

Supplementary Material

Figure S1. Funnel plot of the studies included in the all-cause mortality meta-analysis.

Funnel plot of standard error by log hazard ratio for all-cause mortality for the studies included in the meta-analysis.

Figure S2. Sensitivity analyses of meta-analysis of all-cause mortality

Legend: Pooled hazard ratio for long-term all-cause mortality in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model and (A) removing the estimated HR, (B) removing unadjusted hazard ratio estimates or removing non-population based studies (as only population-based studies reported adjusted hazard ratios, only one forest plot is presented), and (C) removing studies with unknown length of follow-up. For Santos 2014 *a* and *b* refer to two different non-overlapping studies by the same author and published the same year. For *b* the number of patients with and without PTM was not presented.

Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S3. Subgroup meta-analysis of all-cause mortality by transplanted organ

Legend: Pooled hazard ratio for long-term all-cause mortality in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model stratified by (A) kidney recipients and (B) non-kidney recipients. For Santos 2014 *a* and *b* refer to two different non-overlapping studies by the same author and published the same year. For *b* the number of patients with and without PTM was not presented.

Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S4. Sensitivity analyses of meta-analysis of incidence of post-transplant *de novo* malignancy

Legend: Pooled hazard ratio for incidence of post-transplant *de novo* malignancy in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies: (A) removing the estimated hazard ratios from the incidence rate ratios and (B) excluding unadjusted estimates.

Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S5. Subgroup meta-analysis of incidence of post-transplant *de novo* malignancy by transplanted organ

Legend: Pooled hazard ratio for incidence of post-transplant *de novo* malignancy in (A) kidney transplant recipients and (B) non-kidney transplant recipients with pre-transplant malignancies compared to kidney recipients without pre-transplant malignancies.

Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S6. Sensitivity analysis of meta-analysis of NMSC post-transplant *de novo* malignancy incidence.

Legend: Pooled hazard ratio for incidence of post-transplant *de novo* non-melanoma skin cancer in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model and removing the study by Esfeh *et al.*

Abbreviations: PTM: Pre-transplant Malignancy | NMSC: Non-melanoma skin cancer | SE: Standard error | IV: Inverse variance | CI: Confidence interval

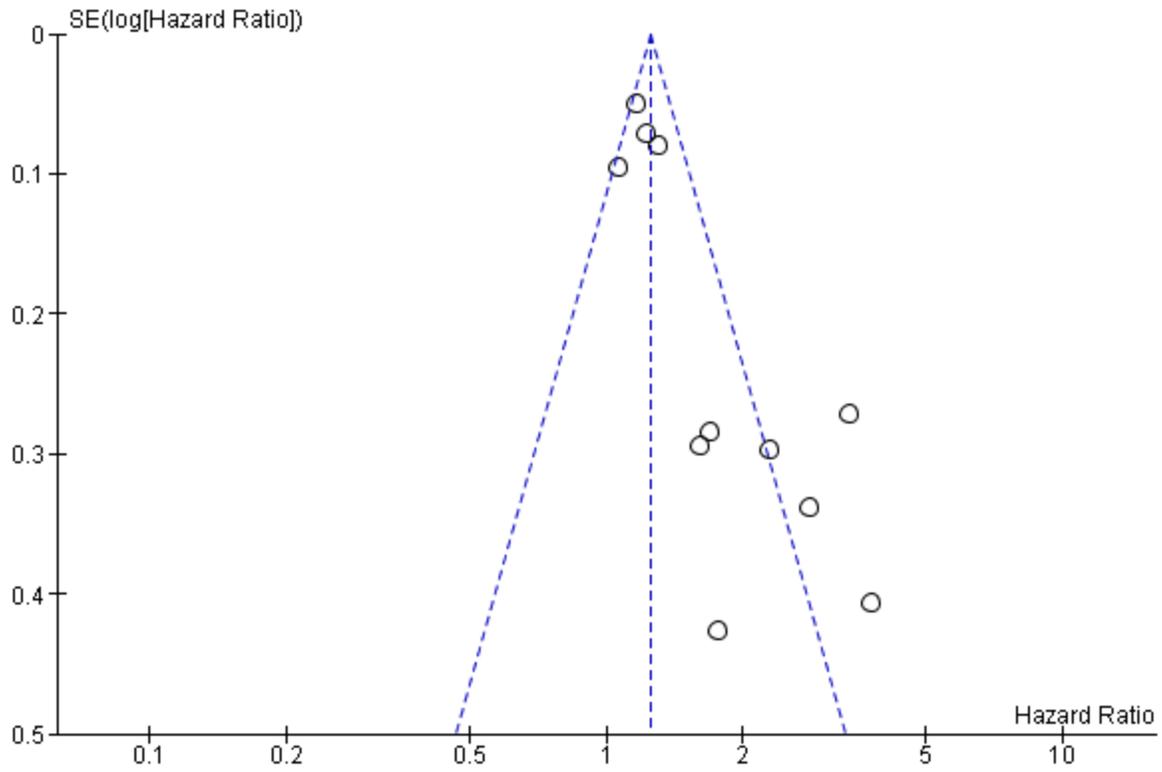
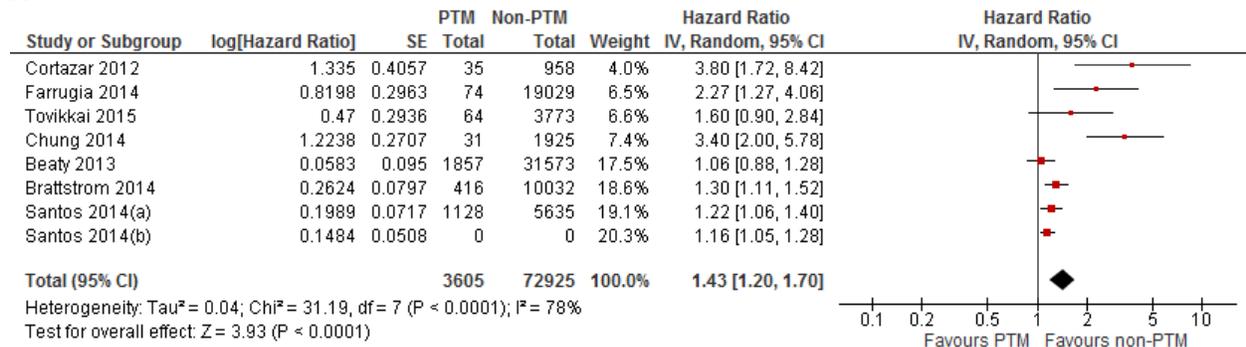


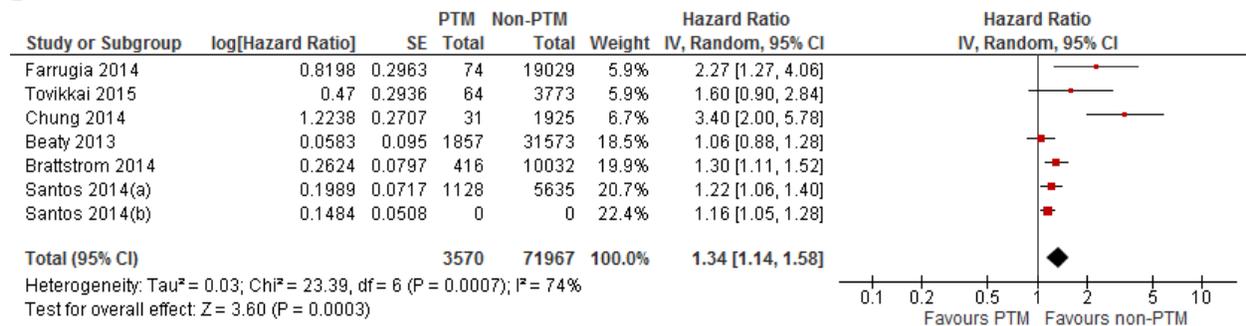
Figure S1. Funnel plot of the studies included in the all-cause mortality meta-analysis. Funnel plot of standard error by log hazard ratio for all-cause mortality for the studies included in the meta-analysis.

Figure S2. Sensitivity analyses of meta-analysis of all-cause mortality

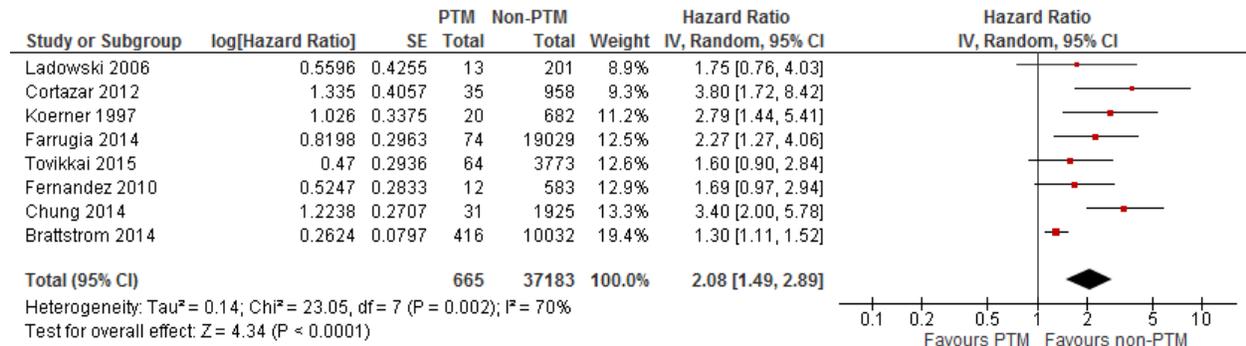
A



B



C

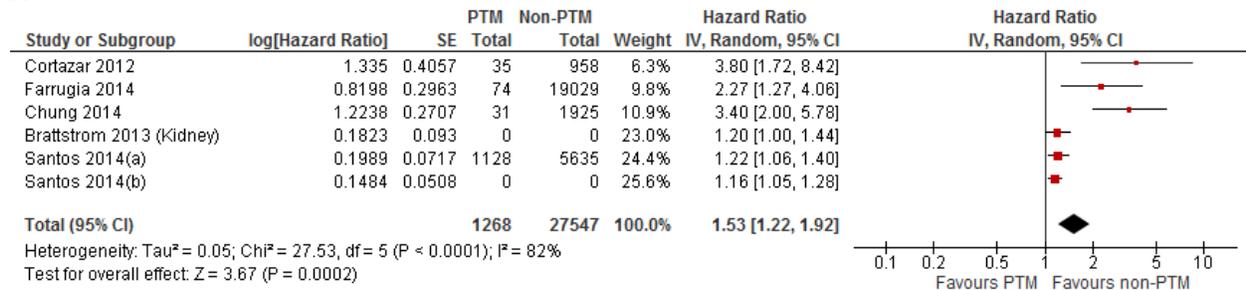


Legend: Pooled hazard ratio for long-term all-cause mortality in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model and (A) removing the estimated HR, (B) removing unadjusted hazard ratio estimates or removing non-population based studies (as only population-based studies reported adjusted hazard ratios, only one forest plot is presented), and (C) removing studies with unknown length of follow-up. For Santos 2014 *a* and *b* refer to two different non-overlapping studies by the same author and published the same year. For *b* the number of patients with and without PTM was not presented.

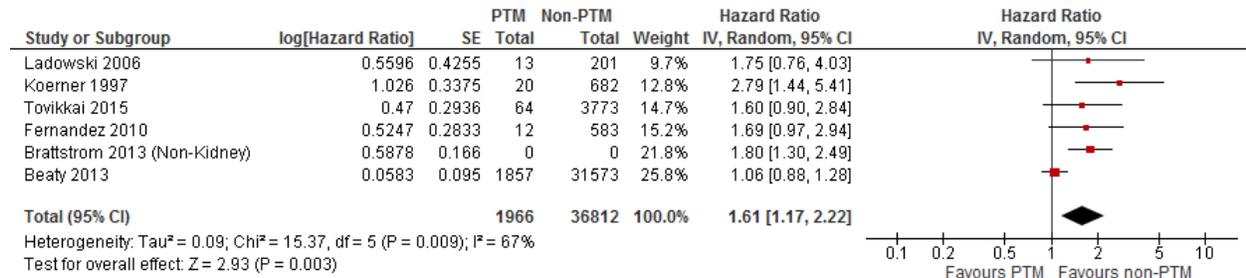
Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S3. Subgroup meta-analysis of all-cause mortality by transplanted organ

A



B

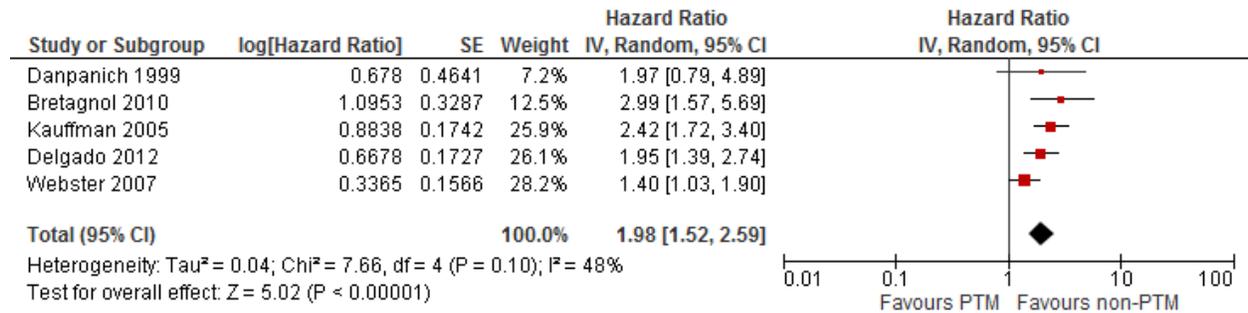


Legend: Pooled hazard ratio for long-term all-cause mortality in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model stratified by (A) kidney recipients and (B) non-kidney recipients. For Santos 2014 *a* and *b* refer to two different non-overlapping studies by the same author and published the same year. For *b* the number of patients with and without PTM was not presented.

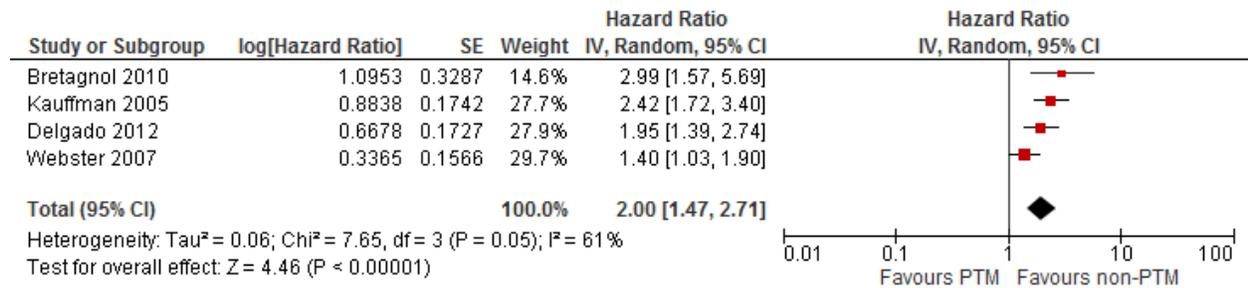
Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S4. Sensitivity analyses of meta-analysis of incidence of post-transplant *de novo* malignancy

A



B

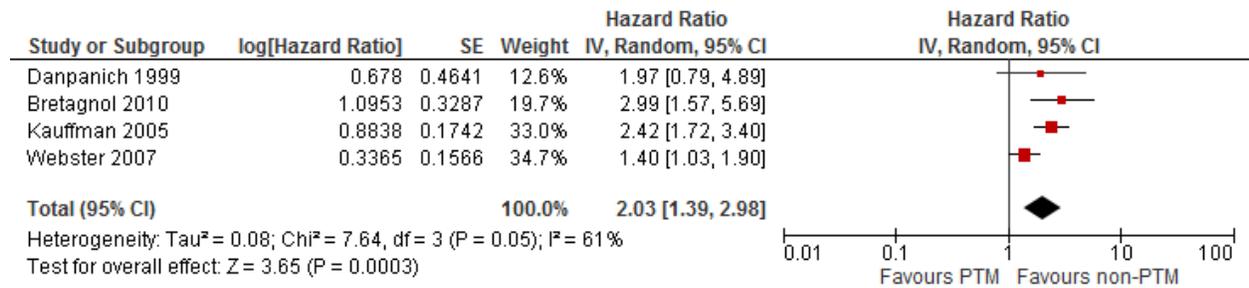


Legend: Pooled hazard ratio for incidence of post-transplant *de novo* malignancy in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies: (A) removing the estimated hazard ratios from the incidence rate ratios and (B) excluding unadjusted estimates.

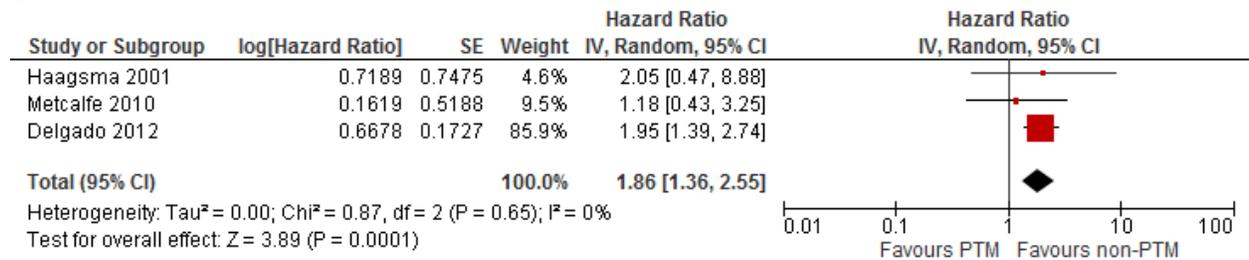
Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S5. Subgroup meta-analysis of incidence of post-transplant *de novo* malignancy by transplanted organ

A



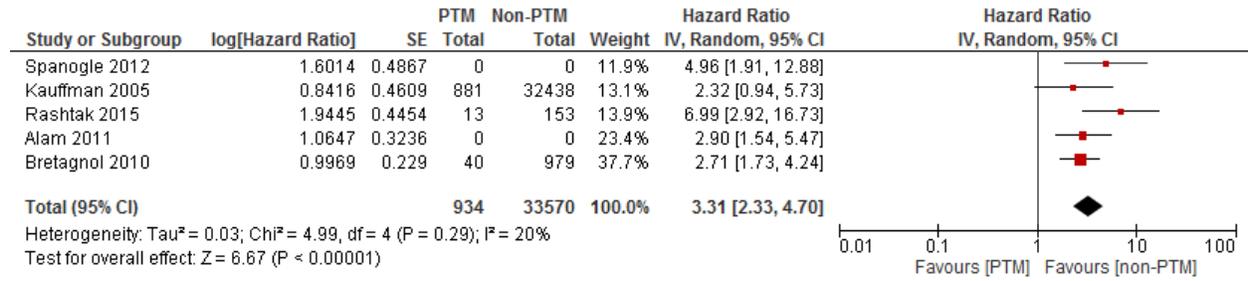
B



Legend: Pooled hazard ratio for incidence of post-transplant *de novo* malignancy in (A) kidney transplant recipients and (B) non-kidney transplant recipients with pre-transplant malignancies compared to kidney recipients without pre-transplant malignancies.

Abbreviations: PTM: Pre-transplant malignancy | SE: Standard error | IV: Inverse variance | CI: Confidence interval | N/A: Not available

Figure S6. Sensitivity analysis of meta-analysis of NMSC post-transplant *de novo* malignancy incidence.



Legend: Pooled hazard ratio for incidence of post-transplant *de novo* non-melanoma skin cancer in solid organ transplant recipients with pre-transplant malignancies compared to recipients without pre-transplant malignancies using a random effects model and removing the study by Esfeh *et al.*

Abbreviations: PTM: Pre-transplant Malignancy | NMSC: Non-melanoma skin cancer | SE: Standard error | IV: Inverse variance | CI: Confidence interval

Appendices

Appendix 1. Literature search strategy

Appendix 2. List of sources included in the grey literature search

Appendix 3. Modified New-Castle Ottawa Coding Manual for Cohort Studies

Appendix 1. Literature search strategy

MEDLINE search strategy

1. exp Neoplasms/
2. neoplas*.tw.
3. cancer*.tw.
4. (tumour* or tumor*).tw.
5. malignan*.tw.
6. (oncology or oncologic or oncologist*).tw.
7. metasta*.tw.
8. carcinoma*.tw.
9. adenocarcinoma*.tw.
10. melanoma*.tw.
11. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. Organ Transplantation/
13. exp Heart Transplantation/
14. Kidney Transplantation/
15. Liver Transplantation/
16. exp Lung Transplantation/
17. Pancreas Transplantation/
18. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2 transplant*).tw.
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. ((preexisting or pre-existing) adj5 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
21. (antecedent adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
22. (history adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
23. 20 or 21 or 22
24. 19 and 23
25. pretransplant*.tw.
26. pre-transplant*.tw.
27. (prior adj5 transplant*).tw.
28. pre-HT.tw.
29. pre-KT.tw.
30. pre-LT.tw.
31. pre-PT.tw.
32. 25 or 26 or 27 or 28 or 29 or 30 or 31
33. 11 and 32
34. 24 or 33
35. remove duplicates from 34
36. cell transplant*.tw
37. bone marrow transplant*.tw.
38. 36 or 37
39. exp Organ Transplantation/
40. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2 transplant*).tw.
41. 39 or 40
42. 38 and 41

43. 38 not 42
44. 35 not 43
45. animals/ not (humans/ and animals/)
46. 44 not 45
47. limit 46 to (editorial or letter)
48. 46 not 47
49. limit 48 to ed=20140201-20150228

EBM Review search strategy

1. exp Neoplasms/
2. neoplas*.tw.
3. cancer*.tw.
4. (tumour* or tumor*).tw.
5. malignan*.tw.
6. (oncology or oncologic or oncologist*).tw.
7. metasta*.tw.
8. carcinoma*.tw.
9. adenocarcinoma*.tw.
10. melanoma*.tw.
11. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. Organ Transplantation/
13. exp Heart Transplantation/
14. Kidney Transplantation/
15. Liver Transplantation/
16. exp Lung Transplantation/
17. Pancreas Transplantation/
18. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2 transplant*).tw.
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. ((preexisting or pre-existing) adj5 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
21. (antecedent adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
22. (history adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
23. 20 or 21 or 22
24. 19 and 23
25. pretransplant*.tw.
26. pre-transplant*.tw.
27. (prior adj5 transplant*).tw.
28. pre-HT.tw.
29. pre-KT.tw.
30. pre-LT.tw.
31. pre-PT.tw.
32. 25 or 26 or 27 or 28 or 29 or 30 or 31
33. 11 and 32
34. 24 or 33
35. remove duplicates from 34
36. cell transplant*.tw.
37. bone marrow transplant*.tw.

38. 36 or 37
39. exp Organ Transplantation/
40. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2 transplant*).tw.
41. 39 or 40
42. 38 and 41
43. 38 not 42
44. 35 not 43
45. limit 44 to yr="2014 -Current"

EMBASE Classic search strategy

1. exp neoplasm/
2. neoplas*.tw.
3. cancer*.tw.
4. (tumour* or tumor*).tw.
5. malignan*.tw.
6. (oncology or oncologic or oncologist*).tw.
7. metasta*.tw.
8. carcinoma*.tw.
9. adenocarcinoma*.tw.
10. melanoma*.tw.
11. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. organ transplantation/
13. exp heart transplantation/
14. exp kidney transplantation/
15. exp liver transplantation/
16. exp lung transplantation/
17. exp pancreas transplantation/
18. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2 transplant*).tw.
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. ((preexisting or pre-existing) adj5 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
21. (antecedent adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
22. (history adj6 (neoplas* or cancer* or tumour* or tumor* or malignan* or metasta* or carcinoma* or adenocarcinoma* or melanoma*)).tw.
23. 20 or 21 or 22
24. 19 and 23
25. pretransplant*.tw.
26. pre-transplant*.tw.
27. (prior adj5 transplant*).tw.
28. pre-HT.tw.
29. pre-KT.tw.
30. pre-LT.tw.
31. pre-PT.tw.
32. 25 or 26 or 27 or 28 or 29 or 30 or 31
33. 11 and 32
34. cell transplant*.tw.
35. bone marrow transplant*.tw.

36. 34 or 35
37. exp organ transplantation/
38. ((organ or heart or heart-lung or kidney or renal or liver or lung or pancreas) adj2
transplant*).tw.
39. 37 or 38
40. 36 and 39
41. 36 not 40
42. 33 not 41
43. animals/ not (humans/ and animals/)
44. 42 not 43
45. limit 44 to (editorial or letter)
46. 44 not 45
47. limit 46 to embase
48. limit 47 to dd=20140201-20150228

Appendix 2. List of sources included in the grey literature search

1. American Association for the Study of Liver Diseases
2. Israel Penn International Tumor Transplant Registry
3. Kidney Liver Foundation
4. National Kidney Foundation
5. Australian and New Zealand Dialysis and Transplant Registry
6. United Network for Organ Sharing
7. The International Society for Heart and Lung Transplantation
8. Transplant Cancer Match Study
9. Google Scholar

Appendix 3. Modified New-Castle Ottawa Coding Manual for Cohort Studies

Domain 1. Selection

- 1) Representativeness of the exposed cohort
 - a) Truly representative of the exposed individuals in the community *
 - b) Somewhat representative of the exposed individuals in the community *
 - c) Selected group of users e.g. nurses, volunteers
 - d) No description of the derivation of the cohort
- 2) Selection of the non-exposed cohort
 - a) Drawn from the same community as the exposed cohort *
 - b) Drawn from a different source
 - c) No description of the derivation of the non-exposed cohort
- 3) Ascertainment of exposure
 - a) Secure record (e.g. surgical records) *
 - b) Record-linkage (e.g. cancer registry) *
 - c) Written self-report
 - d) No description

Domain 2. Comparability

- 1) Comparability of cohorts on the basis of the design or analysis
 - a) Study controls for recipient age and sex *
 - b) Study controls for any additional factor other than recipient age and sex *

Domain 3. Outcome

- 1) Assessment of outcome
 - a) Independent blind assessment *
 - b) Record linkage *
 - c) Self-report
 - d) No description
- 2) Was follow-up long enough for outcomes to occur
 - a) Yes (≥ 2 years)*
 - b) No
- 3) Adequacy of follow up of cohorts
 - a) Complete follow up - all subjects accounted for *
 - b) Subjects lost to follow up unlikely to introduce bias - small number lost - $> 10\%$ follow up, or description provided of those lost *
 - c) Follow up rate $< 10\%$ and no description of those lost
 - d) No statement

Note: A study can be awarded a maximum of one star for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability