Supplementary materials

Table S1. Data elements required in the HQMS system

No.	Data element	Field name	Data type	Length	Required	Remarks
1	Hospital ID	P900	Character	22	Yes	
2	Hospital name	P6891	Character	80	Yes	
3	Medical Insurance Number	P686	Character	50		
4	Health-card number	P800	Character	50		
5	Method of healthcare payment	P1	Character	1	Yes	
6	Admission times	P2	Number	3	Yes	
7	Medical record number	P3	Character	20	Yes	
8	Name	P4	Character	40		
9	Gender	P5	Character	1	Yes	
10	Birth date	P6	Date			yyyy-mm-dd
11	Age	P7	Number	3		Unit (year)
12	Marital status	P8	Character	1	Yes	
13	Occupation	P9	Character	2		
14	Birthplace (province)	P101	Character	30		
15	Birthplace (city)	P102	Character	30		
16	Birthplace (county)	P103	Character	30		
17	Ethnicity	P11	Character	20		
18	Nationality	P12	Character	40		
19	Social ID	P13	Character	18		
20	Residence	P801	Character	200		
21	Residential phone number	P802	Character	40		
22	Postcode of residence	P803	Character	6		
23	Name and address of employer	P14	Character	200		
24	Phone number	P15	Character	40		
25	Postcode of employer address	P16	Character	6		
26	"Hukou" address	P17	Character	200		
27	Postcode of "Hukou" address	P171	Character	6		
28	Name of the contact	P18	Character	20		
29	Relationship with the patient	P19	Character	40		
30	Address of the contact	P20	Character	200		
31	Admission path	P804	Character	1		
32	Phone number of the contact	P21	Character	30		
33	Admission date	P22	Date, time		Yes	yyyy-mm-dd HH:mm:ss
34	Department of admission	P23	Character	6	Yes	
35	Ward of admission	P231	Character	30		
36	Department of patient being transferred to	P24	Character	6		
37	Discharge date	P25	Date, time		Yes	yyyy-mm-dd HH:mm:ss
38	Department of discharge	P26	Character	6	Yes	

39	Ward of discharge	P261	Character	30		
40	Length of hospitalization	P27	Number	6	Yes	
41	Diagnosis code of out-patient/emergency department	P28	Character	20		Diagnosis code: ICD10
42	Diagnosis of out-patient/emergency department	P281	Character	100	Yes	
43	Admission status	P29	Character	1		
44	Admission diagnosis code	P30	Character	30		Diagnosis code: ICD10
45	Admission diagnosis	P301	Character	100		
46	Date of diagnosis being confirmed	P31	Date			yyyy-mm-dd
47	Code of main diagnosis	P321	Character	20	Yes	Diagnosis code: ICD10. If there's no appropriate one, fill in "NA"
48	Primary diagnosis	P322	Character	100	Yes	
49	Primary diagnosis: admission status	P805	Character	1		
50	Primary diagnosis: discharge status	P323	Character	1		
51	Code of other diagnosis 1	P324	Character	20		Diagnosis code: ICD10
52	Other diagnosis 1	P325	Character	100		
53	Other diagnosis 1: admission status	P806	Character	1		
54	Other diagnosis 1: discharge status	P326	Character	1		
55	Code of Other diagnosis 2	P327	Character	20		Diagnosis code: ICD10
56	Other diagnosis 2	P328	Character	100		
57	Other diagnosis 2: admission status	P807	Character	1		
58	Other diagnosis 2: discharge status	P329	Character	1		
59	Code of Other diagnosis 3	P3291	Character	20		Diagnosis code: ICD10
60	Other diagnosis 3	P3292	Character	100		
61	Other diagnosis 3: admission status	P808	Character	1		
62	Other diagnosis 3: discharge status	P3293	Character	1		
63	Code of Other diagnosis 4	P3294	Character	20		Diagnosis code: ICD10
64	Other diagnosis 4	P3295	Character	100		
65	Other diagnosis 4: admission status	P809	Character	1		
66	Other diagnosis 4: discharge status	P3296	Character	1		

67	Code of Other diagnosis 5	P3297	Character	20		Diagnosis code: ICD10
68	Other diagnosis 5	P3298	Character	100		
69	Other diagnosis 5: admission status	P810	Character	1		
70	Other diagnosis 5: discharge status	P3299	Character	1		
71	Code of Other diagnosis 6	P3281	Character	20		Diagnosis code: ICD10
72	Other diagnosis 6	P3282	Character	100		
73	Other diagnosis 6: admission status	P811	Character	1		
74	Other diagnosis6: discharge status	P3283	Character	1		
75	Code of Other diagnosis 7	P3284	Character	20		Diagnosis code: ICD10
76	Other diagnosis 7	P3285	Character	100		
77	Other diagnosis 7: admission status	P812	Character	1		
78	Other diagnosis 7: discharge status	P3286	Character	1		
79	Code of Other diagnosis 8	P3287	Character	20		Diagnosis code: ICD10
80	Other diagnosis 8	P3288	Character	100		
81	Other diagnosis 8: admission status	P813	Character	1		
82	Other diagnosis 8: discharge status	P3289	Character	1		
83	Code of Other diagnosis 9	P3271	Character	20		Diagnosis code: ICD10
84	Other diagnosis 9	P3272	Character	100		
85	Other diagnosis 9: admission status	P814	Character	1		
86	Other diagnosis 9: discharge status	P3273	Character	1		
87	Code of Other diagnosis 10	P3274	Character	20		Diagnosis code: ICD10
88	Other diagnosis 10	P3275	Character	100		
89	Other diagnosis 10: admission status	P815	Character	1		
90	Other diagnosis 10: discharge status	P3276	Character	1		
91	Frequency of in-hospital infection	P689	Number	5		
92	Code of pathological diagnosis 1	P351	Character	20		Diagnosis code: ICD10
93	Pathological diagnosis 1	P352	Character	100		
94	Pathological number 1	P816	Character	50		

95	Code of pathological diagnosis 2	P353	Character	20		Diagnosis code: ICD10
96	Pathological diagnosis 2	P354	Character	100		
97	Pathological number 2	P817	Character	50		
98	Code of pathological diagnosis 3	P355	Character	20		Diagnosis code: ICD10
99	Pathological diagnosis 3	P356	Character	100		
100	Pathological number 3	P818	Character	50		
101	External factors' code of trauma and poisoning 1	P361	Character	20		Diagnosis code: ICD10
102	External factors of trauma and poisoning 1	P362	Character	100		
103	External factors' code of trauma and poisoning 2	P363	Character	20		Diagnosis code: ICD10
104	External factors of trauma and poisoning 2	P364	Character	100		
105	External factors' code of trauma and poisoning 3	P365	Character	20		Diagnosis code: ICD10
106	External factors of trauma and poisoning 3	P366	Character	100		
107	Allergen	P371	Collection	Multi-choice		
108	Allergic drug	P372	Character	100		
109	HBsAg	P38	Character	1		
110	HCV-Ab	P39	Character	1		
111	HIV-Ab	P40	Character	1		
112	Coincidence between out-patient and discharge diagnosis	P411	Character	1		
113	Coincidence between admitting and discharge diagnosis	P412	Character	1		
114	Coincidence between pre- and post-operation diagnosis	P413	Character	1		
115	Coincidence between clinical and pathological diagnosis	P414	Character	1		
116	Coincidence between radial and pathological diagnosis	P415	Character	3		
117	Rescue times	P421	Number	3		
118	Succeeding rescue times	P422	Number	1		
119	Strongest evidence of diagnosis	P687	Character	1		
120	Differentiation degree	P688	Character	40		
121	Chief	P431	Character	40		
122	(Associate) chief physician	P432	Character	40		
123	Attending physician	P433	Character	40		

124	Resident	P434	Character	40		
125	Primary nurse	P819	Character	40		
126	Refresher physician	P435	Character	40		
127	Postgraduate intern	P436	Character	40		
128	Intern	P437	Character	40		
129	Coder	P438	Character	40		
130	Medical record quality	P44	Character	1		
131	Quality-control physician	P45	Character	40		
132	Quality-control primary nurse	P46	Character	40		
133	Quality-control date	P47	Date			yyyy-mm-dd
134	Operation / Procedure code 1	P490	Character	20		Diagnosis code: ICD10
135	Operation / Procedure date 1	P491	Date, time		Obliged if operation code isn't empty	yyyy-mm-dd HH:mm:ss
136	Operation / Procedure level 1	P820	Character	1		
137	Operation / Procedure name 1	P492	Character	100	Obliged if operation code isn't empty	
138	Operation / Procedure part 1	P493	Character	4		
139	Operation / Procedure duration 1	P494	Number	5		Unit (hour)
140	Surgeon 1	P495	Character	40		
141	First assistant 1	P496	Character	40		
142	Second assistant 1	P497	Character	40		
143	Anaesthesia 1	P498	Character	6		
144	Anaesthesia class 1	P4981	Character	1		
145	Wound healing ratings 1	P499	Character	2		
146	Anaesthesiologist 1	P4910	Character	40		
147	Operation / Procedure code 2	P4911	Character	20		Diagnosis code: ICD10
148	Operation / Procedure date 2	P4912	Date, time			yyyy-mm-dd HH:mm:ss
149	Operation / Procedure level 2	P821	Character	1		
150	Operation / Procedure name 2	P4913	Character	100		
151	Operation / Procedure part 2	P4914	Character	4		
152	Operation / Procedure duration 2	P4915	Number	5		Unit (hour)
153	Surgeon 2	P4916	Character	40		
154	First assistant 2	P4917	Character	40		
155	Second assistant 2	P4918	Character	40		
156	Anaesthesia 2	P4919	Character	6		
157	Anaesthesia class 2	P4982	Character	1		
158	Wound healing ratings 2	P4920	Character	2		

159	Anaesthesiologist 2	P4921	Character	40		
160	Operation / Procedure code 3	P4922	Character	20		Diagnosis code: ICD10
161	Operation / Procedure date 3	P4923	Date, time			yyyy-mm-dd HH:mm:ss
162	Operation / Procedure level 3	P822	Character	1		
163	Operation / Procedure name 3	P4924	Character	100		
164	Operation / Procedure part 3	P4925	Character	4		
165	Operation / Procedure duration 3	P4526	Number	5		Unit (hour)
166	Surgeon 3	P4527	Character	40		
167	First assistant 3	P4528	Character	40		
168	Second assistant 3	P4529	Character	40		
169	Anaesthesia 3	P4530	Character	6		
170	Anaesthesia class 3	P4983	Character	1		
171	Wound healing ratings 3	P4531	Character	2		
172	Anaesthesiologist 3	P4532	Character	40		
173	Operation / Procedure code 4	P4533	Character	20		Diagnosis code: ICD10
174	Operation / Procedure date 4	P4534	Date, time			yyyy-mm-dd HH:mm:ss
175	Operation / Procedure level 4	P823	Character	1		
176	Operation / Procedure name 4	P4535	Character	100		
177	Operation / Procedure part 4	P4536	Character	4		
178	Operation / Procedure duration 4	P4537	Number	5		Unit (hour)
179	Surgeon 4	P4538	Character	40		
180	First assistant 4	P4539	Character	40		
181	Second assistant 4	P4540	Character	40		
182	Anaesthesia 4	P4541	Character	6		
183	Anaesthesia class 4	P4542	Character	1		
184	Wound healing ratings 4	P4543	Character	2		
185	Anaesthesiologist 4	P4544	Character	40		
186	Operation / Procedure code 5	P4545	Date, time	20		Diagnosis code: ICD10
187	Operation / Procedure date 5	P4546	Character			yyyy-mm-dd HH:mm:ss
188	Operation / Procedure level 5	P824	Character	1		
189	Operation / Procedure name 5	P4546	Character	100		
190	Operation / Procedure part 5	P4547	Character	4		
191	Operation / Procedure duration 5	P4548	Number	5		Unit (hour)
192	Surgeon 5	P4549	Character	40		
193	First assistant 5	P4550	Character	40		
194	Second assistant 5	P4551	Character	40		
195	Anaesthesia 5	P4552	Character	6		
196	Anaesthesia class 5	P4985	Character	1		
197	Wound healing ratings 5	P4553	Character	2		
198	Anaesthesiologist 5	P4554	Character	40		

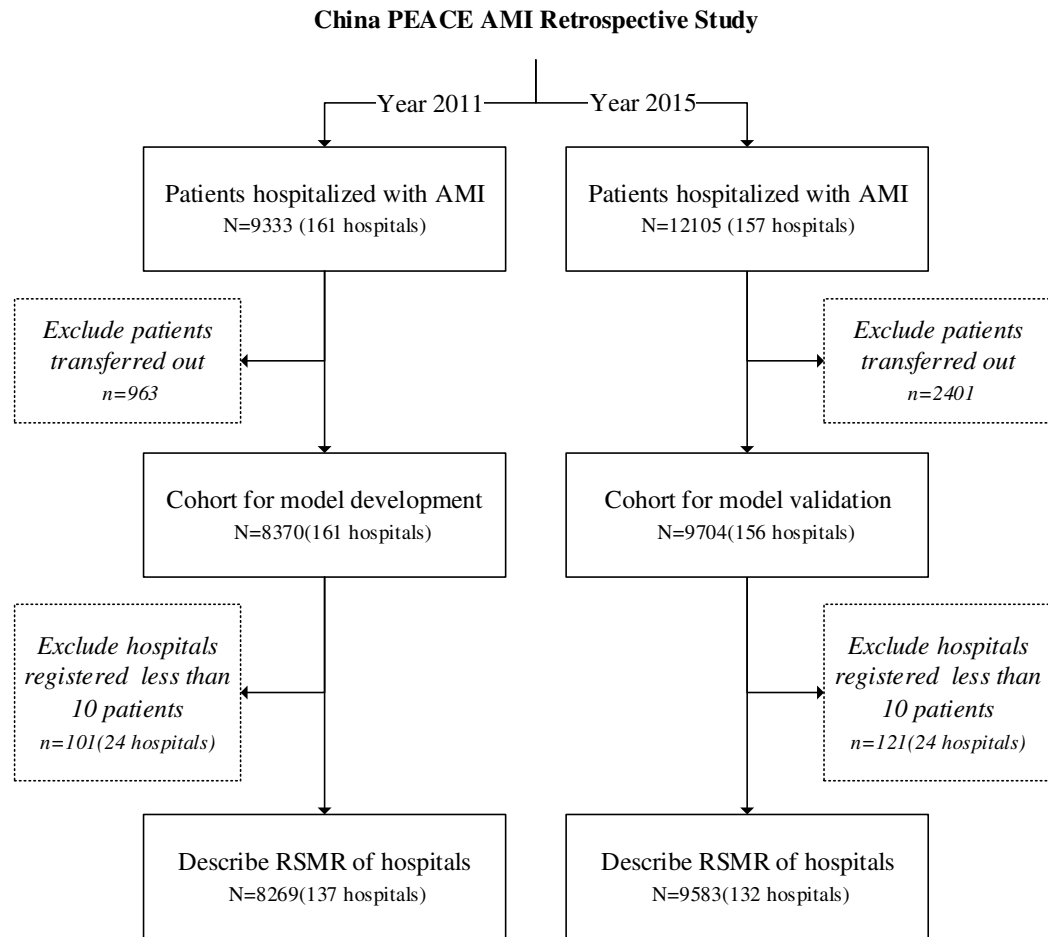| 199	Operation / Procedure code 6	P45002	Character	20		Diagnosis code: ICD10
200	Operation / Procedure date 6	P45003	Date, time			yyyy-mm-dd HH:mm:ss
201	Operation / Procedure level 6	P825	Character	1		
202	Operation / Procedure name 6	P45004	Character	100		
203	Operation / Procedure part 6	P45005	Character	4		
204	Operation / Procedure duration 6	P45006	Number	5		Unit (hour)
205	Surgeon 6	P45007	Character	40		
206	First assistant 6	P45008	Character	40		
207	Second assistant 6	P45009	Character	40		
208	Anaesthesia 6	P45010	Character	6		
209	Anaesthesia class 6	P45011	Character	1		
210	Wound healing ratings 6	P45012	Character	2		
211	Anaesthesiologist 6	P45013	Character	40		
212	Operation / Procedure code 7	P45014	Character	20		Diagnosis code: ICD10
213	Operation / Procedure date 7	P45015	Date, time			yyyy-mm-dd HH:mm:ss
214	Operation / Procedure level 7	P826	Character	1		
215	Operation / Procedure name 7	P45016	Character	100		
216	Operation / Procedure part 7	P45017	Number	4		
217	Operation / Procedure duration 7	P45018	Character	5		Unit (hour)
218	Surgeon 7	P45019	Character	40		
219	First assistant 7	P45020	Character	40		
220	Second assistant 7	P45021	Character	40		
221	Anaesthesia 7	P45022	Character	6		
222	Anaesthesia class 7	P45023	Character	1		
223	Wound healing ratings 7	P45024	Character	2		
224	Anaesthesiologist 7	P45025	Character	40		
225	Operation / Procedure code 8	P45026	Character	20		Diagnosis code: ICD10
226	Operation / Procedure date 8	P45027	Date, time			yyyy-mm-dd HH:mm:ss
227	Operation / Procedure level 8	P827	Character	1		
228	Operation / Procedure name 8	P45028	Character	100		
229	Operation / Procedure part 8	P45029	Character	4		
230	Operation / Procedure duration 8	P45030	Number	5		Unit (hour)
231	Surgeon 8	P45031	Character	40		
232	First assistant 8	P45032	Character	40		
233	Second assistant 8	P45033	Character	40		
234	Anaesthesia 8	P45034	Character	6		
235	Anaesthesia class 8	P45035	Character	1		
236	Wound healing ratings 8	P45036	Character	2		
237	Anaesthesiologist 8	P45037	Character	40		
238	Operation / Procedure code 9	P45038	Character	20		Diagnosis code: ICD10

239	Operation / Procedure date 9	P45039	Date, time			yyyy-mm-dd HH:mm:ss
240	Operation / Procedure level 9	P828	Character	1		
241	Operation / Procedure name 9	P45040	Character	100		
242	Operation / Procedure part 9	P45041	Character	4		
243	Operation / Procedure duration 9	P45042	Number	5		Unit (hour)
244	Surgeon 9	P45043	Character	40		
245	First assistant 9	P45044	Character	40		
246	Second assistant 9	P45045	Character	40		
247	Anaesthesia 9	P45046	Character	6		
248	Anaesthesia class 9	P45047	Character	1		
249	Wound healing ratings 9	P45048	Character	2		
250	Anaesthesiologist 9	P45049	Character	40		
251	Operation / Procedure code 10	P45050	Character	20		Diagnosis code: ICD10
252	Operation / Procedure date 10	P45051	Date, time			yyyy-mm-dd HH:mm:ss
253	Operation / Procedure level 10	P829	Character	1		
254	Operation / Procedure name 10	P45052	Character	100		
255	Operation / Procedure part 10	P45053	Character	4		
256	Operation / Procedure duration 10	P45054	Number	5		Unit (hour)
257	Surgeon 10	P45055	Character	40		
258	First assistant 10	P45056	Character	40		
259	Second assistant 10	P45057	Character	40		
260	Anaesthesia 10	P45058	Character	6		
261	Anaesthesia class 10	P45059	Character	1		
262	Wound healing ratings 10	P45060	Character	2		
263	Anaesthesiologist 10	P45061	Character	40		
264	Length of critical care	P561	Number	6		Unit (day)
265	Length of Grade 1 nursing	P562	Number	6		Unit (day)
266	Length of Grade 2 nursing	P563	Number	6		Unit (day)
267	Length of Grade 3 nursing	P564	Number	6		Unit (day)
268	Intensive care unit 1	P6911	Character	4		
269	Entrance date and time 1	P6912	Date			yyyy-mm-dd
270	Exit date and time 1	P6913	Date			yyyy-mm-dd
271	Intensive care unit 2	P6914	Character	4		
272	Entrance date and time 2	P6915	Date			yyyy-mm-dd
273	Exit date and time 2	P6916	Date			yyyy-mm-dd
274	Intensive care unit 3	P6917	Character	4		
275	Entrance date and time 3	P6918	Date			yyyy-mm-dd
276	Exit date and time 3	P6919	Date			yyyy-mm-dd
277	Intensive care unit 4	P6920	Character	4		
278	Entrance date and time 4	P6921	Date			yyyy-mm-dd
279	Exit date and time 4	P6922	Date			yyyy-mm-dd

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open

280	Intensive care unit 5	P6923	Character	4		
281	Entrance date and time 5	P6924	Date			yyyy-mm-dd
282	Exit date and time 5	P6925	Date			yyyy-mm-dd
283	Autopsy	P57	Character	1		
284	First case of operation, treatment, examination and diagnosis	P58	Character	1		
285	Type of the patients with operation	P581	Collection	Multi-choice		
286	Follow-up	P60	Character	1		
287	Follow-up time (week)	P611	Number	2		
288	Follow-up time (month)	P612	Number	2		
289	Follow-up time (year)	P613	Number	2		
290	Teach Case	P59	Character	1		
291	Blood type (ABO)	P62	Character	1	Yes	
292	Blood type (Rh)	P63	Character	1	Yes	
293	Transfusion reaction	P64	Character	1		
294	Erythrocyte	P651	Number	6		Unit (U)
295	Platelet	P652	Number	6		Unit (bag)
296	Plasma	P653	Number	6		Unit (ml)
297	Whole blood	P654	Number	6		Unit (ml)
298	Autologous recovery	P655	Number	6		Unit (ml)
299	Others	P656	Number	6		Unit (ml)
300	Age (less than 1 years old)	P66	Number	4,2		Unit (month), two decimal places
301	New-born weight 1	P681	Number	6		Unit (gram)
302	New-born weight 2	P682	Number	6		Unit (gram)
303	New-born weight 3	P683	Number	6		Unit (gram)
304	New-born weight 4	P684	Number	6		Unit (gram)
305	New-born weight 5	P685	Number	6		Unit (gram)
306	New-born weight at admission	P67	Number	6		Unit (gram)
307	Pre-admitting (coma duration of cranial injury patients, hour)	P731	Number	6		Unit (hour)
308	Pre-admitting (coma duration of cranial injury patients, minute)	P732	Number	2		Unit (min)
309	Post-admitting (coma duration of cranial injury patients, hour)	P733	Number	6		Unit (hour)
310	Post-admitting coma duration of cranial injury patients, minute)	P734	Number	2		Unit (min)
311	Duration of ventilator application	P72	Number	6		Unit (hour)

Supplemental material

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

BMJ Open

312	Readmission Plan within 31 days after discharge	P830	Character	1		
313	Readmission aims	P831	Character	100		
314	Method of discharge	P741	Character	1		
315	Hospital from which the patient is transferred	P742	Character	100		
316	Community service association/county hospital from which the patient is transferred	P743	Character	100		
317	Gross charge	P782	Number	10,2	Yes	Two decimal places
318	Out-of-pocket money	P751	Number	10,2		Two decimal places
319	Cost for general medical care	P752	Number	10,2		Two decimal places
320	Cost for treatment	P754	Number	10,2		Two decimal places
321	Cost for nursing care	P755	Number	10,2		Two decimal places
322	Cost for other integrated medical services	P756	Number	10,2		Two decimal places
323	Cost for pathological diagnosis	P757	Number	10,2		Two decimal places
324	Cost for lab text	P758	Number	10,2		Two decimal places
325	Cost for imaging test	P759	Number	10,2		Two decimal places
326	Cost for clinical diagnosis items	P760	Number	10,2		Two decimal places
327	Cost for nonoperation therapy	P761	Number	10,2		Two decimal places
328	Cost for clinical physical treatment	P762	Number	10,2		Two decimal places
329	Operation-treatment cost	P763	Number	10,2		Two decimal places
330	Anaesthesia cost	P764	Number	10,2		Two decimal places
331	Operation cost	P765	Number	10,2		Two decimal places
332	Rehabilitation cost	P767	Number	10,2		Two decimal places
333	Cost for traditional Chinese medicine	P768	Number	10,2		Two decimal places
334	Cost for western medicine	P769	Number	10,2		Two decimal places
335	Cost for Antibiotics	P770	Number	10,2		Two decimal places
336	Cost for traditional Chinese medicine	P771	Number	10,2		Two decimal places
337	Cost for Herbs	P772	Number	10,2		Two decimal places
338	Cost for whole blood transfusion	P773	Number	10,2		Two decimal places
339	Cost for blood transfusion	P774	Number	10,2		Two decimal places
340	Cost for globin transfusion	P775	Number	10,2		Two decimal places
341	Cost for clotting factor transfusion	P776	Number	10,2		Two decimal places
342	Cost for cytokine transfusion	P777	Number	10,2		Two decimal places

343	Cost for disposable medical material in examination	P778	Number	10,2		Two decimal places
344	Cost for disposable medical material in treatment	P779	Number	10,2		Two decimal places
345	Cost for disposable medical material in operation	P780	Number	10,2		Two decimal places
346	Other cost	P781	Number	10,2		Two decimal places

Figure S1. Flowchart of patients' exclusion

China PEACE AMI Retrospective Study

Year 2011   Year 2015

Patients hospitalized with AMI N=9333 (161 hospitals)	Patients hospitalized with AMI N=12105 (157 hospitals)
Exclude patients transferred out *n=963*	*Exclude patients transferred out* *n=2401*
Cohort for model development N=8370(161 hospitals)	Cohort for model validation N=9704(156 hospitals)
Exclude hospitals registered less than 10 patients *n=101(24 hospitals)*	*Exclude hospitals registered less than 10 patients* *n=121(24 hospitals)*
Describe RSMR of hospitals N=8269(137 hospitals)	Describe RSMR of hospitals N=9583(132 hospitals)

RSMR: risk standardized mortality rate

Appendix A. Comparison of established risk-perdition model with the GRACE ACS in-hospital mortality model

We calculated the predicted probability of in-hospital death among our development and validation cohorts by 3 models (GRACE ACS model, our complete medical record model and medical record front page model), separately. Then we calculated the AUC of each model and test the statistical difference between GRACE and our models. Integrated discrimination improvement(IDI) was also calculated to evaluated the overall improvement of out models compared with GRACE. Results showed that compared with GRACE ACS model, both our two patient risk prediction model had better AUC (all p value<0.001, see bellowing Figure) and positive IDI among development and validation cohorts. In detail, the IDI of medical record front page model compared with GRACE model was 0.010 (0.003,0.017) in development cohort, and 0.028 (0.021,0.036) in validation cohort.

AUC	
GRACE in-hospital mortality model	0.7151
Complete medical record model	0.7900
MRFP model	0.7760

(a)

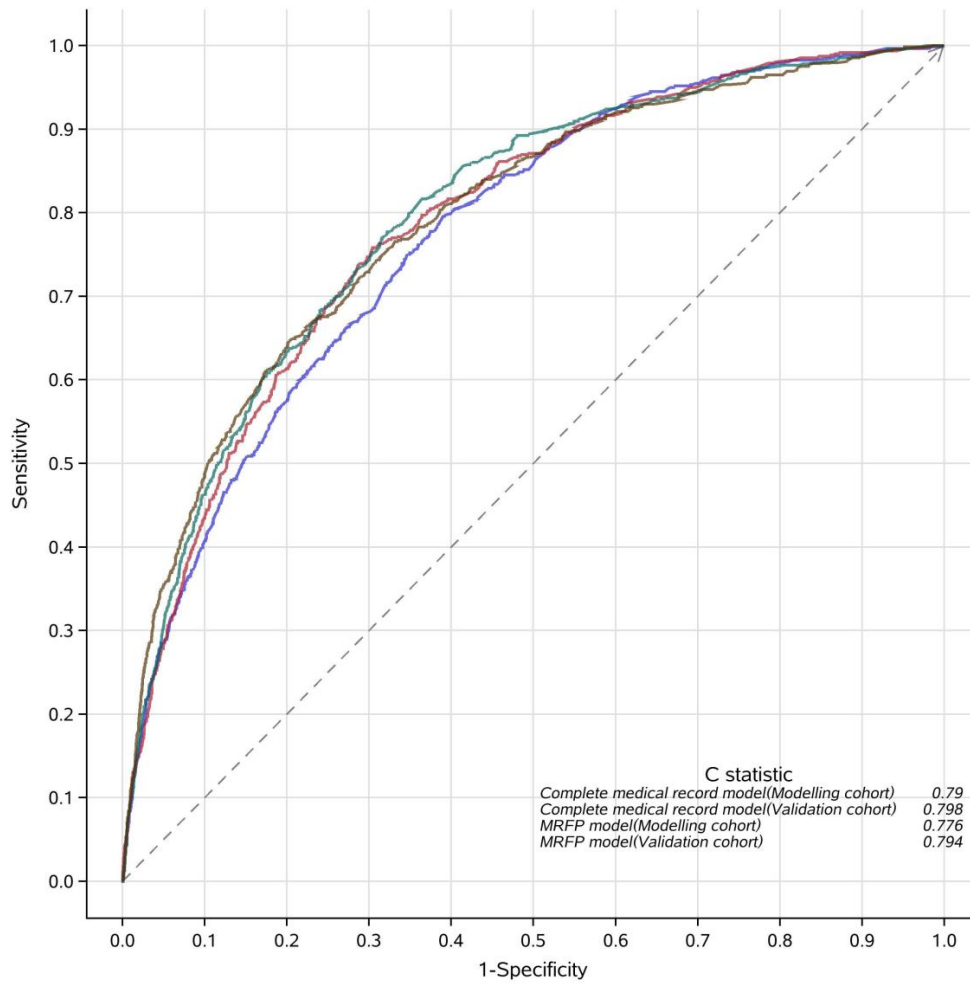| AUC	
GRACE in-hospital mortality model	0.7451
Complete medical record model	0.7980
MRFP model	0.7938
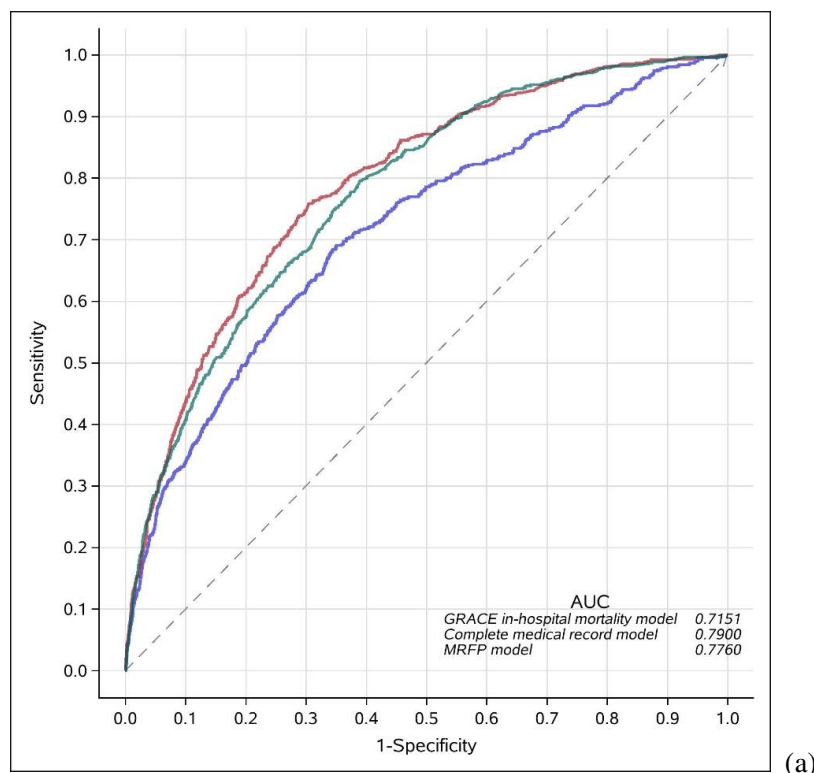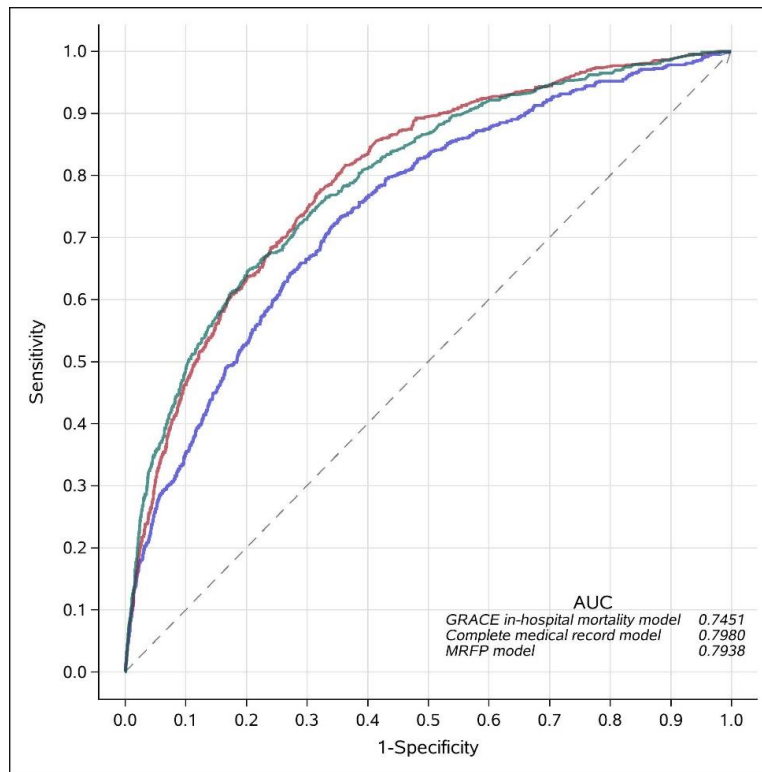
(b)

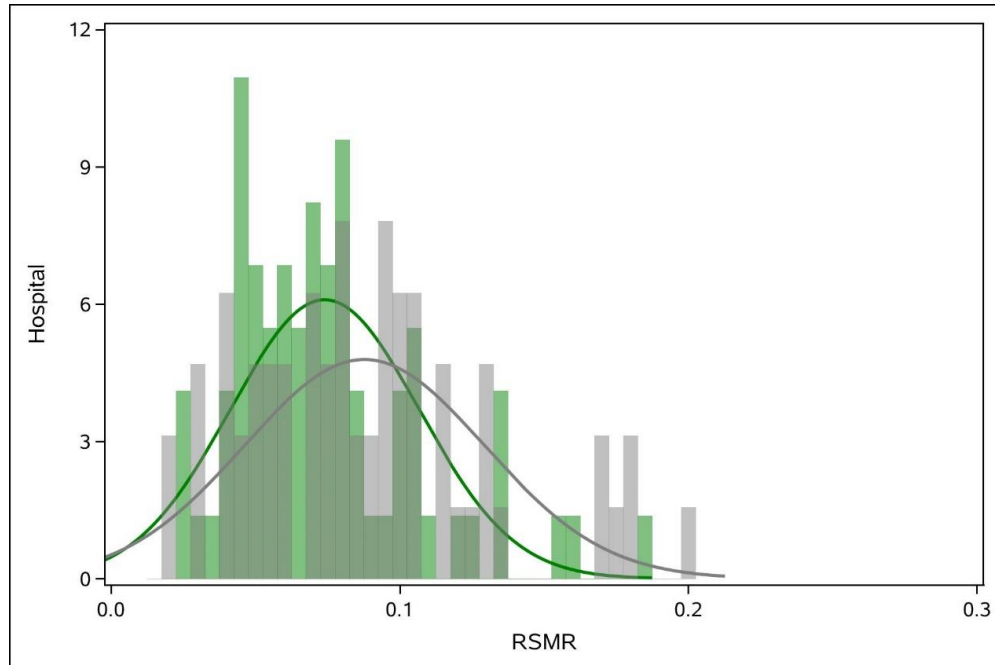**Figure. ROC of 3 models among development(a) and validation(b) cohort.**

Figure S2. Receiver operating characteristic (ROC) curve of MRFP model and complete medical record model based on modelling and validation cohorts.

MRFP: medical record front page.

C statistic
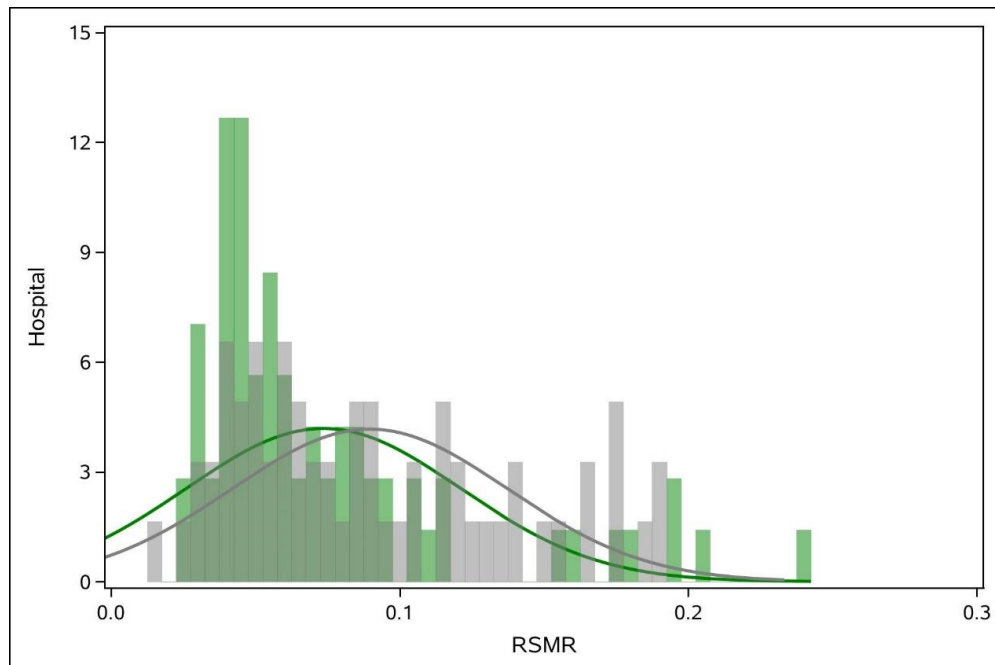|	
Complete medical record model(Modelling cohort)	0.79
Complete medical record model(Validation cohort)	0.798
MRFP model(Modelling cohort)	0.776
MRFP model(Validation cohort)	0.794

Figure S3. Distribution of risk standardized mortality rate of study hospitals estimated by MRFP model. (a) Modelling cohort (b) Validation cohort

(a)

(b)