Model Selection Results

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```
library(tidyverse)
library(kableExtra)

source("aux_functions.R")
```

Model Selection
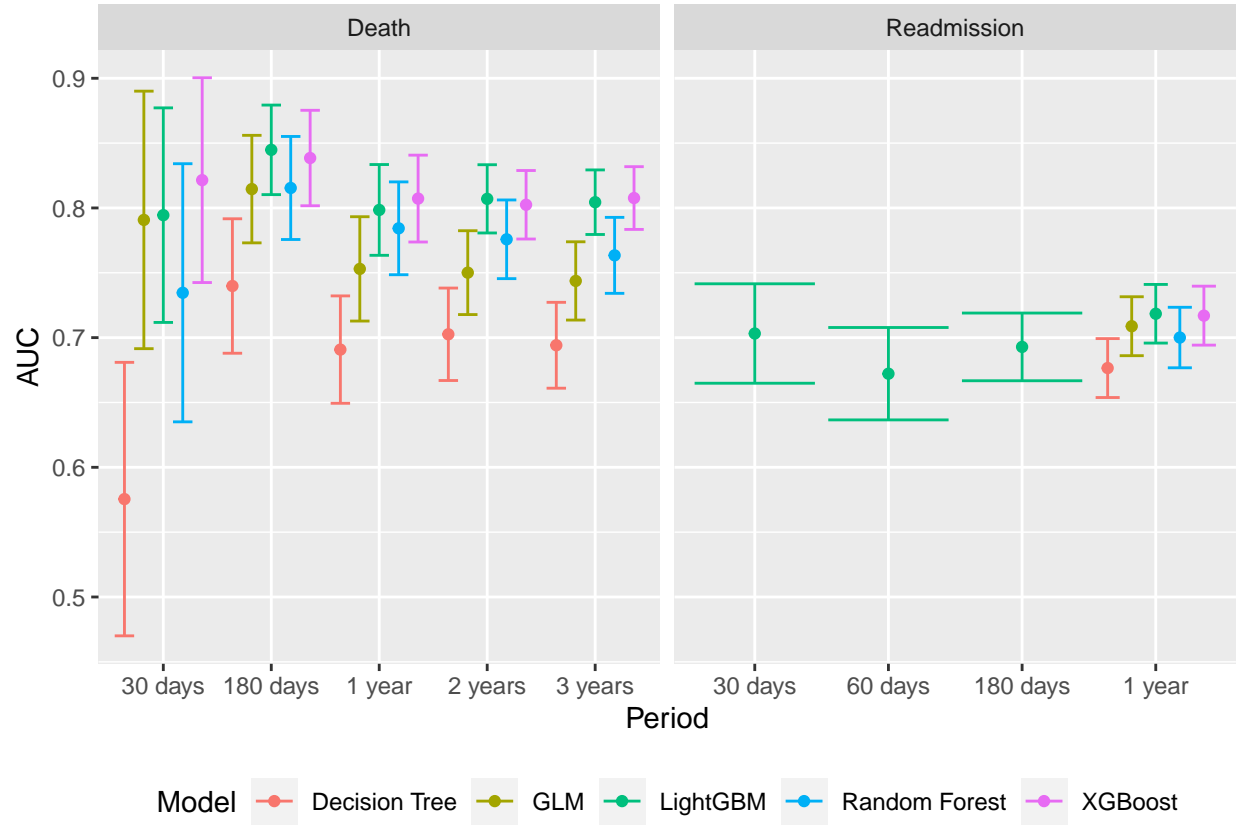

Table 1: Readmission models comparison

Period	Model	AUC	Lower Limit	Upper Limit
30 days	LightGBM	0.70	0.66	0.74
60 days	LightGBM	0.67	0.64	0.71
180 days	LightGBM	0.69	0.67	0.72
1 year	LightGBM	0.72	0.70	0.74
1 year	XGBoost	0.72	0.69	0.74
1 year	GLM	0.71	0.69	0.73
1 year	Random Forest	0.70	0.68	0.72
1 year	Decision Tree	0.68	0.65	0.70

Table 2: Death models comparison

Period	Model	AUC	Lower Limit	Upper Limit
30 days	XGBoost	0.82	0.74	0.90
30 days	LightGBM	0.79	0.71	0.88
30 days	GLM	0.79	0.69	0.89
30 days	Random Forest	0.73	0.64	0.83
30 days	Decision Tree	0.58	0.47	0.68
180 days	LightGBM	0.84	0.81	0.88
180 days	XGBoost	0.84	0.80	0.88
180 days	Random Forest	0.82	0.78	0.86
180 days	GLM	0.81	0.77	0.86
180 days	Decision Tree	0.74	0.69	0.79
1 year	XGBoost	0.81	0.77	0.84
1 year	LightGBM	0.80	0.76	0.83
1 year	Random Forest	0.78	0.75	0.82
1 year	GLM	0.75	0.71	0.79
1 year	Decision Tree	0.69	0.65	0.73
2 years	LightGBM	0.81	0.78	0.83
2 years	XGBoost	0.80	0.78	0.83
2 years	Random Forest	0.78	0.75	0.81
2 years	GLM	0.75	0.72	0.78
2 years	Decision Tree	0.70	0.67	0.74
3 years	XGBoost	0.81	0.78	0.83
3 years	LightGBM	0.80	0.78	0.83
3 years	Random Forest	0.76	0.73	0.79
3 years	GLM	0.74	0.71	0.77
3 years	Decision Tree	0.69	0.66	0.73

Final Model
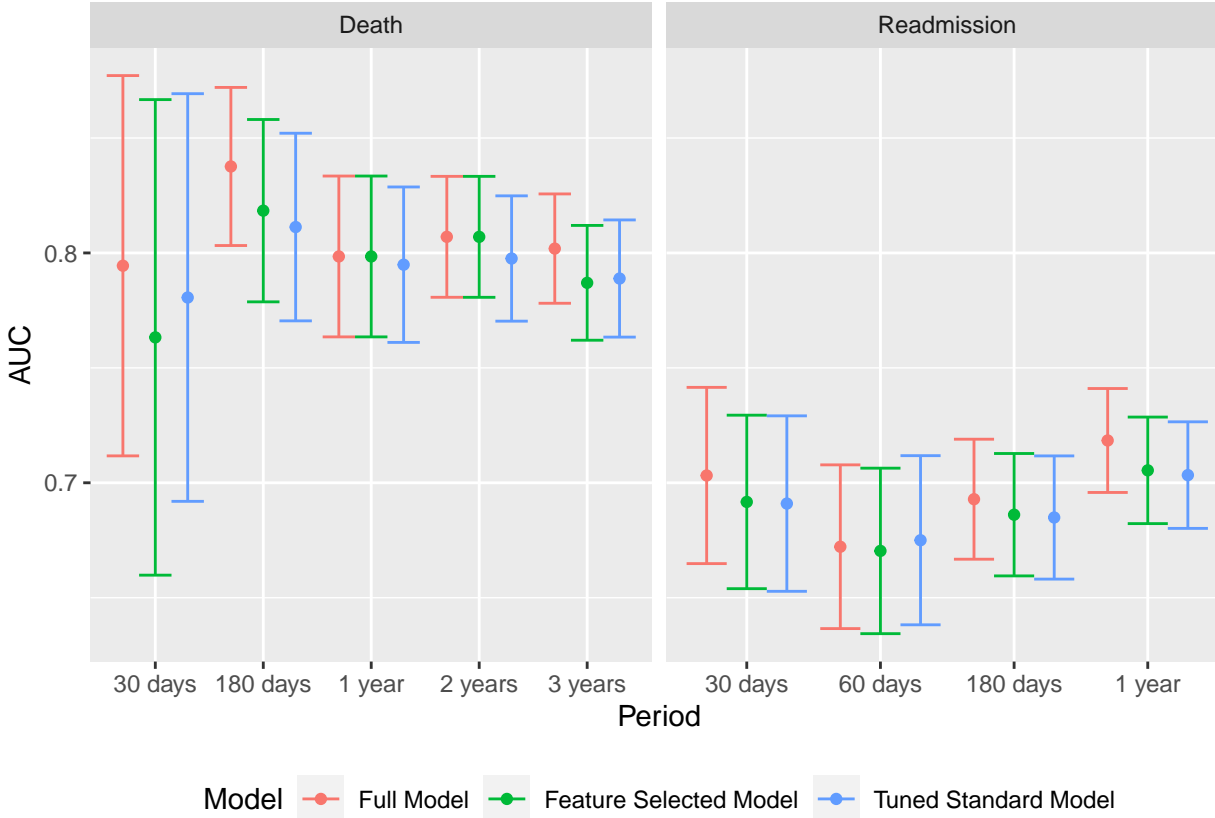
Table 3: Readmission models comparison

Period	Model	Features	AUC	Lower Limit	Upper Limit
30 days	Full Model	76	0.70	0.66	0.74
30 days	Feature Selected Model	7	0.69	0.65	0.73
30 days	Tuned Standard Model	7	0.69	0.65	0.73
60 days	Tuned Standard Model	4	0.68	0.64	0.71
60 days	Full Model	84	0.67	0.64	0.71
60 days	Feature Selected Model	4	0.67	0.63	0.71
180 days	Full Model	95	0.69	0.67	0.72
180 days	Feature Selected Model	5	0.69	0.66	0.71
180 days	Tuned Standard Model	5	0.68	0.66	0.71
1 year	Full Model	97	0.72	0.70	0.74
1 year	Feature Selected Model	5	0.71	0.68	0.73
1 year	Tuned Standard Model	5	0.70	0.68	0.73

Table 4: Death models comparison

Period	Model	Features	AUC	Lower Limit	Upper Limit
30 days	Full Model	65	0.79	0.71	0.88
30 days	Tuned Standard Model	17	0.78	0.69	0.87
30 days	Feature Selected Model	17	0.76	0.66	0.87
180 days	Full Model	78	0.84	0.80	0.87
180 days	Feature Selected Model	12	0.82	0.78	0.86
180 days	Tuned Standard Model	12	0.81	0.77	0.85
1 year	Full Model	83	0.80	0.76	0.83
1 year	Feature Selected Model	43	0.80	0.76	0.83
1 year	Tuned Standard Model	43	0.79	0.76	0.83
2 years	Full Model	80	0.81	0.78	0.83
2 years	Feature Selected Model	71	0.81	0.78	0.83
2 years	Tuned Standard Model	71	0.80	0.77	0.82
3 years	Full Model	81	0.80	0.78	0.83
3 years	Tuned Standard Model	50	0.79	0.76	0.81
3 years	Feature Selected Model	50	0.79	0.76	0.81

Selected Features

death__180days

1. hospital_stay
2. age
3. year_adm_t0
4. espironolactona
5. education_level
6. comorbidities_count
7. admission_pre_t0_count
8. nyha_basal
9. icu_t0
10. antiarritmico
11. interconsulta
12. meds_antimicrobianos
13. cintilografia
14. exames_imagem_qtde
15. endoscopia
16. diabetes

death__1year

1. aco
2. admission__pre__t0__count
3. age
4. analises__clinicas__qtde
5. antiarritmico
6. antifungico
7. cateter__venoso__central
8. cateterismo
9. cied__final__group__1
10. citologia
11. classe__meds__qtde
12. comorbidities__count
13. diabetes
14. diuretico
15. dva
16. ecocardiograma
17. education__level
18. endoscopia
19. equipe__multiprof
20. espironolactona
21. estatina
22. exames__imagem__qtde
23. flebografia
24. hemodialysis
25. hospital__stay
26. icu__t0
27. ieca__bra
28. insuf__cardiaca
29. interconsulta
30. meds__antimicrobianos
31. meds__cardiovasc__qtde
32. metodos__graficos__qtde
33. nyha__basal
34. outros__proced__cirurgicos
35. proced__invasivos__qtde
36. procedure__type__new
37. psicofarmacos
38. sex
39. teste__esforco
40. ultrassom
41. valvopathy
42. vasodilatador
43. year__adm__t0

death__2year

1. aco
2. admission__pre__t0__180d
3. admission__pre__t0__count
4. admission__t0__emergency
5. af
6. age
7. analises__clinicas__qtde
8. angio__tc
9. antiarritmico
10. antifungico
11. antiplaquetario__ev
12. bic
13. cardiac__arrest
14. cateter__venoso__central

15. cateterismo
16. cied_final_1
17. cied_final_group_1
18. cintilografia
19. citologia
20. classe_meds_qtde
21. comorbidities_count
22. copd
23. cultura
24. diabetes
25. dialysis_t0
26. digoxina
27. diuretico
28. dva
29. ecocardiograma
30. education_level
31. endoscopia
32. equipe_multiprof
33. espironolactona
34. estatina
35. exames_imagem_qtde
36. flebografia
37. heart_disease
38. histopatologia_qtde
39. holter
40. hospital_stay
41. hypertension
42. icp
43. icu_t0
44. ieca_bra
45. insuf_cardiaca
46. insulina
47. interconsulta
48. laboratorio
49. meds_antimicrobianos
50. meds_cardiovasc_qtde
51. metodos_graficos_qtde
52. nyha_basal
53. outros_proced_cirurgicos
54. pet_ct
55. prior_mi
56. proced_invasivos_qtde
57. procedure_type_1
58. procedure_type_new
59. psicofarmacos
60. renal_failure
61. ressonancia
62. stroke
63. teste_esforco
64. tilt_teste
65. tomografia
66. ultrassom
67. underlying_heart_disease
68. valvopathy
69. vasodilatador
70. ventilacao_mecanica
71. year_adm_t0

death_30days

1. age

2. admission_pre_t0_count
3. year_adm_t0
4. education_level
5. angiografia
6. psicofarmacos
7. analises_clinicas_qtde
8. bic
9. meds_cardiovasc_qtde
10. renal_failure
11. espironolactona
12. exames_imagem_qtde
13. citologia
14. af
15. ecocardiograma
16. cied_final_1
17. reop_type_1

death_3year

1. age
2. hospital_stay
3. year_adm_t0
4. admission_pre_t0_count
5. ieca_bra
6. classe_meds_qtde
7. comorbidities_count
8. insuf_cardiaca
9. education_level
10. vasodilatador
11. estatina
12. equipe_multiprof
13. analises_clinicas_qtde
14. antiarritmico
15. nyha_basal
16. dva
17. admission_t0_emergency
18. cied_final_group_1
19. renal_failure
20. valvopathy
21. hypertension
22. admission_pre_t0_180d
23. race
24. underlying_heart_disease
25. sex
26. ultrassom
27. diabetes
28. digoxina
29. ecocardiograma
30. aco
31. cied_final_1
32. tomografia
33. cultura
34. af
35. heart_failure
36. bic
37. prior_mi
38. anticonvulsivante
39. outros_proced_cirurgicos
40. insulina
41. antifungico
42. endoscopia

43. copd
44. holter
45. eletrofisiologia
46. cintilografia
47. cateter_venoso_central
48. teste_esforco
49. transfusao
50. transplante_cardiaco

readmission__180d

1. hospital_stay
2. admission_pre_t0_count
3. classe_meds_qtde
4. antiarritmico
5. procedure_type_1

readmission__1year

1. hospital_stay
2. admission_pre_t0_count
3. year_adm_t0
4. antiarritmico
5. procedure_type_new

readmission__30d

1. hospital_stay
2. admission_pre_t0_count
3. antiarritmico
4. digoxina
5. bic
6. icu_t0
7. procedure_type_new

readmission__60d

1. hospital_stay
2. admission_pre_t0_count
3. classe_meds_qtde
4. vasodilatador

Union

1. hospital_stay
2. age
3. year_adm_t0
4. espironolactona
5. education_level
6. comorbidities_count
7. admission_pre_t0_count
8. nyha_basal
9. icu_t0
10. antiarritmico
11. interconsulta
12. meds_antimicrobianos
13. cintilografia
14. exames_imagem_qtde
15. endoscopia
16. diabetes
17. aco

18. analises__clinicas__qtde
19. antifungico
20. cateter__venoso__central
21. cateterismo
22. cied__final__group__1
23. citologia
24. classe__meds__qtde
25. diuretico
26. dva
27. ecocardiograma
28. equipe__multiprof
29. estatina
30. flebografia
31. hemodialysis
32. ieca__bra
33. insuf__cardiaca
34. meds__cardiovasc__qtde
35. metodos__graficos__qtde
36. outros__proced__cirurgicos
37. proced__invasivos__qtde
38. procedure__type__new
39. psicofarmacos
40. sex
41. teste__esforco
42. ultrassom
43. valvopathy
44. vasodilatador
45. admission__pre__t0__180d
46. admission__t0__emergency
47. af
48. angio__tc
49. antiplaquetario__ev
50. bic
51. cardiac__arrest
52. cied__final__1
53. copd
54. cultura
55. dialysis__t0
56. digoxina
57. heart__disease
58. histopatologia__qtde
59. holter
60. hypertension
61. icp
62. insulina
63. laboratorio
64. pet__ct
65. prior__mi
66. procedure__type__1
67. renal__failure
68. ressonancia
69. stroke
70. tilt__teste
71. tomografia
72. underlying__heart__disease
73. ventilacao__mecanica
74. angiografia
75. reop__type__1
76. race
77. heart__failure
78. anticonvulsivante

79. eletrofisiologia
80. transfusao
81. transplante_cardiaco