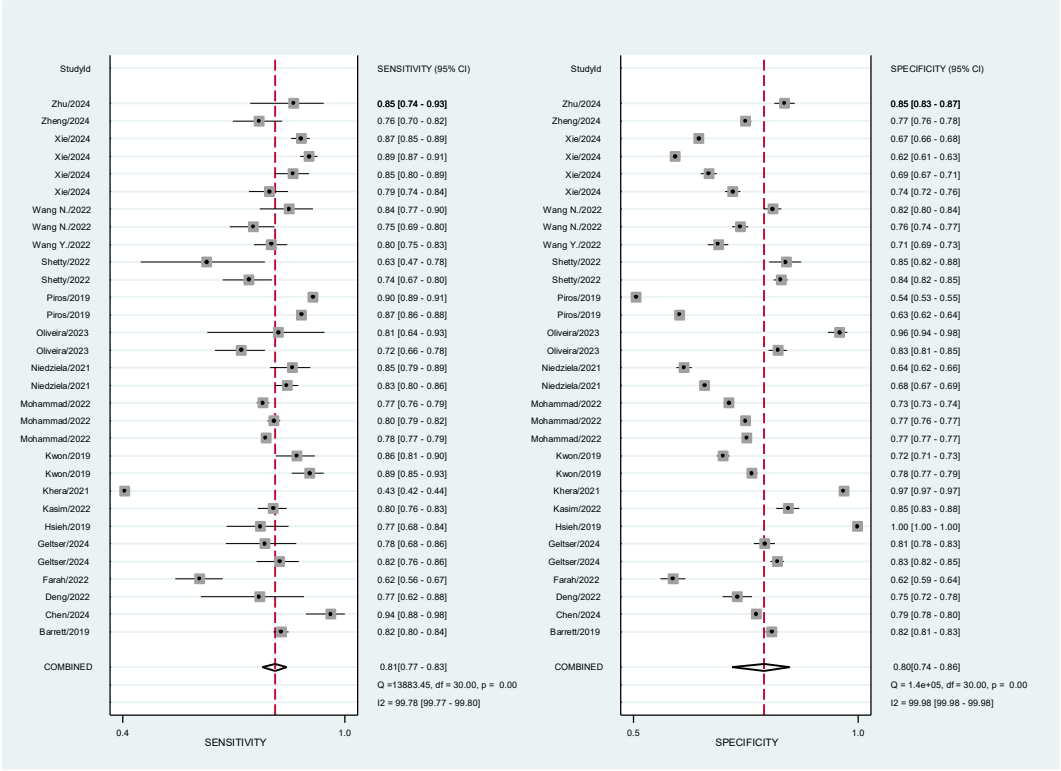
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.81 [0.77 - 0.83]
SPEC = 0.80 [0.74 - 0.86]
SROC Curve
AUC = 0.86 [0.83 - 0.89]
95% Confidence Contour
95% Prediction Contour

B


Studyld
SENSITIVITY (95% CI)
Zhu/2024 0.85 [0.74 - 0.93]
Zheng/2024 0.76 [0.70 - 0.82]
Xie/2024 0.87 [0.85 - 0.89]
Xie/2024 0.89 [0.87 - 0.91]
Xie/2024 0.85 [0.80 - 0.89]
Xie/2024 0.79 [0.74 - 0.84]
Wang N./2022 0.84 [0.77 - 0.90]
Wang N./2022 0.75 [0.69 - 0.80]
Wang Y./2022 0.80 [0.75 - 0.83]
Shetty/2022 0.63 [0.47 - 0.78]
Shetty/2022 0.74 [0.67 - 0.80]
Piros/2019 0.90 [0.89 - 0.91]
Piros/2019 0.87 [0.86 - 0.88]
Oliveira/2023 0.81 [0.64 - 0.93]
Oliveira/2023 0.72 [0.66 - 0.78]
Niedziela/2021 0.85 [0.79 - 0.89]
Niedziela/2021 0.83 [0.80 - 0.86]
Mohammad/2022 0.77 [0.76 - 0.79]
Mohammad/2022 0.80 [0.79 - 0.82]
Mohammad/2022 0.78 [0.77 - 0.79]
Kwon/2019 0.86 [0.81 - 0.90]
Kwon/2019 0.89 [0.85 - 0.93]
Khera/2021 0.43 [0.42 - 0.44]
Kasim/2022 0.80 [0.76 - 0.83]
Hsieh/2019 0.77 [0.68 - 0.84]
Geltser/2024 0.78 [0.68 - 0.86]
Geltser/2024 0.82 [0.76 - 0.86]
Farah/2022 0.62 [0.56 - 0.67]
Deng/2022 0.77 [0.62 - 0.88]
Chen/2024 0.94 [0.88 - 0.98]
Barrett/2019 0.82 [0.80 - 0.84]
COMBINED 0.81[0.77 - 0.83]
Q =13883.45, df = 30.00, p = 0.00
I2 = 99.78 [99.77 - 99.80]
0.4
1.0
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Zhu/2024 0.85 [0.83 - 0.87]
Zheng/2024 0.77 [0.76 - 0.78]
Xie/2024 0.67 [0.66 - 0.68]
Xie/2024 0.62 [0.61 - 0.63]
Xie/2024 0.69 [0.67 - 0.71]
Xie/2024 0.74 [0.72 - 0.76]
Wang N./2022 0.82 [0.80 - 0.84]
Wang N./2022 0.76 [0.74 - 0.77]
Wang Y./2022 0.71 [0.69 - 0.73]
Shetty/2022 0.85 [0.82 - 0.88]
Shetty/2022 0.84 [0.82 - 0.85]
Piros/2019 0.54 [0.53 - 0.55]
Piros/2019 0.63 [0.62 - 0.64]
Oliveira/2023 0.96 [0.94 - 0.98]
Oliveira/2023 0.83 [0.81 - 0.85]
Niedziela/2021 0.64 [0.62 - 0.66]
Niedziela/2021 0.68 [0.67 - 0.69]
Mohammad/2022 0.73 [0.73 - 0.74]
Mohammad/2022 0.77 [0.76 - 0.77]
Mohammad/2022 0.77 [0.77 - 0.77]
Kwon/2019 0.72 [0.71 - 0.73]
Kwon/2019 0.78 [0.77 - 0.79]
Khera/2021 0.97 [0.97 - 0.97]
Kasim/2022 0.85 [0.83 - 0.88]
Hsieh/2019 1.00 [1.00 - 1.00]
Geltser/2024 0.81 [0.78 - 0.83]
Geltser/2024 0.83 [0.82 - 0.85]
Farah/2022 0.62 [0.59 - 0.64]
Deng/2022 0.75 [0.72 - 0.78]
Chen/2024 0.79 [0.78 - 0.80]
Barrett/2019 0.82 [0.81 - 0.83]
COMBINED 0.80[0.74 - 0.86]
Q = 1.4e+05, df = 30.00, p = 0.00
I2 = 99.98 [99.98 - 99.98]
0.5
1.0
SPECIFICITY

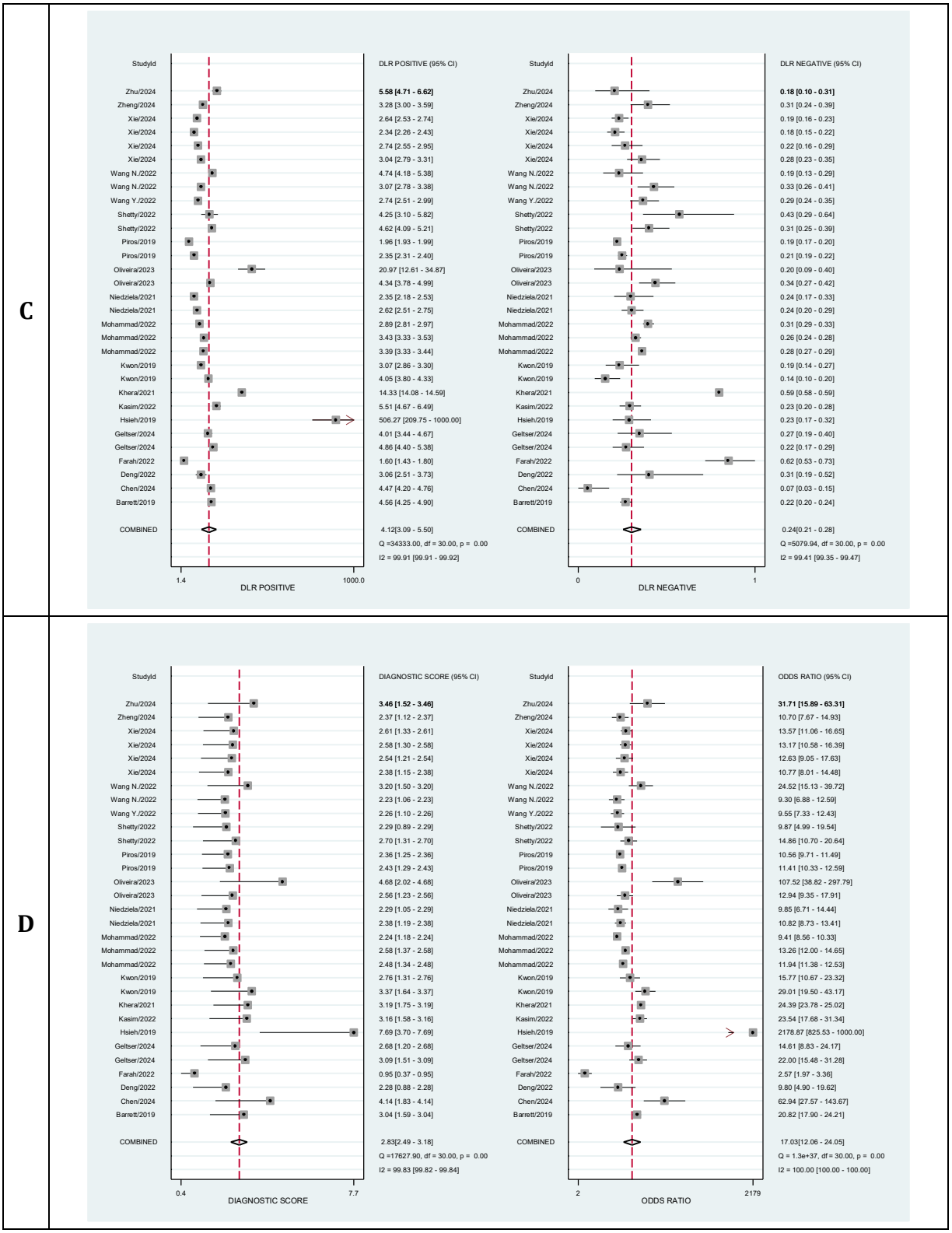


Figure S11. Diagnostic accuracy of the Neural Networks predicting mortality in MI patients.

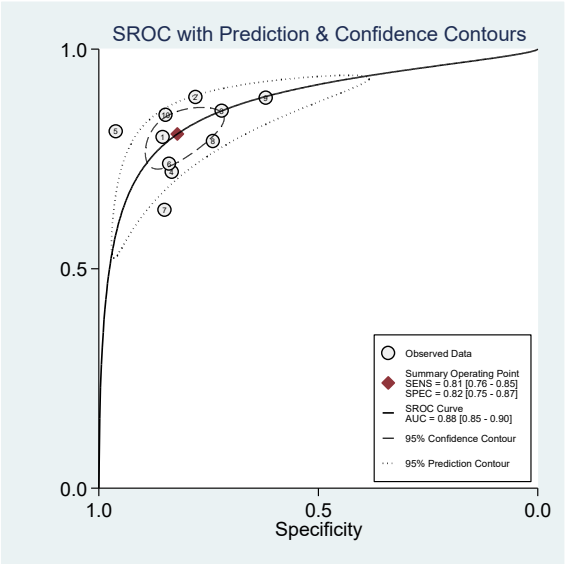
(A) SROC curve showing overall sensitivity and specificity.

(B) DSS chart summarizing sensitivity and specificity with 95% CI.

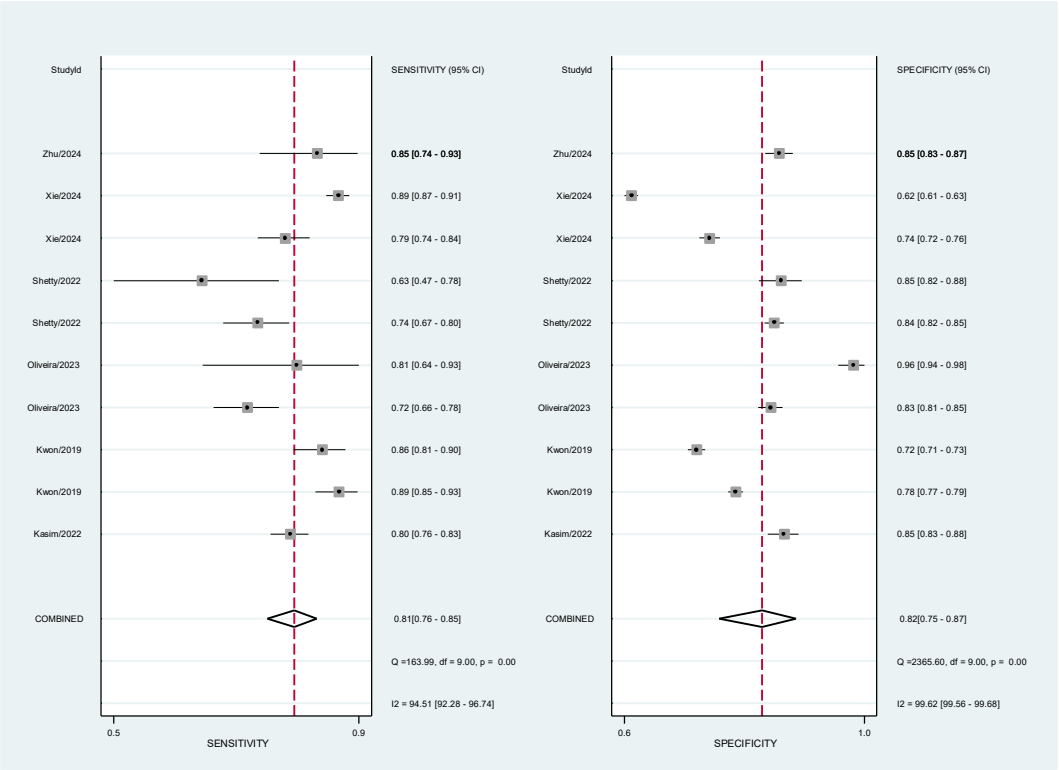
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.81 [0.76 - 0.85]
SPEC = 0.82 [0.75 - 0.87]
SROC Curve
AUC = 0.88 [0.85 - 0.90]
95% Confidence Contour
95% Prediction Contour

B


StudyId
SENSITIVITY (95% CI)
Zhu/2024 0.85 [0.74 - 0.93]
Xie/2024 0.89 [0.87 - 0.91]
Xie/2024 0.79 [0.74 - 0.84]
Shetty/2022 0.63 [0.47 - 0.78]
Shetty/2022 0.74 [0.67 - 0.80]
Oliveira/2023 0.81 [0.64 - 0.93]
Oliveira/2023 0.72 [0.66 - 0.78]
Kwon/2019 0.86 [0.81 - 0.90]
Kwon/2019 0.89 [0.85 - 0.93]
Kasim/2022 0.80 [0.76 - 0.83]
COMBINED 0.81[0.76 - 0.85]
Q =163.99, df = 9.00, p = 0.00
I2 = 94.51 [92.28 - 96.74]
0.5
0.9
SENSITIVITY
StudyId
SPECIFICITY (95% CI)
Zhu/2024 0.85 [0.83 - 0.87]
Xie/2024 0.62 [0.61 - 0.63]
Xie/2024 0.74 [0.72 - 0.76]
Shetty/2022 0.85 [0.82 - 0.88]
Shetty/2022 0.84 [0.82 - 0.85]
Oliveira/2023 0.96 [0.94 - 0.98]
Oliveira/2023 0.83 [0.81 - 0.85]
Kwon/2019 0.72 [0.71 - 0.73]
Kwon/2019 0.78 [0.77 - 0.79]
Kasim/2022 0.85 [0.83 - 0.88]
COMBINED 0.82[0.75 - 0.87]
Q =2365.60, df = 9.00, p = 0.00
I2 = 99.62 [99.56 - 99.68]
0.6
1.0
SPECIFICITY

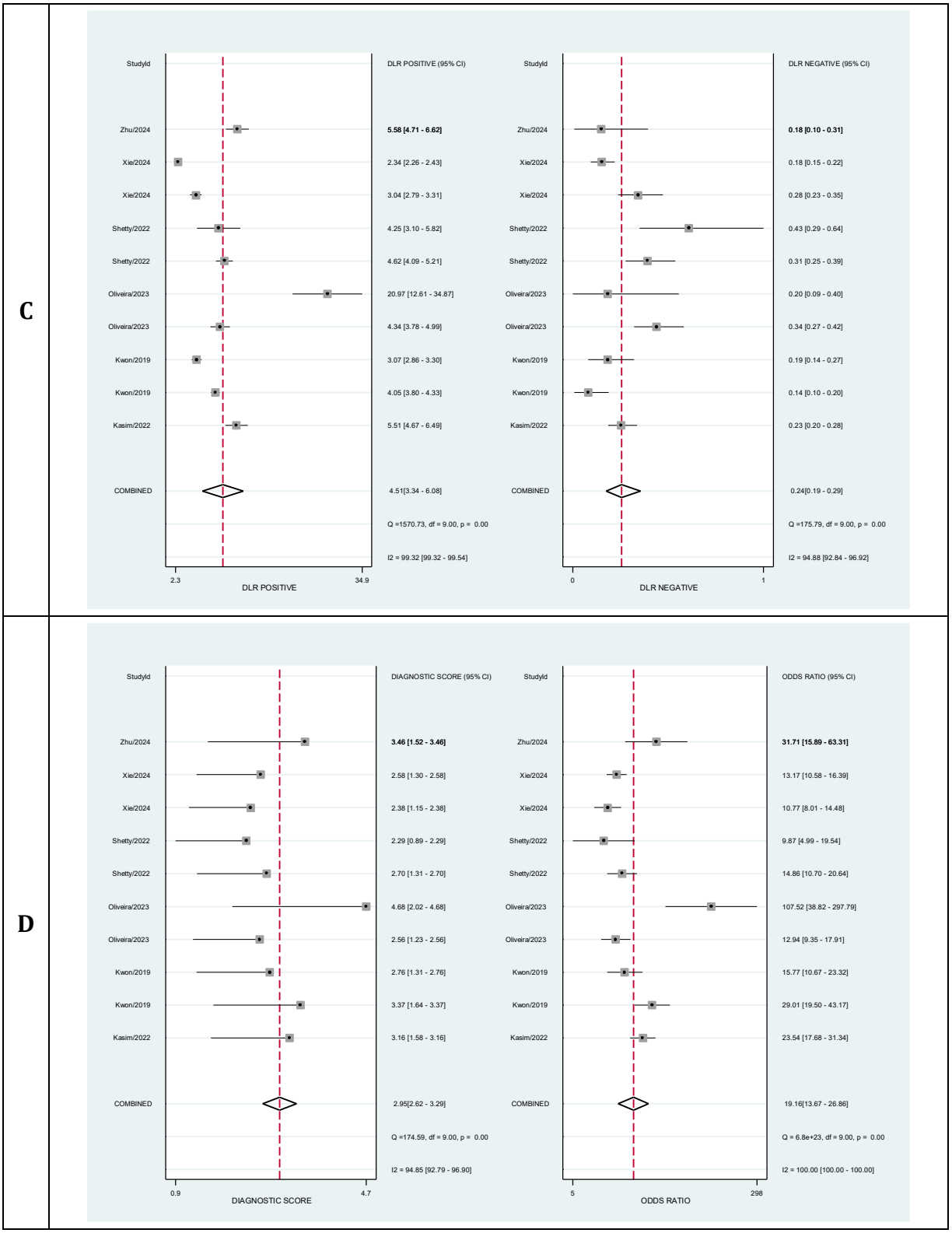
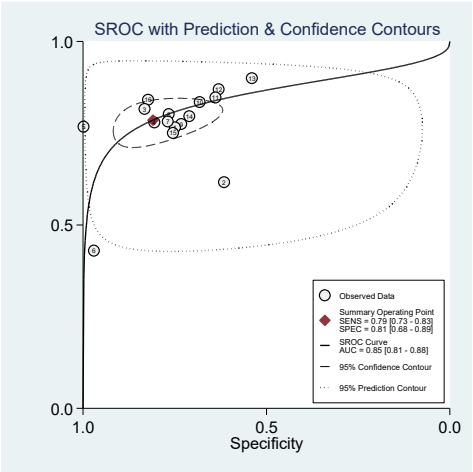
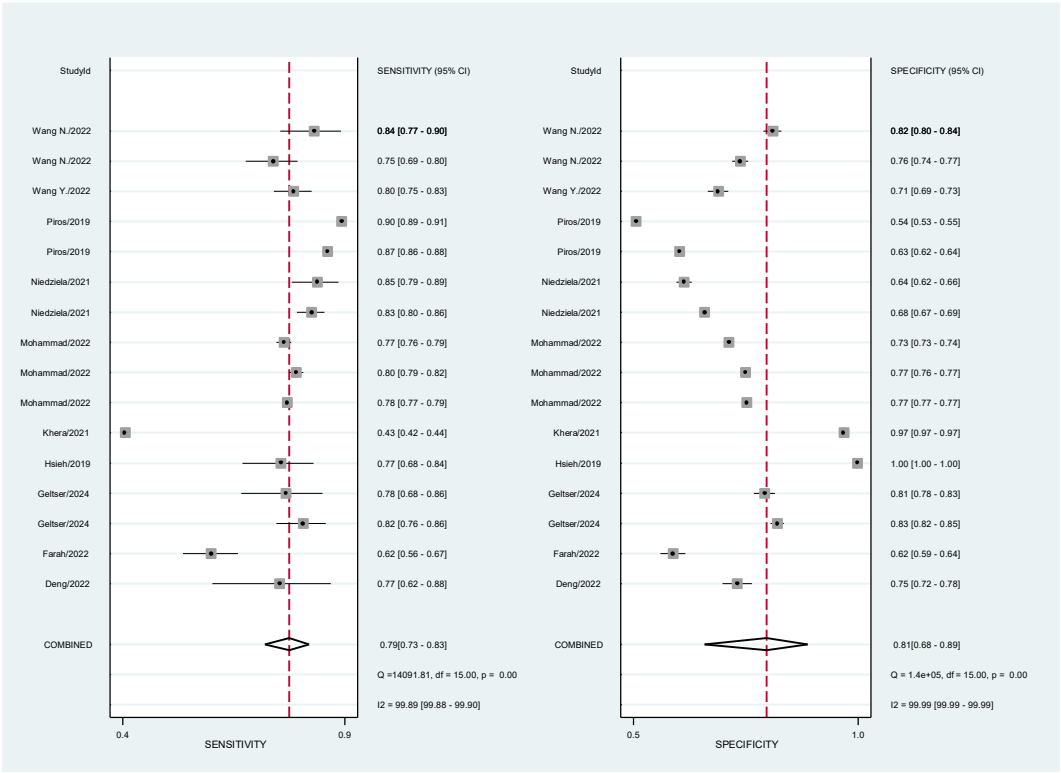


Figure S12. Diagnostic accuracy of the MLP model predicting mortality in MI patients.
(A) SROC curve showing overall sensitivity and specificity.
(B) DSS chart summarizing sensitivity and specificity with 95% CI.
(C) DLR plot showing positive and negative likelihood ratios with 95% CI.
(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.

A


SROC with Prediction & Confidence Contours
1.0
0.5
0.0
1.0
0.5
0.0
Specificity
Observed Data
Summary Operating Point
SENS = 0.79 [0.73 - 0.83]
SPEC = 0.81 [0.68 - 0.89]
SROC Curve
AUC = 0.85 [0.81 - 0.88]
95% Confidence Contour
95% Prediction Contour

B


Studyld
SENSITIVITY (95% CI)
Wang N./2022 0.84 [0.77 - 0.90]
Wang N./2022 0.75 [0.69 - 0.80]
Wang Y./2022 0.80 [0.75 - 0.83]
Piros/2019 0.90 [0.89 - 0.91]
Piros/2019 0.87 [0.86 - 0.88]
Niedziela/2021 0.85 [0.79 - 0.89]
Niedziela/2021 0.83 [0.80 - 0.86]
Mohammad/2022 0.77 [0.76 - 0.79]
Mohammad/2022 0.80 [0.79 - 0.82]
Mohammad/2022 0.78 [0.77 - 0.79]
Khera/2021 0.43 [0.42 - 0.44]
Hsieh/2019 0.77 [0.68 - 0.84]
Geltser/2024 0.78 [0.68 - 0.86]
Geltser/2024 0.82 [0.76 - 0.86]
Farah/2022 0.62 [0.56 - 0.67]
Deng/2022 0.77 [0.62 - 0.88]
COMBINED 0.79[0.73 - 0.83]
Q =14091.81, df = 15.00, p = 0.00
I2 = 99.89 [99.88 - 99.90]
0.4
0.9
SENSITIVITY
Studyld
SPECIFICITY (95% CI)
Wang N./2022 0.82 [0.80 - 0.84]
Wang N./2022 0.76 [0.74 - 0.77]
Wang Y./2022 0.71 [0.69 - 0.73]
Piros/2019 0.54 [0.53 - 0.55]
Piros/2019 0.63 [0.62 - 0.64]
Niedziela/2021 0.64 [0.62 - 0.66]
Niedziela/2021 0.68 [0.67 - 0.69]
Mohammad/2022 0.73 [0.73 - 0.74]
Mohammad/2022 0.77 [0.76 - 0.77]
Mohammad/2022 0.77 [0.77 - 0.77]
Khera/2021 0.97 [0.97 - 0.97]
Hsieh/2019 1.00 [1.00 - 1.00]
Geltser/2024 0.81 [0.78 - 0.83]
Geltser/2024 0.83 [0.82 - 0.85]
Farah/2022 0.62 [0.59 - 0.64]
Deng/2022 0.75 [0.72 - 0.78]
COMBINED 0.81[0.68 - 0.89]
Q = 1.4e+05, df = 15.00, p = 0.00
I2 = 99.99 [99.99 - 99.99]
0.5
1.0
SPECIFICITY

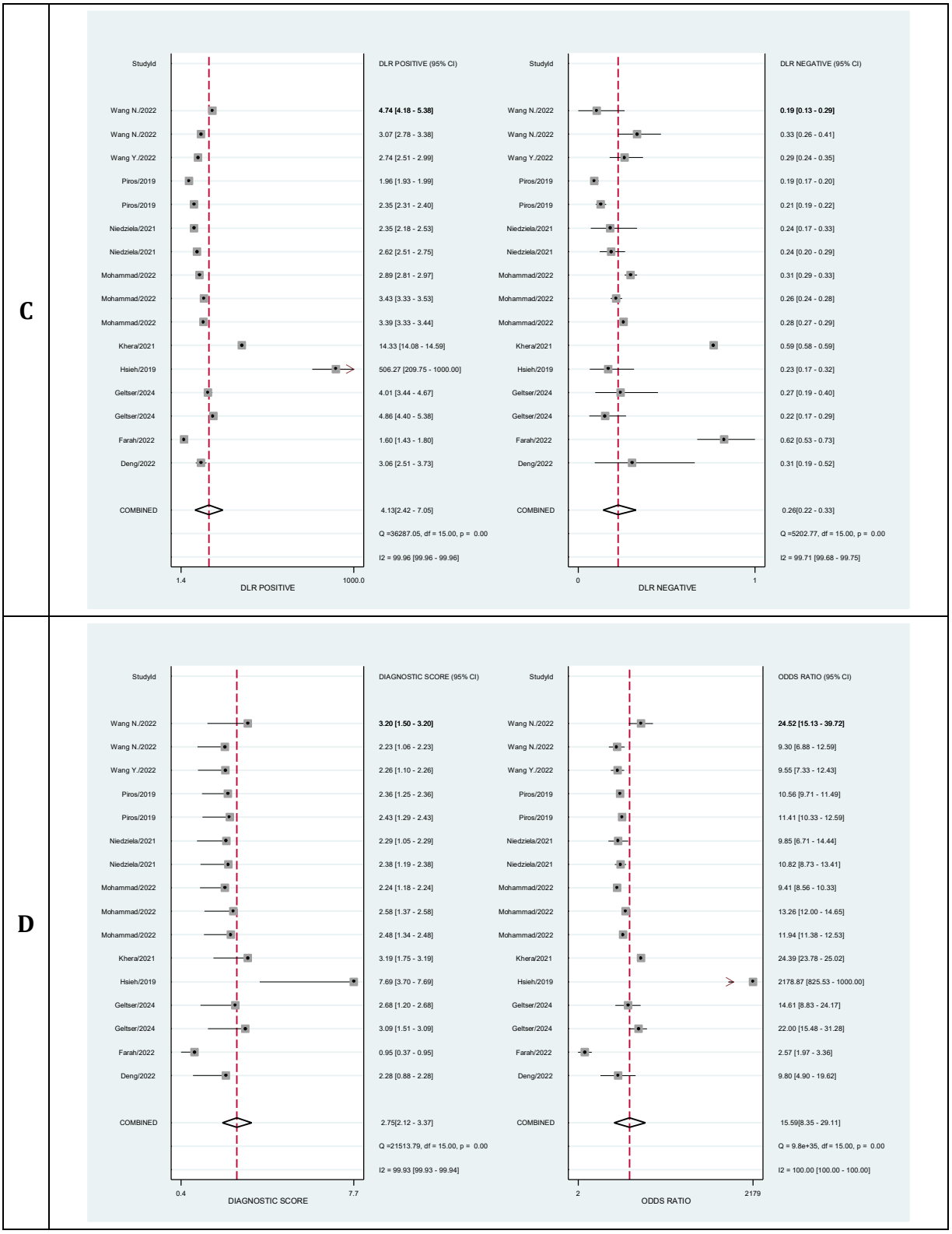


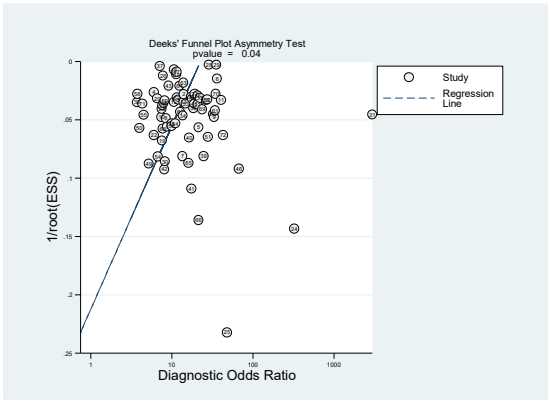
Figure S13. Diagnostic accuracy of the Simple NN models predicting mortality in MI patients.

(A) SROC curve showing overall sensitivity and specificity.

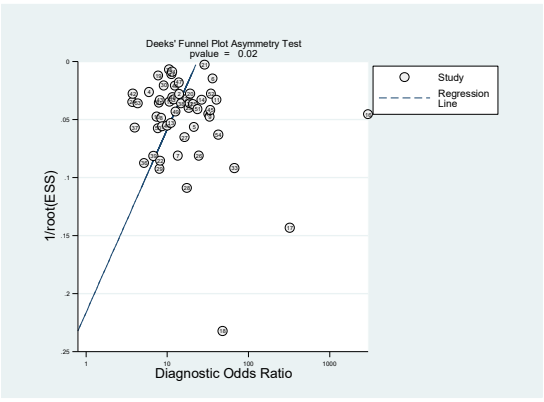
(B) DSS chart summarizing sensitivity and specificity with 95% CI.

(C) DLR plot showing positive and negative likelihood ratios with 95% CI.

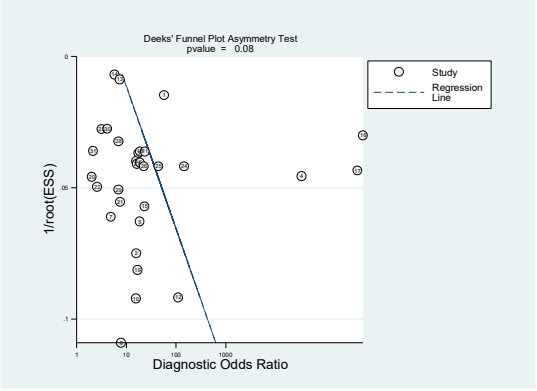
(D) DLOR chart presenting diagnostic score and odds ratio with 95% CI.



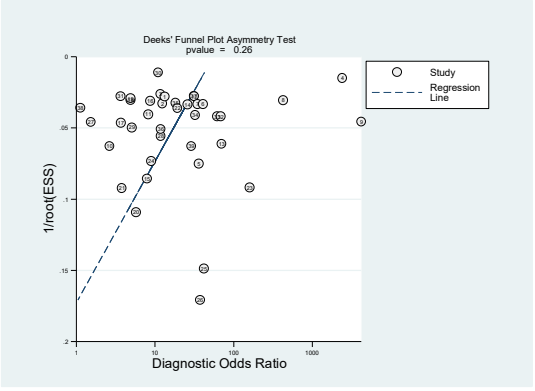
A (Logistic Regression models)



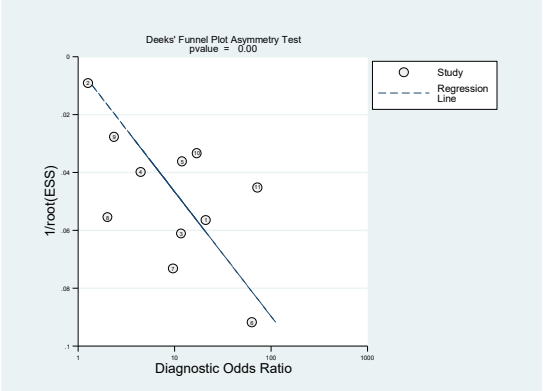
B (Pure Logistic Regression model)



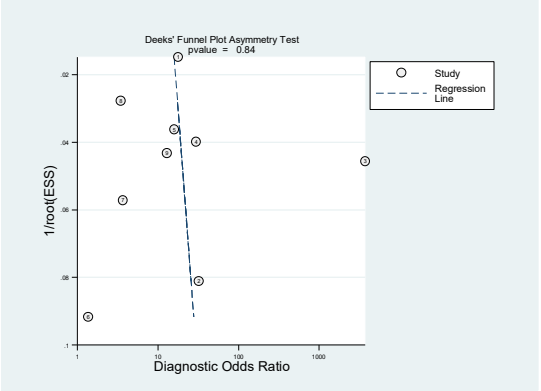
C (Single Decision Tree-based models)



D(Support Vector Machine models)



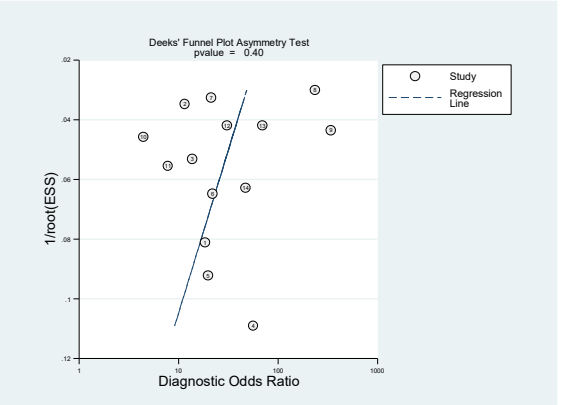
E (kNN model)



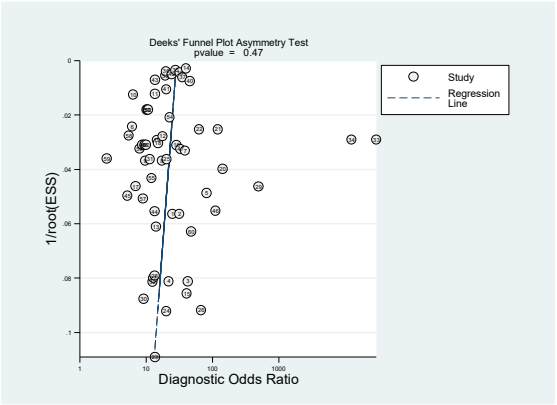
F (Bayesian-based models)

G (Random Forest model)

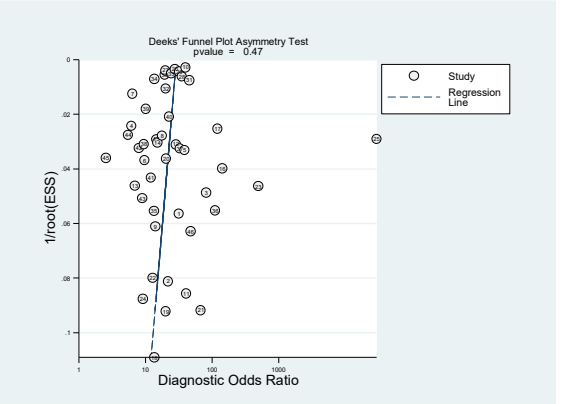
Figure S14. Assessment of Publication Bias Across Logistic Regression models, single DT-based models, Support Vector Machines, kNN and Random Forest Using Deek's Funnel Plot Asymmetry Test. Each subfigure (A–G) represents Deek's funnel plot for publication bias assessment in mortality prediction of MI patients using the machine learning model. The regression line and p-value indicate the presence or absence of significant small-study effects.



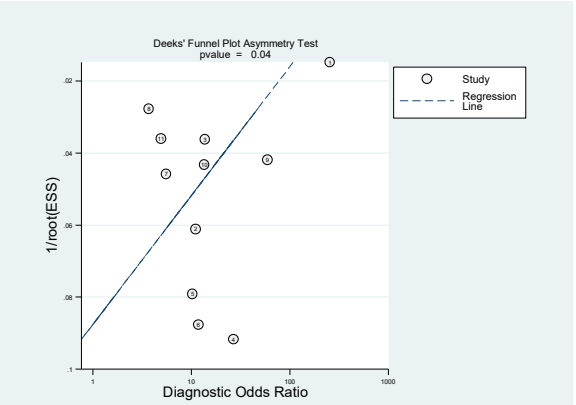
A (Classical GBM models)



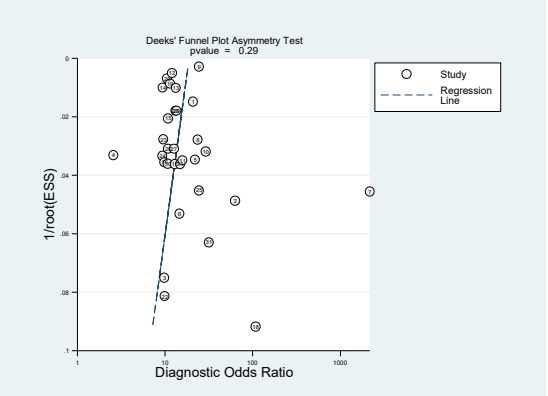
B (Advanced GBM models)



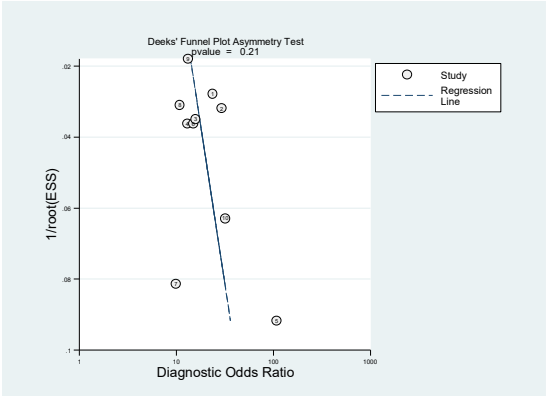
C (XGBoost model)



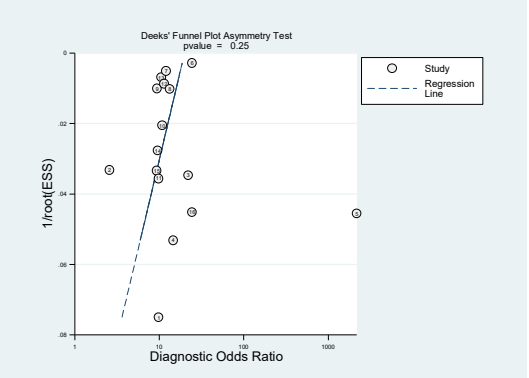
D (AdaBoost model)



E (Neural Network models)



F (MLP model)



G (Simple NN models)

Figure S15. Assessment of Publication Bias Across Gradient Boosting Machines and Neural Networks Using Deek's Funnel Plot Asymmetry Test.
Each subfigure (A–G) represents Deek's funnel plot for publication bias assessment in mortality prediction of MI patients using the machine learning model. The regression line and p-value indicate the presence or absence of significant small-study effects.

Table S1: Search Strategies for each databases

PubMed	1-	"Machine learning"[mh] OR "Unsupervised Machine Learning"[mh] OR "Supervised Machine Learning"[mh] OR "Support Vector machine"[mh] OR "Deep Learning"[mh] OR "Neural Networks, Computer"[mh] OR "Machine learning"[tiab] OR "learning machine*"[tiab] OR "Deep Learning"[tiab] OR "Transfer Learning"[tiab] OR "Semi-supervised Learning"[tiab] OR "Semi supervised Learning"[tiab] OR "Support Vector"[tiab] OR "k nearest neighb*"[tiab] OR "k-nearest neighb*"[tiab] OR "random forest"[tiab] OR "XGboost analysis"[tiab] OR "deep reinforcement learning"[tiab]
	2-	"Myocardial Infarction"[mh] OR "Myocardial ischemia"[mh] OR "Acute Coronary Syndrome"[mh] OR "Coronary Occlusion"[mh] OR "Coronary Thrombosis"[mh] OR "Myocardial Reperfusion Injury"[mh] OR "Inferior Wall Myocardial Infarction"[mh] OR "Anterior Wall Myocardial Infarction"[mh] OR "Non-ST Elevated Myocardial Infarction"[mh] OR "ST Elevation Myocardial Infarction"[mh] OR "Myocardial infarct*"[tiab] OR "Myocardium infarct*"[tiab] OR "Myocardial isch*"[tiab] OR "Myocardium isch*"[tiab] OR "Myocardial necros*"[tiab] OR "Myocardium necros*"[tiab] OR "Subendocardial isch*"[tiab] OR "Heart attack*"[tiab] OR "Heart anoxia"[tiab] OR "Heart infarct*"[tiab] OR "Heart isch*"[tiab] OR "Heart muscle necros*"[tiab] OR "Cardiac infarct*"[tiab] OR "Cardial infarct*"[tiab] OR "Cardiac isch*"[tiab] OR "Cardiac muscle isch*"[tiab] OR "Cardiac necros*"[tiab] OR "Ventricular infarct*"[tiab] OR "Ventricle infarct*"[tiab] OR "Ventricular isch*"[tiab] OR "Ventricle isch*"[tiab] OR "Cardiovascular stroke*"[tiab] OR "obstructive coronary artery disease*"[tiab] OR "occlusive coronary artery disease*"[tiab] OR "Acute coronary syndrome*"[tiab] OR "Coronary isch*"[tiab] OR "Coronary artery isch*"[tiab] OR "Coronary occlusion*"[tiab] OR "Coronary artery occlusion*"[tiab] OR "Coronary obstruction*"[tiab] OR "Coronary artery obstruction*"[tiab] OR "Coronary thrombos*"[tiab] OR "Coronary artery thrombos*"[tiab] OR "Myocardial Reperfusion Injur*"[tiab] OR "Myocardial Ischemic Reperfusion Injur*"[tiab] OR "STEMI"[tiab] OR "NSTEMI"[tiab] OR "Non-STEMI"[tiab] OR "ST elevat*"[tiab] OR "Non-ST elevat*"[tiab] OR "ST segment elevat*"[tiab]
	3-	#1 AND #2
EMBASE	1-	'machine learning'/exp OR 'explainable machine learning'/exp OR 'deep learning'/exp OR 'deep reinforcement learning'/exp OR 'semi supervised machine learning'/exp OR 'supervised machine learning'/exp OR 'support vector machine'/exp OR 'unsupervised machine learning'/exp OR 'Machine learning':ab,ti OR 'learning machine*':ab,ti OR 'Deep Learning':ab,ti OR 'Transfer Learning':ab,ti OR 'Semi-supervised Learning':ab,ti OR 'Semi supervised Learning':ab,ti OR 'Support Vector machine*':ab,ti OR 'k nearest neighb*':ab,ti OR 'k-nearest neighb*':ab,ti OR 'XGboost analysis':ab,ti OR 'deep reinforcement learning':ab,ti
	2-	'heart infarction'/exp OR 'acute heart infarction'/exp OR 'anterior myocardial infarction'/exp OR 'heart atrium infarction'/exp OR 'heart muscle necrosis'/exp OR 'heart reinfarction'/exp OR 'heart ventricle infarction'/exp OR 'inferior myocardial infarction'/exp OR 'non ST segment elevation myocardial infarction'/exp OR 'non st segment elevation acute coronary syndrome'/exp OR 'posterior myocardial infarction'/exp OR 'silent myocardial infarction'/exp OR 'ST segment elevation myocardial infarction'/exp OR 'acute coronary syndrome'/exp OR 'coronary artery thrombosis'/exp OR 'heart muscle ischemia'/exp OR 'obstructive coronary artery disease'/exp OR 'silent myocardial ischemia'/exp OR 'Myocardial infarct*':ab,ti OR 'Myocardium infarct*':ab,ti OR 'Myocardial isch*':ab,ti OR 'Myocardium isch*':ab,ti OR 'Myocardial necros*':ab,ti OR 'Myocardium necros*':ab,ti OR 'Subendocardial isch*':ab,ti OR 'Heart attack*':ab,ti OR 'Heart ischaemic attack*':ab,ti OR 'Heart ischemic attack*':ab,ti OR 'Heart infarct*':ab,ti OR 'Heart reinfarct*':ab,ti OR 'Heart isch*':ab,ti OR 'Heart muscle isch*':ab,ti OR 'Heart muscle necros*':ab,ti OR 'Cardiac infarct*':ab,ti OR 'Cardial infarct*':ab,ti OR 'Cardiac isch*':ab,ti OR 'Cardiac muscle isch*':ab,ti OR 'Cardiac necros*':ab,ti OR 'Ventricular infarct*':ab,ti OR 'Ventricle infarct*':ab,ti OR 'Ventricular isch*':ab,ti OR 'Ventricle isch*':ab,ti OR 'Atrium infarct*':ab,ti OR 'Cardiovascular stroke*':ab,ti OR 'obstructive coronary artery disease*':ab,ti OR 'occlusive coronary artery disease*':ab,ti OR 'Acute coronary syndrome*':ab,ti OR 'Coronary isch*':ab,ti OR 'Coronary artery isch*':ab,ti OR 'Coronary occlusion*':ab,ti OR 'Coronary artery occlusion*':ab,ti OR 'Coronary obstruction*':ab,ti OR 'Coronary artery obstruction*':ab,ti OR 'Coronary thrombos*':ab,ti OR 'Coronary artery thrombos*':ab,ti OR 'Myocardial Reperfusion Injur*':ab,ti OR 'Myocardial Ischemic Reperfusion Injur*':ab,ti OR 'STEMI':ab,ti OR 'NSTEMI':ab,ti OR 'Non-STEMI':ab,ti OR 'ST elevat*':ab,ti OR 'Non-ST elevat*':ab,ti OR 'ST segment elevat*':ab,ti
	3-	#1 AND #2
Web Of Science	1-	TS=("Machine learning" OR "learning machine*" OR "Deep Learning" OR "Transfer Learning" OR "Semi-supervised Learning" OR "Semi supervised Learning" OR "Support Vector machine*" OR "k nearest neighb*" OR "k-nearest neighb*" OR "random forest" OR "XGboost analysis" OR "deep reinforcement learning")
	2-	TS=("Myocardial infarct*" OR "Myocardium infarct*" OR "Myocardial isch*" OR "Myocardium isch*" OR "Myocardial necros*" OR "Myocardium necros*" OR "Subendocardial isch*" OR "Heart attack*" OR "Heart ischaemic attack*" OR "Heart ischemic attack*" OR "Heart anoxia" OR "Heart infarct*" OR "Heart reinfarct*" OR "Heart isch*" OR "Heart muscle isch*" OR "Heart muscle necros*" OR "Cardiac infarct*" OR "Cardial infarct*" OR "Cardiac isch*" OR "Cardiac muscle isch*" OR "Cardiac necros*" OR "Ventricular infarct*" OR "Ventricle infarct*" OR

	"Ventricular isch*" OR "Ventricle isch*" OR "Atrium infarct*" OR "Cardiovascular stroke*" OR "obstructive coronary artery disease*" OR "occlusive coronary artery disease*" OR "Acute coronary syndrome*" OR "Coronary isch*" OR "Coronary artery isch*" OR "Coronary occlusion*" OR "Coronary artery occlusion*" OR "Coronary obstruction*" OR "Coronary artery obstruction*" OR "Coronary thrombos*" OR "Coronary artery thrombos*" OR "Myocardial Reperfusion Injur*" OR "Myocardial Ischemic Reperfusion Injur*" OR "STEMI" OR "NSTEMI" OR "Non-STEMI" OR "ST elevat*" OR "Non-ST elevat*" OR "ST segment elevat*") 3- #1 AND #2
Scopus	1- TITLE-ABS-KEY("Machine learning" OR "learning machine*" OR "Deep Learning" OR "Transfer Learning" OR "Semi-supervised Learning" OR "Semi supervised Learning" OR "Support Vector machine*" OR "k nearest neighb*" OR "k-nearest neighb*" OR "random forest" OR "XGboost analysis" OR "deep reinforcement learning") 2- TITLE-ABS-KEY("Myocardial infarct*" OR "Myocardium infarct*" OR "Myocardial isch*" OR "Myocardium isch*" OR "Myocardial necros*" OR "Myocardium necros*" OR "Subendocardial isch*" OR "Heart attack*" OR "Heart ischaemic attack*" OR "Heart ischemic attack*" OR "Heart anoxia" OR "Heart infarct*" OR "Heart reinfarct*" OR "Heart isch*" OR "Heart muscle isch*" OR "Heart muscle necros*" OR "Cardiac infarct*" OR "Cardial infarct*" OR "Cardiac isch*" OR "Cardiac muscle isch*" OR "Cardiac necros*" OR "Ventricular infarct*" OR "Ventricle infarct*" OR "Ventricular isch*" OR "Ventricle isch*" OR "Atrium infarct*" OR "Cardiovascular stroke*" OR "obstructive coronary artery disease*" OR "occlusive coronary artery disease*" OR "Acute coronary syndrome*" OR "Coronary isch*" OR "Coronary artery isch*" OR "Coronary occlusion*" OR "Coronary artery occlusion*" OR "Coronary obstruction*" OR "Coronary artery obstruction*" OR "Coronary thrombos*" OR "Coronary artery thrombos*" OR "Myocardial Reperfusion Injur*" OR "Myocardial Ischemic Reperfusion Injur*" OR "STEMI" OR "NSTEMI" OR "Non-STEMI" OR "ST elevat*" OR "Non-ST elevat*" OR "ST segment elevat*") 3- #1 AND #2

	Domain 1 (Participants)					Domain 2 (Index Test)						Domain 3 (Outcome)					Domain 4 (Flow and Timing)						Domain 5 (Analysis)				
Study	**S1.1**	**S1.2**	**S1.3**	**overall**	**applicability**	**S2.1**	**S2.2**	**S2.3**	**S2.4**	**overall**	**applicability**	**S3.1**	**S3.2**	**S3.3**	**overall**	**applicability**	**S4.1**	**S4.2**	**S4.3**	**S4.4**	**overall**	**applicability**	**S5.1**	**S5.2**	**S5.3**	**S5.4**	**overall**
Alcober, 2020 [12]	no	no	no	**high**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Aziz, 2021 [13]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Bai, 2021 [14]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Barrett, 2019 [15]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Chen, 2023 [16]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Chen, 2024 [17]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Cheng, 2022 [18]	no	yes	yes	**high**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Cosentino, 2021 [19]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Deng, 2022 [20]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Farah, 2022 [21]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Geltser, 2024 [22]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Ghafari, 2023 [23]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Gong, 2024 [24]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Gupta, 2024 [25]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Hadanny, 2021 [26]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Halim, 2018 [27]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Helgestad, 2021 [28]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Hsieh, 2019 [29]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Iftikhar, 2020 [30]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Islam, 2023 [31]	unclear	yes	unclear	**high**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Kashirina, 2020 [32]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Kashirina, 2021 [33]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Kasim, 2022 [34]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Kasim, 2024 [35]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Khera, 2021 [36]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**

Kononova, 2023 [37]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Kwon, 2019 [38]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Lee, 2021 [39]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Lee, 2022 [40]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Li, 2020 [41]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Li, 2023 [42]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Li, 2024 [43]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Lin, 2024 [44]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Mohammad, 2022 [45]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Niedziela, 2021 [46]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Oliveira, 2023 [47]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Peng, 2021 [48]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Piros, 2019 [49]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Piros, 2020 [50]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Razavi, 2024 [51]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Razavi, 2025 [52]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Romanov, 2023 [53]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Roudini, 2024 [54]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Salman, 2019 [55]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Shakhgeldyan, 2024 [56]	no	yes	yes	**high**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Sherazi, 2023 [57]	unclear	yes	unclear	**high**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Shetty, 2022 [58]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Song, 2014 [59]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Sritharan, 2024 [60]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Tang, 2024 [61]	yes	yes	unclear	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Tarabanis, 2023 [62]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Tindale, 2023 [63]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**

Tsarapatsani, 2023 [64]	yes	yes	unclear	**unclear**	**low**	yes	yes	yes	yes	**low**	**unclear**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Vázquez, 2021 [65]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Wallert, 2017 [66]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Wang N., 2022 [67]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Wang Y., 2022 [68]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Wang L., 2024 [69]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Xie, 2024 [70]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Yan, 2025 [71]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Yang, 2024 [72]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Yu, 2024 [73]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Zhang Q., 2024 [74]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Zhang Y., 2024 [75]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Zhao, 2021 [76]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	unclear	N/A	yes	**unclear**
Zhao, 2023 [77]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Zheng, 2023 [78]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Zheng, 2024 [79]	yes	yes	yes	**low**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**
Zhu, 2024 [80]	unclear	yes	yes	**unclear**	**low**	yes	yes	yes	yes	**low**	**low**	yes	yes	yes	**low**	**low**	yes	N/A	yes	yes	**low**	**low**	yes	yes	N/A	yes	**low**

Table S2. Risk of bias assessment for each article using QUAPAS tool

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Title page: "a systematic review and meta-analysis"
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Abstract (first page of main text)
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction, paragraphs 1–2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	end of Introduction
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods: "Eligibility Criteria"
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods: "Information Sources"
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Methods: "Search Strategy and Selection Process"; Supplementary Table S1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods: "Selection Process"
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods: "Data Collection Process"
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods: " Data Items"

Section and Topic	Item #	Checklist item	Location where item is reported
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods: " Data Items"
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods: "Risk of Bias Assessment"
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Methods: "Effect Measures"
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Methods: "Eligibility Criteria" and "Synthesis Methods"
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods: "Effect Measures" and "Synthesis Methods"
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods: "Synthesis Methods"
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods: "Synthesis Methods"
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	Methods: "Synthesis Methods"
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	**Not applicable**
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Methods: "Reporting Bias Assessment";
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Methods: "Certainty Assessment";
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Results: "Study Selection"; Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Results: "Study Selection" and Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Results: "Study Characteristics"; Table 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Results: "Risk of Bias in Studies"; Figure 3
Results of	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its	Tables and Supplementary

Section and Topic	Item #	Checklist item	Location where item is reported
individual studies		precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figures S1–S13
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results: "Results of Syntheses"; Tables 2–4
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Tables 2–3 and Figures
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Results: "Results of Syntheses"
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	**Not applicable**
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Results: "Publication Bias"
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Results: "Certainty of Evidence"; Table 4
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion: Paragraphs 1–2
	23b	Discuss any limitations of the evidence included in the review.	Discussion: Paragraphs 3–4
	23c	Discuss any limitations of the review processes used.	Discussion: Paragraph 4
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion: Final paragraph
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods: "Eligibility Criteria" — PROSPERO ID: (CRD42025633287)
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	PROSPERO
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	None
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Acknowledgments (IUMS)
Competing interests	26	Declare any competing interests of review authors.	Declaration of interests
Availability of	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from	Data sharing

Section and Topic	Item #	Checklist item	Location where item is reported
data, code and other materials		included studies; data used for all analyses; analytic code; any other materials used in the review.	statement

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n