

Supplemental Table S1. Molecular epidemiological details of 41 ST22-MRSA-IVh isolates recovered from one ward of a Dublin hospital during a six-week period in 2007<sup>a</sup>

Isolate number	Date of isolation	Bay	Bed	Source	Pairs <sup>b</sup>	CTEs <sup>c</sup>	<i>spa</i> type	<i>dru</i> type	PFGE type	MRSA acquisition
M07/0319	07/30/2007	D	23	Patient	Pair 2	NA	t515	dt10a	01042	OA
M07/0320	07/30/2007	D	23	Mattress	Pair 2	NA	t515	dt10a	01042	NA
M07/0321	07/30/2007	E	30	Mattress	NA	NA	t515	dt10a	01039	NA
M07/0322	08/01/2007	E	18	Patient	NA	NA	t032	dt10j	01030	OA
M07/0323	07/31/2007	C	16	Patient	NA	CTE 1	t032	dt10n	01024	OA
M07/0324	07/30/2007	A	6	Patient	Pair 3	NA	t022	dt10p	01039	OA
M07/0325	07/30/2007	A	6	Mattress	Pair 3	NA	t022	dt10p	01039	NA
M07/0326	08/08/2007	C	21	Patient	NA	NA	t032	dt7g	01018	OA
M07/0327	08/09/2007	A	6	Patient	NA	NA	t515	dt11j	01049	OA-K
M07/0328	08/13/2007	B	15	Patient	NA	CTE 1	t032	dt10n	01024	OA
M07/0329	08/13/2007	E	31	Patient	Pair 4	CTE	t1214	dt10a	01039	HA
M07/0330	08/15/2007	5	SO	Bedrail	NA	NA	t032	dt10a	01039	NA
M07/0331	08/15/2007	E	31	Pillow	Pair 4	NA	t515	dt10a	01063	NA
M07/0332	08/17/2007	D	27	Patient	NA	NA	t032	dt10j	01018	OA-K
M07/0333	08/20/2007	B	13	Patient	Pair 1 <sup>d</sup>	CTE 1	t032	dt10j	01024	HA
M07/0334	08/21/2007	D	23	Mattress	NA	CTE 3	t032	dt10a	01018	NA
M07/0335	08/21/2007	D	23	Mattress	NA	CTE 3	t032	dt10a	01018	NA
M07/0336	08/21/2007	D	26	Mattress	NA	CTE 3	t032	dt10a	01018	NA
M07/0337	08/22/2007	E	29	Bedframe	Pair 1 <sup>d</sup>	NA	t022	dt10a	01039	NA
M07/0338	08/22/2007	E	30	Pillow	NA	NA	t032	dt10j	01146	NA
M07/0339	08/21/2007	B	15	Patient	Pair 5	CTE 2&3	t032	dt10n	01018	OA
M07/0340	08/22/2007	B	10	Bedframe	NA	CTE 2	t032	dt10a	01018	NA
M07/0341	08/22/2007	B	11	Bedframe	NA	CTE 2	t032	dt10n	01018	NA
M07/0342	08/22/2007	B	15	Pillow	NA	CTE 4	t032	dt10a	01039	NA
M07/0343	08/22/2007	B	14	Mattress	NA	NA	t022	dt10a	01039	NA
M07/0344	08/22/2007	B	15	Mattress	Pair 5	CTE 4	t032	dt10a	01039	NA
M07/0345	08/22/2007	B	35	Mattress	NA	NA	t032	dt10n	01018	NA
M07/0346	08/22/2007	2	SO	Bedframe	NA	NA	t032	dt10a	01018	NA
M07/0348	08/27/2007	B	14	Patient	NA	CTE 2&3	t032	dt10n	01018	HA
M07/0350	08/28/2007	D	27	Patient	NA	CTE 3	t032	dt10a	01018	HA
M07/0351	09/03/2007	A	7	Patient	NA	NA	t032	dt10j	01024	OA
M07/0352	09/03/2007	B	15	Patient	NA	CTE 4	t515	dt10a	01039	OA
M07/0353	09/03/2007	B	15	Patient	NA	CTE 4	t1214	dt10a	01039	OA
M07/0354	09/03/2007	E	17	Patient	NA	NA	t1214	dt10a	01039	OA
M07/0355	09/03/2007	E	30	Patient	NA	CTE 5	t032	dt10a	01042	OA
M07/0356	09/03/2007	E	29	Patient	NA	NA	t515	dt7i	01039	OA
M07/0357	09/04/2007	E	33	Bedframe	NA	NA	t022	dt10a	01039	NA
M07/0358	09/10/2007	E	31	Patient	NA	CTE 5	t032	dt10j	01042	>72 h
M07/0359	08/29/2007	C	16	Patient	NA	NA	t2951	dt6e	01088	OA
M07/0415	10/04/2007	A	9	Patient	NA	NA	t032	dt10j	01024	HA
M07/0475	11/20/2007	B	SO	Air	NA	NA	t1214	dt10a	01039	NA

<sup>a</sup>Molecular epidemiological data for isolates was determined as part of previous studies (1, 2).

<sup>b</sup>Each pair of isolates included one isolate recovered from a patient and one recovered from their immediate ward environment. Four of the 10 isolates in these pairs were also previously implicated in the cross transmission events (CTEs).

<sup>c</sup>CTEs were previously determined by conventional molecular epidemiological typing.

<sup>d</sup>Isolates associated with pair 1 were recovered from a patient and environmental site in two separate bays. The patient was found to be positive for MRSA while in bay B but was subsequently moved to bay E where the environmental isolate was recovered allowing these two isolates to be classified as a pair.

Abbreviations: SO, single occupancy; NA, not applicable; PFGE, pulsed-field gel electrophoresis; >72 h, the patient's MRSA status was determined 72 h after admission to the ward; OA; the patient was positive for MRSA on admission to the ward; OA-K; the patients' MRSA positive status was known at the time of admission to the ward; HA, hospital-acquired MRSA.

Supplemental Table S2. Comparison of the conventional molecular epidemiological typing data and single-nucleotide variant (SNV) differences identified among isolates within 10 arbitrarily selected pairwise comparisons (PCs)<sup>a</sup> exhibiting  $\leq 40$  SNVs and  $>40$  SNVs

PCs	Compared isolates <sup>b</sup>	Date of isolation	Bay	Bed	Source	MRSA acquisition	<i>spa</i> type	<i>dru</i> type	PFGE type	No of conventional typing method differences	SNVs
$\leq 40$ SNV differences											
1	M07/0325	07/30/2007	A	6	mattress	NA	t022	dt10p	01039	3	0
	M07/0328	08/13/2007	B	15	patient	OA	t032	dt10n	01024		
2	M07/0326	08/08/2007	C	21	patient	OA	t032	dt7g	01018	2	4
	M07/0328	08/13/2007	B	15	patient	OA	t032	dt10n	01024		
3	M07/0319	07/30/2007	D	23	patient	OA	t515	dt10a	01042	0	10
	M07/0320	07/30/2007	D	23	mattress	NA	t515	dt10a	01042		
4	M07/0321	07/30/2007	E	30	mattress	NA	t515	dt10a	01039	1	1
	M07/0329	08/13/2007	E	31	patient	HA	t1214	dt10a	01039		
5	M07/0324	07/30/2007	A	6	patient	OA	t022	dt10p	01039	3	15
	M07/0336	08/21/2007	D	26	mattress	NA	t032	dt10a	01018		
6	M07/0355	09/03/2007	E	30	patient	OA	t032	dt10a	01042	1	20
	M07/0358	09/10/2007	E	31	patient	>72h	t032	dt10j	01042		
7	M07/0337	08/22/2007	E	29	bedframe	NA	t022	dt10a	01039	0	27
	M07/0359	08/29/2007	C	16	patient	OA	t2951	dt6e	01088		
8	M07/0333	08/20/2007	B	13	patient	HA	t032	dt10j	01024	2	33
	M07/0342	08/22/2007	B	15	pillow	NA	t032	dt10a	01039		
9	M07/0341	08/22/2007	B	11	bedframe	NA	t032	dt10n	01018	2	38
	M07/0355	09/03/2007	E	30	patient	OA	t032	dt10a	01042		
10	M07/0337	08/22/2007	E	29	bedframe	NA	t022	dt10a	01039	3	39
	M07/0415	10/04/2007	A	9	patient	HA	t032	dt10j	01024		

> 40 SNV differences											
1	M07/0335	08/21/2007	D	23	mattress	NA	t032	dt10a	01018	1	43
	M07/0415	10/04/2007	A	9	patient	HA	t032	dt10j	01024		
2	M07/0319	30/07/2007	D	23	patient	OA	t515	dt10a	01042	2	54
	M07/0475	11/20/2007	B	SO	air	NA	t1214	dt10a	01039		
3	M07/0328	08/13/2007	B	15	patient	OA	t032	dt10n	01024	3	63
	M07/0337	08/22/2007	E	29	bedframe	NA	t022	dt10a	01039		
4	M07/0320	07/30/2007	D	23	mattress	NA	t515	dt10a	01042	2	78
	M07/0346	08/22/2007	2	SO	bedframe	NA	t032	dt10a	01018		
5	M07/0355	09/03/2007	E	30	patient	OA	t032	dt10a	01042	1	75
	M07/0351	09/03/2007	A	7	patient	OA	t032	dt10j	01024		
	M07/0336	08/21/2007	D	26	mattress	NA	t032	dt10a	01018		
6	M07/0328	08/13/2007	B	15	patient	OA	t032	dt10n	01024	2	96
	M07/0338	08/22/2007	E	30	pillow	NA	t032	dt10j	01146		
7	M07/0339	08/21/2007	B	15	patient	OA	t032	dt10n	01018	3	99
	M07/0352	09/03/2007	B	15	patient	OA	t515	dt10a	01039		
8	M07/0321	07/30/2007	E	30	mattress	NA	t515	dt10a	01039	0	354
	M07/0352	09/03/2007	B	15	patient	OA	t515	dt10a	01039		
	M07/0334	08/21/2007	D	23	mattress	NA	t032	dt10a	01018		
9	M07/0323	07/31/2007	C	16	patient	NA	t032	dt10n	01024	2	209
	M07/0332	08/17/2007	D	27	patient	OA-K	t032	dt10j	01018		
10	M07/0324	07/30/2007	A	6	patient	OA	t022	dt10p	01039	3	112
	M07/0340	08/22/2007	B	10	bedframe	NA	t032	dt10a	01018		

<sup>a</sup>Pairwise comparisons were randomly selected from those differing by  $\leq 40$  SNV and  $> 40$  SNV for comparison to previously reported conventional molecular epidemiological typing data (1, 2).

Abbreviations: NA, not applicable; PFGE, pulsed-field gel electrophoresis; OA, the patient was positive for MRSA on admission to the ward;  $>72$  h, the patient's MRSA status was determined 72 h after admission to the ward; HA, hospital-acquired MRSA; OA-K, the patients' MRSA positive status was known at the time of admission to the ward

1. **Shore AC, Rossney AS, Kinnevey PM, Brennan OM, Creamer E, Sherlock O, Dolan A, Cunney R, Sullivan DJ, Goering RV, Humphreys H, Coleman DC.** 2010. Enhanced discrimination of highly clonal ST22-methicillin-resistant *Staphylococcus aureus* IV isolates achieved by combining *spa*, *dru*, and pulsed-field gel electrophoresis typing data. J Clin Microbiol **48**:1839-1852.
2. **Creamer E, Shore AC, Rossney AS, Dolan A, Sherlock O, Fitzgerald-Hughes D, Sullivan DJ, Kinnevey PM, O'Lorcain P, Cunney R, Coleman DC, Humphreys H.** 2012. Transmission of endemic ST22-MRSA-IV on four acute hospital wards investigated using a combination of *spa*, *dru* and pulsed-field gel electrophoresis typing. Eur J Clin Microbiol Infect Dis **31**:3151-3161.

# Supplemental Fig. S1

(A)

Isolate no.	M07/0319	M07/0320	M07/0321	M07/0322	M07/0323	M07/0324	M07/0325	M07/0326	M07/0327	M07/0328	M07/0329	M07/0330	M07/0331	M07/0332	M07/0333	M07/0334	M07/0335	M07/0336	M07/0337	M07/0338	M07/0339	M07/0340	M07/0341	M07/0342	M07/0343	M07/0344	M07/0345	M07/0346	M07/0348	M07/0350	M07/0351	M07/0352	M07/0353	M07/0354	M07/0355	M07/0356	M07/0357	M07/0358	M07/0359	M07/0415		
	P	E	E	P	P	P	E	P	P	P	P	P	E	P	P	P	E	E	E	E	P	E	E	E	E	P	P	P	P	P	P	P	P	P	P	E	P	P	P			
M07/0319	P																																									
M07/0320	E	10																																								
M07/0321	E	384	374																																							
M07/0322	P	171	161	213																																						
M07/0323	P	65	55	319	106																																					
M07/0324	P	208	198	176	37	143																																				
M07/0325	E	108	98	276	63	43	100																																			
M07/0326	P	104	94	280	67	39	104	4																																		
M07/0327	P	301	291	83	130	236	93	193	197																																	
M07/0328	P	108	98	276	63	43	100	0	4	193																																
M07/0329	P	385	375	1	214	320	177	277	281	84	277																															
M07/0330	P	163	153	221	8	98	45	55	59	138	55	222																														
M07/0331	E	286	276	98	115	221	78	178	182	15	178	99	123																													
M07/0332	P	274	264	110	103	209	66	166	170	27	166	111	111	12																												
M07/0333	P	151	141	233	20	86	57	43	47	150	43	234	12	135	123																											
M07/0334	P	115	105	269	56	50	93	7	11	186	7	270	48	171	159	36																										
M07/0335	E	167	157	217	4	102	41	59	63	134	59	218	4	119	107	16	52																									
M07/0336	E	223	213	161	52	158	15	115	119	78	115	162	60	63	51	72	108	56																								
M07/0337	E	171	161	213	0	106	37	63	67	130	63	214	8	115	103	20	56	4	52																							
M07/0338	E	204	194	180	33	139	4	96	100	97	96	181	41	82	70	53	89	37	19	33																						
M07/0339	P	129	119	255	42	64	79	21	25	172	21	256	34	157	145	22	14	38	94	42	75																					
M07/0340	E	96	86	288	75	31	112	12	8	205	12	289	67	190	178	55	19	71	127	75	108	33																				
M07/0341	E	156	146	228	15	91	52	48	52	145	48	229	7	130	118	5	41	11	67	15	48	27	60																			
M07/0342	E	118	108	266	53	53	90	10	14	183	10	267	45	168	156	33	3	49	105	53	86	11	22	38																		
M07/0343	E	171	161	213	0	106	37	63	67	130	63	214	8	115	103	20	56	4	52	0	33	42	75	15	53																	
M07/0344	E	114	104	270	57	49	94	6	10	187	6	271	49	172	160	37	1	53	109	57	90	15	18	42	4	57																
M07/0345	P	146	136	238	25	81	62	38	42	155	38	239	17	140	128	5	31	21	77	25	58	17	50	10	28	25	32															
M07/0346	P	88	78	296	83	23	120	20	16	213	20	297	75	198	186	63	27	79	135	83	116	41	8	68	30	83	26	58														
M07/0348	P	172	162	212	1	107	36	64	68	129	64	213	9	114	102	21	57	5	51	1	32	43	76	16	54	1	58	26	84													
M07/0350	P	105	95	279	66	40	103	3	1	196	3	280	58	181	169	46	10	62	118	66	99	24	9	51	13	66	9	41	17	67												
M07/0351	P	92	82	292	79	27	116	16	12	209	16	293	71	194	182	59	23	75	131	79	112	37	4	64	26	79	22	54	4	80	13											
M07/0352	P	30	20	354	141	35	178	78	74	271	78	355	133	256	244	121	85	137	193	141	174	99	66	126	88	141	84	116	58	142	75	62										
M07/0353	P	23	13	361	148	42	185	85	81	278	85	362	140	263	251	128	92	144	200	148	181	106	73	133	95	148	91	123	65	149	82	69	7									
M07/0354	P	40	30	344	131	25	168	68	64	261	68	345	123	246	234	111	75	127	183	131	164	89	56	116	78	131	74	106	48	132	65	52	10	17								
M07/0355	P	118	108	266	53	53	90	10	14	183	10	267	45	168	156	33	3	49	105	53	86	11	22	38	0	53	4	28	30	54	13	26	88	95	78							
M07/0356	P	131	121	253	40	66	77	23	27	170	23	254	32	155	143	20	16	36	92	40	73	2	35	25	13	40	17	15	43	41	26	39	101	108	91	13						
M07/0357	E	114	104	270	57	49	94	6	10	187	6	271	49	172	160	37	1	53	109	57	90	15	18	42	4	57	0	32	26	58	9	22	84	91	74	4	17					
M07/0358	P	138	128	246	33	73	70	30	34	163	30	247	25	148	136	13	23	29	85	33	66	9	42	18	20	33	24	8	50	34	33	46	108	115	98	20	7	24				
M07/0359	P	198	188	186	27	133	10	90	94	103	90	187	35	88	76	47	83	31	25	27	6	69	102	42	80	27	84	52	110	26	93	106	168	175	158	80	67	84	60			
M07/0415	P	210	200	174	39	145	2	102	106	91	102	175	47	76	64	59	95	43	13	39	6	81	114	54	92	39	96	64	122	38	105	118	180	187	170	92	79	96	72	12		

(B)

Isolate no.	M07/0319	M07/0322	M07/0323	M07/0324	M07/0326	M07/0327	M07/0328	M07/0329	M07/0330	M07/0332	M07/0333	M07/0334	M07/0339	M07/0345	M07/0346	M07/0348	M07/0350	M07/0351	M07/0352	M07/0353	M07/0354	M07/0355	M07/0356	M07/0358	M07/0359	M07/0415	M07/0475
M07/0319	p																										
M07/0322	p	171																									
M07/0323	p	65	106																								
M07/0324	p	208	37	143																							
M07/0326	p	104	67	39	104																						
M07/0327	p	301	130	236	93	197																					
M07/0328	p	108	63	43	100	4	193																				
M07/0329	p	385	214	320	177	281	84	277																			
M07/0330	p	163	8	98	45	59	138	55	222																		
M07/0332	p	274	103	209	66	170	27	166	111	111																	
M07/0333	p	151	20	86	57	47	150	43	234	12	123																
M07/0334	p	115	56	50	93	11	186	7	270	48	159	36															
M07/0339	p	129	42	64	79	25	172	21	256	34	145	22	14														
M07/0345	p	146	25	81	62	42	155	38	239	17	128	5	31	17													
M07/0346	p	88	83	23	120	16	213	20	297	75	186	63	27	41	58												
M07/0348	p	172	1	107	36	68	129	64	213	9	102	21	57	43	26	84											
M07/0350	p	105	66	40	103	1	196	3	280	58	169	46	10	24	41	17	67										
M07/0351	p	92	79	27	116	12	209	16	293	71	182	59	23	37	54	4	80	13									
M07/0352	p	30	141	35	178	74	271	78	355	133	244	121	85	99	116	58	142	75	62								
M07/0353	p	23	148	42	185	81	278	85	362	140	251	128	92	106	123	65	149	82	69	7							
M07/0354	p	40	131	25	168	64	261	68	345	123	234	111	75	89	106	48	132	65	52	10	17						
M07/0355	p	118	53	53	90	14	183	10	267	45	156	33	3	11	28	30	54	13	26	88	95	78					
M07/0356	p	131	40	66	77	27	170	23	254	32	143	20	16	2	15	43	41	26	39	101	108	91	13				
M07/0358	p	138	33	73	70	34	163	30	247	25	136	13	23	9	8	50	34	33	46	108	115	98	20	7			
M07/0359	p	198	27	133	10	94	103	90	187	35	76	47	83	69	52	110	26	93	106	168	175	158	80	67	60		
M07/0415	p	210	39	145	2	106	91	102	175	47	64	59	95	81	64	122	38	105	118	180	187	170	92	79	72	12	
M07/0475	p	54	117	11	154	50	247	54	331	109	220	97	61	75	92	34	118	51	38	24	31	14	64	77	84	144	156

(C)

Isolate no.	M07/0320	M07/0321	M07/0325	M07/0331	M07/0335	M07/0336	M07/0337	M07/0338	M07/0340	M07/0341	M07/0342	M07/0343	M07/0344	M07/0357
M07/0320	E													
M07/0321	E	374												
M07/0325	E	98	276											
M07/0331	E	276	98	178										
M07/0335	E	157	217	59	119									
M07/0336	E	213	161	115	63	56								
M07/0337	E	161	213	63	115	4	52							
M07/0338	E	194	180	96	82	37	19	33						
M07/0340	E	86	288	12	190	71	127	75	108					
M07/0341	E	146	228	48	130	11	67	15	48	60				
M07/0342	E	108	266	10	168	49	105	53	86	22	38			
M07/0343	E	161	213	63	115	4	52	0	33	75	15	53		
M07/0344	E	104	270	6	172	53	109	57	90	18	42	4	57	
M07/0357	E	104	270	6	172	53	109	57	90	18	42	4	57	0

Supplemental Fig. S1. Pairwise comparisons of single-nucleotide variant (SNV) differences identified between the 41 ST22-MRSA-IVh isolates based on alignment of all isolate whole-genome sequences to the earliest recovered isolate (M07/0319) with subsequent assignment of isolates exhibiting  $\leq 40$  SNVs as representing a cross-transmission event (CTE). (A) Isolates differing by  $\leq 40$  SNVs where one isolate was recovered from a patient and one was recovered from their immediate ward environment (indicated with grey shading). (B) Isolates differing by  $\leq 40$  SNVs where both isolates were recovered from separate patients (indicated with grey shading). (C) Isolates differing by  $\leq 40$  SNVs where both isolates were recovered from a different environmental source (indicated with grey shading). Abbreviations: Patient, P; Environment, E.