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MATCH
Management of Post-Transplant Infections in Collaborating Hospitals

Evaluation of novel programme aimed at reducing the risk of severe viral infections , including cytomegalovirus, following solid organ transplantation

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BACKGROUND

- CMV infection frequently complicates the course after solid organ transplantation and may cause life threatening disease if not diagnosed early
- Since many solid organ transplant recipients at our hospital presented with severe CMV infection, we developed The MATCH Programme

AIM

- Evaluate patients transplanted in the first year (and with › 6 months follow-up) after introducing the MATCH Program and compare their CMV infection outcome with that of patients transplanted in two previous calendar periods

OVERVIEW OF THE MATCH PROGRAMME

- Main purpose is to standardize several key functions in procedures required to diagnose and treat viral infections early after they emerge. The principles of the MATCH programme are shown in **Figure 1.** Several stakeholders are involved:

Transplant coordinators

- Perform the registration of donor and recipient in the database
- At the time of the transplantation, blood from both donor and recipient is analysed using a standardized protocol

Clinical laboratories

- Deliver real-time electronic interface to their databases ensuring direct access to all completed viral analyses

Clinical department

- Administers CMV chemo prophylaxis (primary intervention) and treatment (secondary interventions) according to the MATCH programme
- Ensures schema's for screening for viral infection are followed
- Provide updates regarding patient status and management

MATCH database (central coordination)

- Based on algorithms for matching donor and recipient viral status at time of transplantation recommend CMV chemo prophylactic and monitoring schema for emerging viral infections according to individual a priori risk
- This information is electronically communicated to the clinical department
- When/if a viral analysis shows an abnormal value or is missing, an electronic alarm is generated and appropriate action is taken
- Via these alarms + continuous assessment of viral analyses and clinical status, monitoring schema and medical interventions are modified.
- Updated patient plan is electronically communicated to the clinical department

- A steering committee with representatives from all stakeholders make strategic and scientific decisions regarding the programme

Figure 1

Principles of The MATCH programme

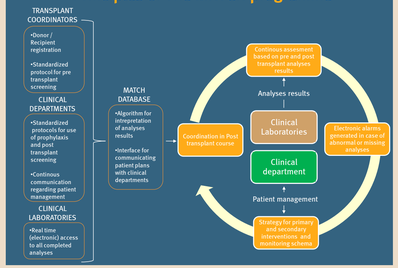


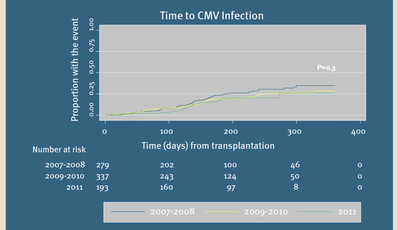
Table 1

Characteristics of 809 patients transplanted between 2007-2011

Year of transplantation	2007-2008	2009-2010	2011	Total
Number of transplantations	279	337	193	**809**
No. males (%)	160 (57%)	204 (61%)	117 (61%)	**481 (59%)**
Age, median (IQR)	47 (31–57)	48 (35–58)	48 (36–57)	**48 (34-58)**
Transplant type				
Heart	25 (9%)	26 (8%)	15 (8%)	**66 (8%)**
Kidney	123 (44%)	164 (49%)	99 (51%)	**386 (48%)**
Liver	50 (18%)	60 (18%)	49 (25%)	**159 (20%)**
Lung	81 (29%)	87 (26%)	30 (16%)	**198 (24%)**
Donor / recipient CMV IgG No. (%)				
D+/R-	45 (16%)	49 (15%)	35 (18%)	**129 (16%)**
D+/R+	136 (49%)	154 (46%)	87 (45%)	**377 (47%)**
D-/R+	60 (22%)	79 (23%)	46 (24%)	**185 (23%)**
D-/R-	28 (10%)	42 (12%)	25 (13%)	**95 (12%)**
Unknown	9 (3%)	13 (4%)	.	**22 (2%)**

Figure 2

Time to CMV Infection



The MATCH programme was implemented January 1st 2011. Time to CMV infection (two consecutive CMV PCR › 300 copies/mL) according to year of transplantation. The at risk period was calculated from the time of transplantation till diagnosis of CMV infection, death or the end of follow up whichever came first.

METHODS

Patients and study design

- All patients transplanted from 2007 to 2011 were included in the analysis
- Recipients transplanted after implementation of the program (2011) were compared to that of recipients transplanted prior to (2007-2008) and while (2009-2010) the program was developed
- During the first year after transplantation the incidence of CMV infection (two consecutive CMV PCR › 300 copies/mL) among recipients transplanted in each of the three calendar periods was determined
- The severity of the infection (mild ‹ 10,000 / moderate 10,000-29,999 / severe ≥ 30,000 copies/mL) at the time of diagnosis was assessed
- Rate of admission related to CMV infection was also determined

Statistical methods

- Risk factors for moderate to severe CMV infection and hospital admission were explored using unadjusted and adjusted Cox and logistic regression models. Models were adjusted for age, gender and all variables shown

RESULTS

Tables and figures

- Characteristics of 809 included patients at the time of the transplantation are depicted in **Table 1**
- A total of 148 (18%) developed CMV infection and the incidence did not vary over calendar time (p›0.3), **Figure 2**
- At the time of diagnosis of CMV the prevalence of moderate to severe infection decreased from 49% to 41% to 10% over calendar time, **Figure 3**
- Factors associated with moderate to severe CMV infection at the time of diagnosis were calendar time adjusted hazard ratio (HR) (2011 versus 2007-2008) = 0.08[0.02 to 0.3] (p‹0.0001) and Donor/Recipient CMV IgG matching HR (D+/R- versus D+/R+) = 7.6 [4.1 to 14.2] (p‹0.0001), **Figure 4**
- The rate of admission due to CMV decreased from 44% and 52% to 13% over calendar time, **Figure 3**
- Factors associated with admission were calendar time adjusted odds ratio (OR) (2011 versus 2007-2008)= 0.16[0.05 to 0.5] (p=0.003) and Donor/Recipient CMV IgG matching OR (D+/R-versus D+/R+) = 2.9 [1.2 to 6.7] (p=0.014) (**Figure 5**). In a separate model, also adjusting for severity of the infection at the time of diagnosis, this variable was also associated with increased odds of admission (adjusted odds ratio (OR) (severe versus mild)= 10.1 [3.7 to 27.8] p‹0.0001)

CONCLUSION

- By use of systematic risk stratification, aimed at screening for emerging infections at times when risk is high, the clinical prognosis of CMV infection radically improved
- This novel program can be implemented at any transplant unit

Figure 3

Severity of CMV infection at the time of diagnosis and CMV related hospital admission rates

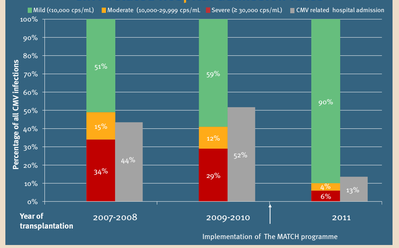
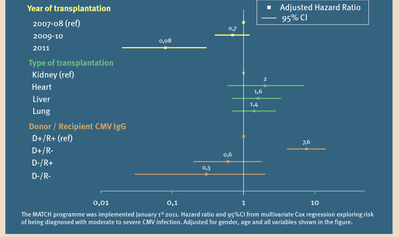


Figure 4

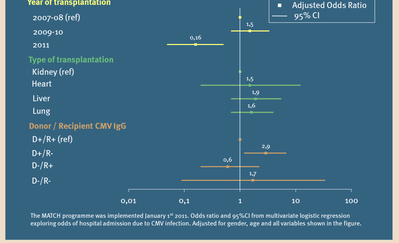
Risk of moderate to severe CMV infection at the time of diagnosis



The MATCH programme was implemented January 1st 2011. Hazard ratio and 95%CI from multivariate Cox regression exploring risk of being diagnosed with moderate to severe CMV infection. Adjusted for gender, age and all variables shown in the figure.

Figure 5

Risk of CMV infection related hospital admission



The MATCH programme was implemented January 1st 2011. Odds ratio and 95%CI from multivariate logistic regression exploring odds of hospital admission due to CMV infection. Adjusted for gender, age and all variables shown in the figure.

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