EFFECTIVENESS OF PLATELET TRANSFUSION IN DENGUE FEVER PATIENTS: A SYSTEMATIC REVIEW

Ninu Desyarni[1*], Endang Triyanto[2]

[1]Postgraduate Nursing program, Faculty of Health Science, Universitas Jenderal Soedirman
[2]Doctor of Nursing Practice, Associate Professor at Indonesia's, Universitas Jenderal Soedirman

Corresponding Author: endang.triyanto@unsoed.ac.id

Disubmit: 12 Desember 2024 Diterima: 28 Juli 2025 Diterbitkan: 01 Agustus 2025
Doi: https://doi.org/10.33024/mahesa.v5i8.18717

ABSTRACT

Dengue fever is a global health concern characterized by severe thrombocytopenia and an increased risk of bleeding. Platelet transfusion is often used to manage thrombocytopenia, but its effectiveness remains uncertain. This review aims to evaluate the efficacy of platelet transfusion in preventing bleeding and improving clinical outcomes among dengue fever patients. A systematic search was conducted across PubMed, ScienceDirect, and Google Scholar using keywords such as “platelet transfusion,” “dengue fever,” and “thrombocytopenia.” Nine studies, including randomized controlled trials and observational studies, were analyzed for outcomes related to bleeding incidence, platelet recovery, and hospitalization duration. The findings indicate that prophylactic platelet transfusion does not significantly reduce bleeding incidence or improve recovery rates in dengue patients. It may be associated with delayed platelet recovery, prolonged hospitalization, and increased risk of adverse events.

Keywords: Dengue Fever, Platelet Transfusion, Thrombocytopenia, Bleeding, Hospitalization.

INTRODUCTION

Millions of people worldwide suffer from dengue fever each year, which is brought on by the dengue virus spread by Aedes mosquitoes. Thrombocytopenia, a sign of a severe dengue infection, raises questions about potential bleeding complications. Although platelet transfusion has been routinely used to reduce the risk of bleeding, its effectiveness and safety are still up for debate. With an emphasis on overall clinical outcomes and bleeding prevention, this review attempts to methodically assess the data regarding the efficacy of platelet transfusion in dengue fever patients.

Platelets play an important role in maintaining hemostasis by adhering to blood vessel sites and forming platelet plaques.1 Healthy individuals have blood platelet levels of 150x109 to 400x109 platelets per liter. Thrombocytopenia can cause bleeding symptoms ranging from petechiae to intracranial hemorrhage, pulmonary hemorrhage, and death (Andriastuti, 2024).

Refractory thrombocytopenia can be caused by immune and non-immune factors. Non-immune causes are more likely to cause poor post-transfusion responses. Non-immune causes should be evaluated and addressed. The most common immune cause is the presence of antibodies to human leukocyte antigens (HLA) and/or human platelet antigens (HPA). These antibodies can be formed from exposure to transfusion, pregnancy, or transplantation. Immune causes of refractory thrombocytopenia should be evaluated by identifying the presence of anti-HLA and anti-HPA antibodies. If these antibodies are identified, there are several strategies to identify compatible platelet units. One strategy is crossmatching. Donor platelets from crossmatching results can be given to patients who have anti-HLA and/or anti-HPA antibodies (Manoharan, 2016).

LITERATURE REVIEW

Platelet transfusion in dengue hemorrhagic fever (DHF) is done to increase platelet levels in the blood and prevent bleeding. Platelet transfusion is usually given if the patient's platelet levels drop drastically to below the critical limit or if the patient experiences bleeding (Asmarani, 2021).The decision to give platelet transfusion to DHF patients should be based on several factors below.

1. Platelet count. The platelet count drops quite significantly and is very low, which is around 20,000 pieces per microliter of blood (mcL).
2. Clinical signs of bleeding. DHF patients experience active bleeding, including bruising on the skin, bleeding gums, nosebleeds, or internal bleeding.
3. Other factors. The age and overall health condition of the patient can influence the decision to transfuse platelets (Kaur, 2014).

RESEARCH METHODS

Google Scholar, ScienceDirect, and PubMed were all thoroughly searched using keywords such as “platelet transfusion,” “dengue fever,” and “thrombocytopenia.” Nine studies, including randomized controlled trials and observational studies, were analyzed for outcomes related to bleeding incidence, platelet recovery, and hospitalization duration. PICO (Population = dengue fever patient, Intervention = transfusion platelet, Comparison = not given platelet transfusion, and Outcome = improve recovery rates) was the basis for the inclusion criteria. (Barker et al., 2023). Table 1 contains an overview of the research or data extraction.

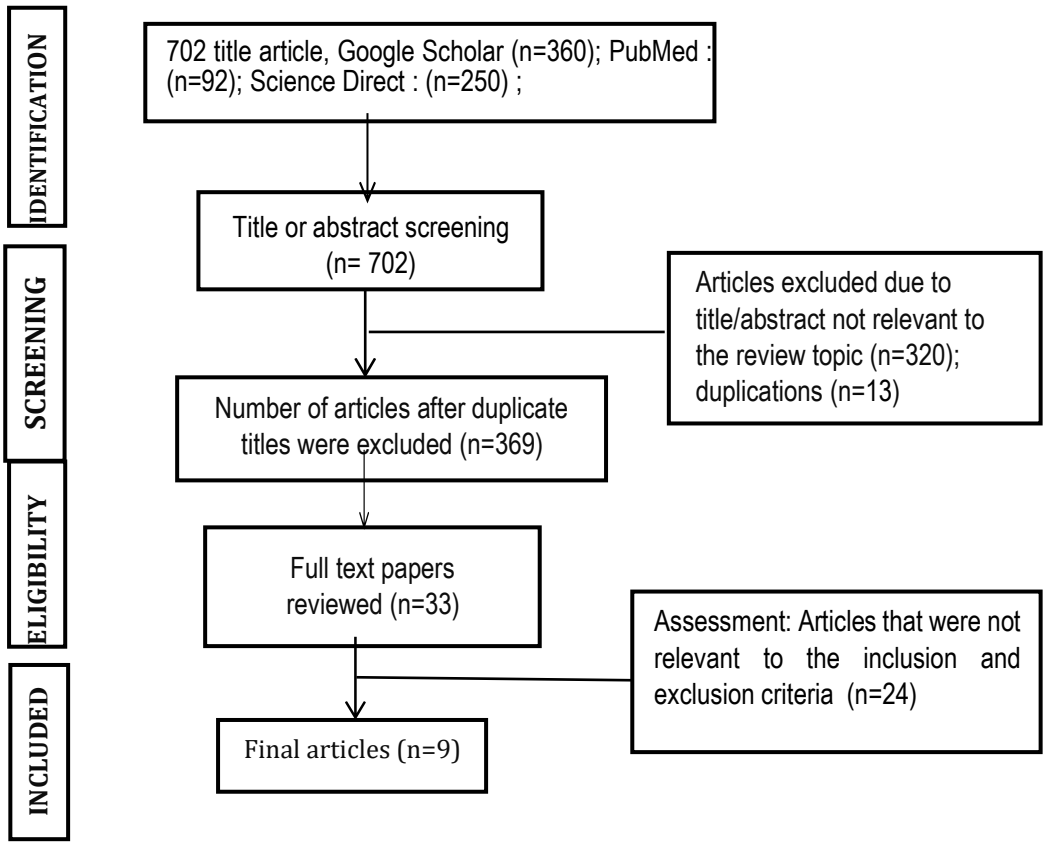

Figure 1. flowchart of PRISMA diagram

Search Strategy

A comprehensive literature search was conducted using PubMed, ScienceDirect, and Google Scholar with keywords "platelet transfusion," "dengue fever," and "thrombocytopenia." The search spanned articles published up to 2024. The inclusion criteria were:

1. Articles published in English.
2. Studies focusing on dengue fever patients receiving platelet transfusion.
3. Study designs including randomized controlled trials, cohort studies, or observational studies.
4. Reporting of relevant clinical outcomes, such as bleeding incidence, platelet recovery, and hospitalization duration.

Study Selection and Data Extraction

From 702 identified studies, 369 were screened after duplicate removal. Following title and abstract screening, 33 full-text articles were assessed for eligibility, with nine meeting the inclusion criteria. Data extraction focused on study design, population characteristics, interventions, and reported outcomes.

PRISMA Flow Diagram

1. Records identified through database searching: 702.
2. Records after duplicates removed: 369.
3. Full-text articles assessed for eligibility: 33.
4. Studies included in qualitative synthesis: 9.

Tabel 1

Title articles	Authors and year of publication	N	Design	Intervention	Tool	Outcome
Platelet Transfusion and Tranexamic Acid in the Treatment of Bleeding in Dengue Fever	(Saddique et al., 2022) Pakistan	100	*Retrospective review of patient data. Groups: Patients classified into four treatment groups (details on treatments classified but not specified in the excerpt).*	• Interventions Studied: Platelet transfusion and/or intravenous tranexamic acid	Data Collection: Review of clinical records from Jinnah Hospital, Lahore, Pakistan	Results; There was no significant difference in the median time between groups from the start of treatment to the end of bleeding (p value = 0.724). Among the side effects reported were pruritus and stomach ache. •The study found that in individuals with clinical bleeding from dengue fever, platelet transfus

					ion and/or tranexamic acid do not significantly improve standard care treatment and may even have negative side effects.
Predictors and Clinical Outcomes of Poor Platelet Recovery in Dengue	(Archuleta et al., 2020) Singapore	*The study utilized a multicenter, prospective design*	Monitoring platelet recovery in dengue patients was part of the strategy, with an emphasis on the consequences of platelet transfusion.	The study employed clinical assessments and laboratory tests to evaluate platelet counts and other baseline characteristics.	Platelet recovery and clinical outcomes associated with dengue severity, such as hospitalization duration and the occurrence of severe dengue, were the main outcomes assessed. The study found that poor platelet recovery in

						dengue patients is significantly predicted by age, white cell count, and day of illness at enrollment. Furthermore, the relationship between platelet transfusion and severe dengue was emphasized, suggesting that preventative transfusions could aid in some patients' recuperation.
Effect of Platelet Transfusion on Clot Strength in Dengue Fever with	(Sundar & Bhaskar, 2019) India	74	*This was a thromboelastography-based study that assessed the impact*	The interventions included weight-based random	The main instrument used for assessment was thromboelastography,	Following transfusion, the study assessed the

Thrombocytopenia Related Bleeding: A Thromboelastography-Based Study	*of platelet transfusions on bleeding control and clot strength*	donor platelets and single donor apheresis units.	which evaluates clot formation and strength.	patients' maximum amplitude value, which indicates the strength of the clot, and the rise in platelet count. Although platelet counts significantly increased, there was no discernible change in the strength of the clot. The study found that whereas platelet infusions increased the absolute number of platelets in dengue patients who

						experienced bleeding problems, they had no effect on the strength of the clot. Even after getting platelet transfusions, most patients still experienced bleeding.
Safety and costs of blood transfusion practices in dengue cases in Brazil	(Machado et al., 2019) Brazil	361	*Prospective observational study*	he study focused on the use of blood components in the management of dengue cases, following WHO/PAHO recommendations. First Stage: Included all dengue cases hospitalized from January to Decembe	• Structured questionnaire for data collection. Analysis of medical records from hospitalized patients with confirmed dengue diagnoses.	• 52 (16.1%) of the 323 patients received transfusions of blood components. • 25 (48%) received transfusions according to WHO recommendations (with criteria), while 27 (52%)

			r 2010 during a major epidemic. 2. Second Stage: Conducted from March 2016 to December 2017 during a non-epidemic year.	received transfusions without criteria. • Among 271 patients not transfused, 12 should have received blood components according to WHO guidelines. The study highlights discrepancies in the application of WHO recommendations for blood transfusion in dengue cases, indicating a need for improved adherence to guidelines to ensure appropri

						ate clinical management and resource utilization in the treatment of dengue patients
Prophylactic platelet transfusion plus supportive care versus supportive care alone in adults with dengue and thrombocytopenia: a multicentre, randomised controlled trial	(Lye et al., 2017) Singapore	372	*The study was a multicentre, randomised controlled trial (RCT) with an intention-to-treat analysis. (PFTC)*	The intervention involved administering prophylactic platelet transfusions (4 units of pooled platelets each day) to patients with a platelet count of 20,000 per µL or lower, in addition to supportive care.	The study utilized web-based randomisation for participant allocation and SAS version 9.3 for statistical analyses.	The primary outcomes included the occurrence of severe bleeding and the incidence of warning signs of severe dengue by day 7. The results indicated no significant difference in these outcomes between the transfusion group and the control group.
A study protocol for a randomised controlled trial evaluating clinical effects of	(Ypma et al., 2016) Netherlands	618	*Randomised, single-blinded, multicentre controlled trial*	Comparison of pathogen-reduced platelet concentrates treated by the Mirasol	Daily monitoring of bleeding symptoms; adjudication by blinded adjudicators and an automated algorithm	Primary endpoint is the percentage of patients experiencing WHO grade ≥2 bleeding complicati

platelet transfusion products: the Pathogen Reduction Evaluation and Predictive Analytical Rating Score (PREPARe S) trial.			system versus standard plasma-stored platelet concentrates		ons.
Effectiveness of Pooled Platelet Transfusion in Concordant and Discordant Groups among Dengue Patients	(Bhat et al., 2016) India	*The study utilized a randomized control trial design to evaluate the effectiveness of pooled platelet transfusions*	Patients received pooled platelet transfusions, with a focus on comparing outcomes between ABO-compatible and ABO-incompatible transfusions	Platelet counts were measured using standard laboratory techniques, and Corrected Count Increment (CCI) was calculated to assess the effectiveness of the transfusions	The study found that the median post-transfusion Platelet Count Increment (PPI) and Corrected Count Increment (CCI) were significantly higher among responders compared to non-responders. Higher post-transfusion platelet count increments were noted in recipients of ABO-compatible pooled platelet transfusions. The study

						concluded that ABO-compatible pooled platelet transfusions are more effective in increasing platelet counts in dengue patients compared to ABO-incompatible transfusions, highlighting the importance of blood group compatibility in transfusion practices for better clinical outcomes.
Potential Harm of Prophylactic Platelet Transfusion in Adult Dengue Patients	(Lee et al., 2016) Vietnames	788	*The study utilized a retrospective cohort design, analyzing clinical outcomes between patients who received prophylactic platelet transfusions and those who did not.*	The intervention was prophylactic platelet transfusion administered to patients with critically low platelet counts.	Data collection involved clinical records, which included demographic information, clinical features, laboratory results, and treatment outcomes. Statistical analyses were performed using logistic regression	The outcomes measured included: • Incidence of clinical bleeding • Platelet increment the day after transfusion • Time for platelet count to exceed 50,000/mm^3 • Length of hospital stay

					and propensity score matching	• Intensive care unit (ICU) admission • Mortality Conclusion The study concluded that prophylactic platelet transfusion in adult dengue patients with low platelet counts may not be beneficial and could potentially lead to adverse outcomes. The findings suggest a need for careful consideration of transfusion practices in this patient population.
Lack of Efficacy of Prophylactic Platelet Transfusion for Severe Thrombocytopenia in Adults with Acute Uncompli	(Lye et al., 2015) Singapore	256	*This was a retrospective cohort study conducted in the*	The intervention involved prophylactic platelet transfusion, which was defined as platelet transfusi	The study utilized medical chart reviews to extract demographic characteristics, clinical and laboratory data, as well as treatment and outcome	Patients who got transfusions and those who did not were compared for subsequent bleeding, platelet increase, and platelet recovery.

cated Dengue Infection	on given data. without clinical bleeding.	According to the results, adult dengue infection patients' bleeding could not be stopped by prophylacti c platelet transfusion . Although thrombocyt openia is frequently seen in acute dengue infections, the study found that it was not a reliable indicator of serious bleeding.

RESEARCH RESULT

Study Characteristics

The nine included studies represented a mix of randomized controlled trials (RCTs) and retrospective cohort analyses. Sample sizes ranged from 74 to 7,500 patients, and the studies were conducted in diverse settings, including Singapore, India, Brazil, and Pakistan. The study populations primarily included hospitalized dengue patients with thrombocytopenia, defined as platelet counts below 20,000/mm^3(Assir et al., 2013).

Key Findings

1. Prophylactic Platelet Transfusion:
   Several studies (e.g., Lye et al., 2016) found no statistically significant reduction in clinical bleeding rates among patients receiving prophylactic platelet transfusion compared to those managed with supportive care alone.
   In some cases, transfused patients experienced delayed platelet recovery compared to non-transfused counterparts.
2. Clinical Bleeding and Recovery:
   Transfusion often delayed platelet recovery by 1–2 days and extended hospitalization duration. For instance, patients in the transfused group in Lye et al. (2016) required an average of one additional day to achieve platelet counts above 50,000/mm^3.
3. Adverse Events:
   Adverse events such as mucosal bleeding and fluid overload were

more frequently observed in patients receiving transfusions.

Risks associated with transfusion included prolonged hospital stays and potential complications like infections or allergic reactions.

4. Subgroup Analysis:
   Outcomes varied based on baseline severity and initial platelet levels. Sundar et al. (2019) demonstrated that patients with lower baseline platelet counts (<10,000/mm^3) had marginally better responses to transfusion in terms of platelet increment but still experienced extended hospital stays(Kaur & Kaur, 2014).

The findings indicate that prophylactic platelet transfusion does not significantly reduce bleeding incidence or improve recovery rates in dengue patients. It may be associated with delayed platelet recovery, prolonged hospitalization, and increased risk of adverse events.

DISCUSSION

The findings indicate that prophylactic platelet transfusion does not offer a clear clinical benefit in managing dengue-associated thrombocytopenia. Instead, it may contribute to slower endogenous platelet production, potentially due to suppression of thrombopoietin-driven recovery. Furthermore, the additional risks associated with transfusion, such as fluid overload and increased resource utilization, highlight the need for restrictive transfusion practices.(Newland et al., 2019).

Clinical Implications

1. Restrictive Transfusion Policies:
   Platelet transfusion should be reserved for patients with active clinical bleeding or critical thrombocytopenia with imminent bleeding risk. Current evidence does not support routine prophylactic use.
2. Alternative Strategies:
   Enhanced monitoring and supportive care, including adequate hydration and management of comorbidities, may provide safer and more effective outcomes for most dengue patients.

Limitations

1. Study Design Variability:
   Differences in methodologies, including criteria for transfusion and patient management protocols, may limit the generalizability of findings.
2. Lack of Longitudinal Data:
   Few studies evaluated long-term outcomes beyond hospitalization, such as recurrence of thrombocytopenia or delayed complications.
3. Population-Specific Factors:
   Variations in healthcare infrastructure and transfusion protocols across study regions could influence outcomes.

CONCLUSION

The evidence from this systematic review suggests that platelet transfusion should not be used prophylactically in dengue fever patients with thrombocytopenia in the absence of active bleeding. Clinicians should adopt evidence-based, restrictive transfusion policies to minimize potential risks and optimize resource utilization. Further high-quality randomized controlled trials are essential to establish definitive

guidelines for platelet transfusion in dengue management.

REFERENCES

Archuleta, S., Chia, P. Y., Wei, Y., Syed-Omar, S. F., Low, J. G., Oh, H. M., Fisher, D., Ponnampalavanar, S. S. L., Wijaya, L., Kamarulzaman, A., Lum, L. C. S., Tambyah, P. A., Leo, Y. S., & Lye, D. C. (2020). Predictors And Clinical Outcomes Of Poor Platelet Recovery In Adult Dengue With Thrombocytopenia: A Multicenter, Prospective Study. *Clinical Infectious Diseases*, *71*(2), 383–389. Https://Doi.Org/10.1093/Cid/Ciz850

Andriastuti, M., Chozie, N. A., & Rahmani, S. Laporan Kasus Berbasis Bukti Efektivitas Transfusi Trombosit Hasil Uji Silang Serasi (Crossmatch) Pada Kondisi Trombositopenia Refrakter.

Asmarani, E. (2021). *Penatalaksanaan Trombositopenia Pada Pasien Dengue Hemorrhagic Fever* (Doctoral Dissertation, Stikes Insan Cendekia Medika Jombang).

Assir, M. Z. K., Kamran, U., Ahmad, H. I., Bashir, S., Mansoor, H., Anees, S. Bin, & Akram, J. (2013). Effectiveness Of Platelet Transfusion In Dengue Fever: A Randomized Controlled Trial. *Transfusion Medicine And Hemotherapy*, *40*(5), 362–368. Https://Doi.Org/10.1159/000354837

Barker, T. H., Stone, J. C., Sears, K., Klugar, M., Tufanaru, C., Leonardi-Bee, J., Aromataris, E., & Munn, Z. (2023). The Revised Jbi Critical Appraisal Tool For The Assessment Of Risk Of Bias For Randomized Controlled Trials. *Jbi Evidence Synthesis*, *21*(3), 494–506. Https://Doi.Org/10.11124/Jbies-22-00430

Bhat, A., Chowdappa, V., & Masamatti, S. S. (2016). Effectiveness Of Pooled Platelet Transfusion In Concordant And Discordant Groups Among Dengue Patients. *Journal Of Clinical And Diagnostic Research*, *10*(7), Ec21–Ec24. Https://Doi.Org/10.7860/Jcdr/2016/19278.8213

Chaudhary, R., Khetan, D., Sinha, S., Sinha, P., Sonker, A., Pandey, P., ... & Ray, V. (2006). Transfusion Support To Dengue Patients In A Hospital Based Blood Transfusion Service In North India. *Transfusion And Apheresis Science*, *35*(3), 239-244.

Kaur, P., & Kaur, G. (2014). Transfusion Support In Patients With Dengue Fever. *International Journal Of Applied And Basic Medical Research*, *4*(3), 8. Https://Doi.Org/10.4103/2229-516x.140708

Lee, T. H., Wong, J. G. X., Leo, Y. S., Thein, T. L., Ng, E. L., Lee, L. K., & Lye, D. C. (2016). Potential Harm Of Prophylactic Platelet Transfusion In Adult Dengue Patients. *Plos Neglected Tropical Diseases*, *10*(3), 1–10. Https://Doi.Org/10.1371/Journal.Pntd.0004576

Lye, D. C., Archuleta, S., Syed-Omar, S. F., Low, J. G., Oh, H. M., Wei, Y., Fisher, D., Ponnampalavanar, S. S. L., Wijaya, L., Lee, L. K., Ooi, E. E., Kamarulzaman, A., Lum, L. C., Tambyah, P. A., & Leo, Y.

S. (2017). Prophylactic Platelet Transfusion Plus Supportive Care Versus Supportive Care Alone In Adults With Dengue And Thrombocytopenia: A Multicentre, Open-Label, Randomised, Superiority Trial. *The Lancet*, *389*(10079), 1611–1618. Https://Doi.Org/10.1016/S0140-6736(17)30269-6

Lye, D. C., Lee, V. J., Sun, Y., & Leo, Y. S. (2009). Lack Of Efficacy Of Prophylactic Platelet Transfusion For Severe Thrombocytopenia In Adults With Acute Uncomplicated Dengue Infection. *Clinical Infectious Diseases*, *48*(9), 1262–1265. Https://Doi.Org/10.1086/597773

Machado, A. A. V., Negrao, F. J., Croda, J., De Medeiros, E. S., & Pires, M. A. D. S. (2019). Safety And Costs Of Blood Transfusion Practices In Dengue Cases In Brazil. *Plos One*, *14*(7), 1–14. Https://Doi.Org/10.1371/Journal.Pone.0219287

Manoharan, A., Janarthanam, V., Srivastava, R., Sowmya, S., & Gandhi, N. (2016). Effectiveness Of Platelet Transfusion In Dengue Fever. *Int J Res Rev*, *3*, 5-9.

Makroo, R. N., Raina, V., Kumar, P., & Kanth, R. K. (2007). Role Of Platelet Transfusion In The Management Of Dengue Patients In A Tertiary Care Hospital. *Asian Journal Of Transfusion Science*, *1*(1), 4-7.

Newland, A., Bentley, R., Jakubowska, A., Liebman, H., Lorens, J., Peck-Radosavljevic, M., Taieb, V., Takami, A., Tateishi, R., & Younossi, Z. M. (2019). A Systematic Literature Review On The Use Of Platelet Transfusions In Patients With Thrombocytopenia. *Hematology (United Kingdom)*, *24*(1), 679–719. Https://Doi.Org/10.1080/16078454.2019.1662200

Prashantha, B., Varun, S., Sharat, D., Murali Mohan, B. V., Ranganatha, R., Shivaprasad, & Naveen, M. (2014). Prophyactic Platelet Transfusion In Stable Dengue Fever Patients: Is It Really Necessary?. *Indian Journal Of Hematology And Blood Transfusion*, *30*, 126-129.

Ypma, P. F., Van Der Meer, P. F., Heddle, N. M., Van Hilten, J. A., Stijnen, T., Middelburg, R. A., Hervig, T., Van Der Bom, J. G., Brand, A., & Kerkhoffs, J. L. H. (2016). A Study Protocol For A Randomised Controlled Trial Evaluating Clinical Effects Of Platelet Transfusion Products: The Pathogen Reduction Evaluation And Predictive Analytical Rating Score (Prepares) Trial. *Bmj Open*, *6*(1), 1–12. Https://Doi.Org/10.1136/Bmjopen-2015-010156