

Global practice and challenges in the diagnosis and management of disseminated intravascular coagulation: communication from the ISTH SSC Subcommittee on Disseminated Intravascular Coagulation

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Abstract

Background: Despite the global burden of disseminated intravascular coagulation (DIC) and decades of scoring system development, no international assessment has evaluated current global practices among clinicians.

Objectives: To describe international diagnostic and treatment practices for DIC, identify barriers, and examine differences across country income levels.

Methods: The International Society on Thrombosis and Haemostasis (ISTH) Scientific Standardization Subcommittee on DIC conducted an international survey (March

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2024 to February 2025) to assess global diagnostic and treatment practices. Analysis was stratified by country income level based on World Bank classifications.

Results: A total of 153 clinicians from 27 countries completed the survey, with most respondents from high-income countries (64%). The most suggestive clinical features of DIC were bleeding (89%), petechiae (77%), and shock (63%). Standard laboratory tests, such as platelet count (93%), prothrombin time/international normalized ratio (85%), fibrinogen (78%), and D-dimer (76%), were commonly used; however, respondents from middle-income countries had reduced access to fibrinogen testing, serial monitoring, and advanced diagnostics. Only 28% of clinicians used a formal DIC scoring system (ISTH 21%; sepsis-induced coagulopathy 14%), despite 76% reporting familiarity with the ISTH definition. First-line management relied primarily on fresh-frozen plasma (65%), platelets (38%), and cryoprecipitate (32%), whereas middle-income clinicians more frequently used whole blood and less frequently specialized factor concentrates. Major challenges in the diagnosis and management of DIC included diagnostic uncertainty due to variable underlying disorders (59%) and a heterogeneous clinical presentation (47%). Resource limitations, including restricted laboratory testing (57%), inadequate transfusion supplies (54%), and insufficient critical care support (38%), were more frequent challenges in middle-income countries ($P < .001$ for all comparisons).

Conclusion: Despite strong global awareness, major gaps persist between recommended and real-world DIC practice, particularly in resource-limited settings. Efforts to expand access to diagnostics, strengthen transfusion and critical care networks, and support guideline-based management are needed.

KEYWORDS

blood coagulation disorders, blood transfusion, critical care, disseminated intravascular coagulation, global health

1 | INTRODUCTION

Disseminated intravascular coagulation (DIC) is a life-threatening acquired disorder with complex pathomechanistic processes that accompanies various diseases and involves systemic activation of coagulation, dysregulated fibrinolysis, and endothelial injury [1]. The International Society of Thrombosis and Haemostasis (ISTH) updated its 2001 definition of DIC [2] to the following: “An acquired, life-threatening intravascular disorder characterized by systemic coagulation activation, dysregulated fibrinolysis, and endothelial injury, resulting in microthrombosis” [3]. Although DIC develops secondary to multiple pathologies, deterioration of coagulation and endothelial injury is core to these pathologies. Severe infections, obstetrical complications, trauma, solid organ and hematologic malignancies, and various biological and chemical agents can all lead to DIC [4]. Sepsis and trauma account for most cases worldwide, yet outcomes, including mortality, vary considerably depending on the underlying disease [5]. Clinically, DIC manifests along a spectrum, from mild abnormalities in “nonovert DIC” to multiorgan dysfunction or

massive hemorrhage in “overt DIC” [3]. Thrombotic and hemorrhagic phenotypes may coexist due to widespread microvascular thrombosis, hypoperfusion, and subsequent organ injury [6].

DIC remains a diagnostic challenge due to its heterogeneous etiology and variable clinical presentation, with no single test or biomarker independently confirming the diagnosis. Multiple scoring systems developed by the ISTH, the Japanese Association for Acute Medicine, the Korean Society on Thrombosis and Hemostasis, and the Japanese Society on Thrombosis and Haemostasis incorporate various laboratory tests to support diagnosis [2,7–10]. The history of the development of these scoring systems from 1983 to 2024 has recently been reviewed [6]. Over the past 4 decades, these systems have evolved, culminating most recently in the ISTH 2025 update [3]. The revision emphasizes D-dimer, rather than fibrin/fibrinogen degradation products, as the preferred fibrin-related marker and adjusts scoring thresholds. In this revised scoring, D-dimer levels more than 3 times the upper limit of normal are assigned 2 points, while levels exceeding 7 times the upper limit receive 3 points [3]. However, except for sepsis, disease-specific

TABLE 1 Participant demographics and institutional characteristics.

	All	High income	Middle income
Characteristic	N = 153 (%)	n = 97 (%)	n = 56 (%)
Sex			
Male	79 (52)	52 (54)	27 (48)
Clinical role			
Consultant	60 (39)	33 (34)	27 (48)
Hospital-based physician	56 (37)	44 (45)	12 (21)
Specialist registrar/fellow	29 (19)	12 (12)	17 (30)
Advanced practice practitioner	8 (5)	8 (8)	0 (0)
Speciality^a			
Critical care	67 (44)	59 (61)	8 (14)
Anesthesiology	49 (32)	39 (40)	10 (18)
Hematology/transfusion	34 (22)	12 (12)	22 (39)
Obstetrics and gynecology	12 (8)	2 (2)	10 (19)
Internal medicine	8 (5)	4 (4)	4 (7)
Emergency medicine	7 (5)	5 (5)	2 (4)
Trauma/surgery	4 (3)	3 (3)	1 (2)
Other	6 (4)	4 (4)	2 (4)
Years in practice			
<5	25 (16)	20 (21)	5 (9)
5-10	39 (25)	25 (26)	14 (25)
11-15	35 (23)	19 (20)	16 (29)
16-20	16 (10)	9 (9)	7 (13)
>20	38 (25)	24 (25)	14 (25)
Region of practice			
Europe	56 (37)	49 (51)	7 (13)
North America	45 (29)	37 (38)	8 (14)
Sub-Saharan Africa	31 (20)	0 (0)	31 (55)
Asia	11 (7)	3 (3)	8 (14)
Middle East & North Africa	8 (5)	6 (6)	2 (4)
Oceania	2 (1)	2 (2)	0 (0)
Place of practice			
Tertiary healthcare	109 (71)	62 (64)	47 (84)
Type of practice			
Public	76 (50)	42 (43)	34 (61)
University-affiliated	66 (43)	49 (51)	17 (30)

(Continues)

TABLE 1 (Continued)

	All	High income	Middle income
Characteristic	N = 153 (%)	n = 97 (%)	n = 56 (%)
Private	11 (7)	6 (6)	5 (9)
Hospital bed capacity			
<200	16 (10)	6 (6)	10 (18)
200-500	31 (20)	14 (14)	17 (30)
501-1000	57 (37)	36 (37)	21 (38)
1001-2000	32 (21)	29 (30)	3 (5)
>2000	17 (11)	12 (12)	5 (9)

^a Respondents could select more than 1 option.

criteria for early-phase (nonovert) DIC remain unavailable [11]. As a result, there remains clinical uncertainty in recognizing early disease [11].

The accuracy of the 2025 scoring system depends on global standardization of D-dimer assays, which has not yet been achieved. Laboratory components of some scores are not universally accessible, and several systems lack validation in key subpopulations, such as pregnant patients [12]. Sensitivity, specificity, and predictive performance differ across scoring systems, and published studies continue to report inconsistent accuracy [13–15]. Although guidelines recommend using a structured scoring system, no consensus exists on which system best supports diagnosis or prognostication [16]. Repeat laboratory testing is also essential for monitoring disease progression, yet this requirement may be impractical in resource-limited settings.

Management of DIC similarly lacks standardization. While treating the underlying cause remains the cornerstone, such as antibiotics for sepsis-induced DIC or surgical intervention, ancillary treatment recommendations differ across guidelines. Supportive management includes blood component transfusion for bleeding complications, anticoagulation for thrombotic complications, and antifibrinolytics as required, but the evidence base is inconsistent, and real-world practice patterns are poorly defined. Additionally, it is unclear how regional differences in resource availability, laboratory capacity, and institutional protocols might inform global management practice.

Collectively, these diagnostic and therapeutic uncertainties highlight a major gap in current DIC care. Despite the global burden of DIC and decades of scoring system development, no international assessment has evaluated how clinicians currently diagnose and manage DIC, how widely scoring systems are applied, or what barriers clinicians encounter in real-world practice. To date, no DIC practice survey has been published [17]. The objectives of this survey are to examine global practices and identify challenges and barriers in the diagnosis and treatment of DIC.

2 | METHODS

This survey-based study was conducted by the ISTH Scientific Standardization Committee (SSC) on DIC. A prospective, question-based survey was designed to assess healthcare professionals' experiences in practice and the challenges associated with the diagnosis and management of DIC. This study was approved by the ISTH Executive Committee.

The 40 questions captured in the survey were developed between March and July 2024. Questions were related to individual demographics, institutional characteristics, common presentations of DIC, diagnostic scoring utilization, treatment options, and challenges faced. Individuals were eligible to complete the survey if they were a health care professional who diagnoses or manages DIC. Both physicians and advanced practice providers were eligible.

The survey was designed and administered through the Research Electronic Data Capture platform hosted by the ISTH. Efforts were made to ensure global representation. Survey dissemination occurred via the ISTH newsletter and mailing lists, was shared on the ISTH "My Community" website, and was circulated by ISTH SSC DIC members to appropriate hematology and critical care associations. The survey link was also promoted at the ISTH 2024 Congress. Previously published strategies were utilized to maximize survey response rates [18]. The survey began accepting responses on 26 March, 2024, and closed on 21 February, 2025.

Responses were summarized using descriptive statistics, and all analyses were conducted using Microsoft Excel 2019 (Microsoft Corporation). Countries were classified based on the World Bank's 2025 to 2026 income classification to assess differences in practice between high- and middle-income countries [19]. For the statistical analysis, upper-middle-income and lower-middle-income countries were grouped together as a single middle-income category. Statistical significance was assessed using chi-squared or Fisher's exact tests, as appropriate, with $P < .05$ considered statistically significant. Incomplete responses were included if sufficient data were available on an individual's practice in diagnosing and managing DIC.

3 | RESULTS

3.1 | Demographics

A total of 153 healthcare professionals completed the survey. Participant demographics and institutional characteristics are displayed in Table 1. Physicians comprised the majority (95%) of respondents. Respondents most commonly specialized in critical care (44%), anesthesiology (32%), and hematology or transfusion medicine (22%).

Participants represented 27 countries, with the highest response rates in the USA (22%) and Nigeria (20%). The full geographic distribution of respondents is depicted in Supplementary Figure S1.

Most respondents practiced in high-income countries (64%), followed by lower-middle-income (24%) and upper-middle-income (12%) countries.

3.2 | Diagnosis—signs and symptoms, investigations, and scoring

Various signs and symptoms suggest DIC, as shown in Table 2. The most reported suggestive symptoms were bleeding from orifices or puncture sites (89%) and petechiae (77%), followed by hemodynamic instability or shock (63%), bruising (55%), and limb ischemia or acrocyanosis (47%).

The majority of respondents ordered a platelet count (93%), prothrombin time/international normalized ratio (85%), fibrinogen level (78%), activated partial thromboplastin time (76%), and D-dimer (76%) in the investigation of DIC (Table 2). Respondents from middle-income countries ordered fibrinogen significantly less (89% vs 59%; $P = .003$).

Hemoglobin/hematocrit (55%) was also used to aid diagnosis, but middle-income countries used this test more often (70% vs 46%; $P < .05$). Middle-income countries also ordered more peripheral blood films (54% vs 34%; $P = .018$), bedside clotting time (45% vs 10%; $P < .001$), and abdominal ultrasounds (21% vs 5%; $P < .002$).

Notably, 88% of respondents monitored patients with serial laboratory testing, most frequently daily (42%) or twice daily (27%). A significantly lower proportion of respondents from middle-income countries monitor DIC with serial testing (77% vs 95%; $P < .001$). Respondents from middle-income countries that order repeat laboratory tests, order them less frequently compared to high-income countries. Among those who did not pursue serial testing, the most common reasons are financial and resource limitations. Respondents from middle-income countries more often reported financial constraints and resource/laboratory logistics as barriers to repeat testing.

Despite widespread familiarity with the 2001 ISTH SSC definition of DIC (76%), only 28% of respondents reported using a formal scoring system, with the ISTH (21%) and Sepsis-Induced Coagulopathy (14%) scoring systems being the most common (Table 3). Similarly, only 42% of respondents indicated adherence to national or international guidelines. There was no difference in the use of diagnostic scores and treatment guidelines for DIC between high- and middle-income countries.

3.3 | Therapeutic management and treatment challenges

First-line blood product and component management of DIC is displayed in Table 4. First-line treatment of DIC included fresh-frozen plasma (65%), platelets (38%), cryoprecipitate (32%), and whole blood (24%). Fibrinogen concentrate (26%), coagulation factor concentrates (13%), and prothrombin complex concentrate (10%) were less frequently used. Middle-income countries reported significantly

TABLE 2 Investigations and diagnosis of suspected or evident disseminated intravascular coagulation.

	All	High income	Middle income	
Characteristic	N = 153 (%)	n = 97 (%)	n = 56 (%)	P value
Signs or symptoms that suggest DIC ^a				
Bleeding from orifices	136 (89)	84 (87)	52 (93)	.014
Petechiae	118 (77)	74 (76)	44 (79)	
Shock	97 (63)	62 (64)	35 (64)	
Bruising	84 (55)	53 (55)	31 (55)	
Acrocyanosis/limb ischemia	72 (47)	53 (55)	19 (34)	
Altered consciousness	46 (30)	25 (26)	21 (38)	
Fever	41 (27)	21 (22)	20 (36)	
Chest pain	18 (12)	12 (12)	6 (11)	
Investigations ordered ^a				
Platelet count	142 (93)	90 (93)	52 (93)	<.001
PT/INR	130 (85)	83 (86)	47 (84)	
Fibrinogen	119 (78)	86 (89)	33 (59)	
APTT	117 (76)	74 (76)	43 (77)	
D-dimer	116 (76)	75 (77)	41 (73)	.005
Hemoglobin, hematocrit	84 (55)	45 (46)	39 (70)	
Renal function	64 (42)	37 (38)	27 (48)	
Infection screen	63 (41)	36 (37)	27 (48)	.018
Peripheral blood film	63 (41)	33 (34)	30 (54)	
Thrombin time	54 (35)	36 (37)	18 (32)	
Liver function tests	52 (34)	29 (30)	23 (41)	<.001
Antithrombin	45 (29)	32 (33)	13 (23)	
Bedside clotting time	35 (23)	10 (10)	25 (45)	
Abdominal ultrasound	17 (11)	5 (5)	12 (21)	.002
Monitor DIC with serial laboratory testing				<.001
Yes	135 (88)	92 (95)	43 (77)	.002
If yes, how often do you repeat testing				
Twice daily	36 (27)	29 (32)	7 (17)	
Daily	56 (42)	39 (43)	17 (40)	
Every other day	13 (10)	3 (3)	10 (24)	
Individualized protocol	27 (20)	20 (22)	7 (17)	
If no, why don't you repeat testing? ^a				.035
Financial constraint	12 (71)	1 (25)	11 (85)	
Resource/laboratory logistics	6 (35)	1 (25)	5 (38)	
Limited utility of repeat testing	2 (12)	2 (50)	0 (0)	
Do you look out for nonovert or chronic DIC				<.001
Yes	54 (35)	32 (33)	22 (39)	

APTT, activated partial thromboplastin time; DIC, disseminated intravascular coagulation; INR, international normalized ratio; PT, prothrombin time.

^a Respondents could select >1 option.

TABLE 3 Diagnostic scoring and treatment guidelines.

	All	High income	Middle income	
Characteristic	N = 153 (%)	n = 97 (%)	n = 56 (%)	P value
Do you score patients with DIC?				
Yes	43 (28)	28 (29)	15 (27)	
Which scoring system do you use?				
ISTH	32 (21)	24 (25)	8 (14)	
SIC score	22 (14)	15 (15)	7 (13)	
Quick DIC score	12 (8)	8 (8)	4 (7)	
Chinese Diagnostic Scoring System	5 (3)	2 (2)	3 (5)	
JAAM	5 (3)	3 (3)	2 (4)	
JMHW	5 (3)	2 (2)	3 (5)	
JSTH	4 (3)	2 (2)	2 (4)	
Do you follow any national or international guidelines for DIC management?				
Yes	64 (42)	42 (43)	22 (39)	

DIC, disseminated intravascular coagulation; ISTH, International Society on Thrombosis and Haemostasis; JAAM, Japanese Association for Acute Medicine; JMHW, Japanese Ministry of Health, Labour and Welfare; JSTH, Japanese Society on Thrombosis and Haemostasis; SIC, sepsis-induced coagulopathy.

higher use of whole blood (41% vs 14%; $P < .001$) and lower use of prothrombin complex concentrates (2% vs 15%; $P = .010$) and fibrinogen concentrate (11% vs 35%; $P < .001$). Although only 22% reported using anticoagulation as a first-line treatment, in non-bleeding DIC, a majority (40%) utilized anticoagulants at prophylactic (52%) or therapeutic (28%) doses at some point during DIC management (Table 5).

Most respondents used transfusion thresholds guided by both hemoglobin and platelet levels (56%; Table 5). A hemoglobin threshold of 70 g/L was the most common trigger (59%) for red blood cell transfusion. A platelet-based threshold of $20 \times 10^9/L$ was the most common trigger (43%) for a platelet transfusion. Respondents from middle-income countries reported using a platelet-based threshold significantly more than high-income countries. Triggers

TABLE 4 First-line blood product and component management of disseminated intravascular coagulation.

	All	High income	Middle income	
Characteristic	N = 152 (%)	n = 96 (%)	n = 56 (%)	P value
Blood product				
Whole blood	36 (24)	13 (14)	23 (41)	<.001
Platelet	57 (38)	37 (39)	20 (36)	
Plasma (FFP)	99 (65)	64 (67)	35 (63)	
Cryoprecipitate	48 (32)	34 (35)	14 (25)	
Blood component				
Prothrombin complex concentrate	15 (10)	14 (15)	1 (2)	.010
Fibrinogen concentrate	40 (26)	34 (35)	6 (11)	<.001
Coagulation factors	19 (13)	13 (14)	6 (11)	
Antithrombin	13 (9)	12 (13)	1 (2)	.032
Other agents				
rFVIIa	6 (4)	4 (4)	2 (4)	
Antifibrinolytics	24 (16)	15 (16)	9 (16)	
Anticoagulation (UFH/LMWH)	34 (22)	26 (27)	8 (14)	

FFP, fresh-frozen plasma; LMWH, low-molecular-weight heparin; rFVIIa, recombinant factor VIIa; UFH, unfractionated heparin.

TABLE 5 Principles of therapeutic management in disseminated intravascular coagulation.

	All	High income	Middle income	
Characteristic	N = 151 (%)	n = 96 (%)	n = 55 (%)	P value
What is your trigger for blood product transfusion?				.008
Low hemoglobin	56 (37)	44 (46)	12 (22)	
Low platelet	10 (7)	7 (7)	3 (5)	
Both	85 (56)	45 (47)	40 (73)	
Hemoglobin-based transfusion threshold, g/L	n = 147 (%)	n = 93 (%)	n = 54 (%)	<.001
60	2 (1)	0 (0)	2 (4)	
70	87 (59)	65 (70)	22 (41)	
80	44 (30)	26 (28)	18 (33)	
100	9 (6)	1 (1)	8 (15)	
Other	5 (3)	1 (1)	4 (7)	
Platelet-based transfusion threshold	n = 150 (%)	n = 96 (%)	n = 54 (%)	.004
20 × 10 ⁹ /L	64 (43)	46 (48)	18 (33)	
21-50 × 10 ⁹ /L	57 (38)	35 (36)	22 (41)	
Transfused independent of platelet count	15 (10)	3 (3)	12 (22)	
Other	14 (9)	12 (13)	2 (4)	
When do you transfuse FFP, Cryo, or FC^a	n = 150 (%)	n = 96 (%)	n = 54 (%)	
Serious bleeding	103 (69)	71 (74)	32 (59)	
Fibrinogen < 0.5 g/L	77 (51)	58 (60)	19 (35)	.003
Individualized protocol	52 (35)	36 (38)	16 (30)	
Significantly elevated APTT	41 (27)	22 (23)	19 (35)	
Anticoagulants for DIC beyond VTE prophylaxis	n = 150 (%)	n = 96 (%)	n = 54 (%)	
Yes	61 (41)	38 (40)	23 (43)	
If yes, what dose?	n = 58	n = 36 (%)	n = 22 (%)	
Prophylactic	30 (52)	15 (42)	15 (68)	
Therapeutic	16 (28)	12 (33)	4 (18)	
Intermediate	12 (21)	9 (25)	3 (14)	
If yes, which anticoagulant?	n = 60	n = 37 (%)	n = 23 (%)	
LMWH	29 (48)	16 (43)	13 (57)	
UFH	20 (33)	15 (41)	5 (22)	
DOAC	3 (5)	0 (0)	3 (13)	
Antithrombin	8 (13)	6 (16)	2 (9)	

APTT, activated partial thromboplastin time; Cryo, cryoprecipitate; DIC, disseminated intravascular coagulation; DOAC, direct oral anticoagulant; FC, fibrinogen concentrate; FFP, fresh-frozen plasma; LMWH, low-molecular-weight heparin; UFH, unfractionated heparin; VTE, venous thromboembolism.

^a Respondents could select >1 option.

for plasma or cryoprecipitate transfusion included serious bleeding (69%) and laboratory-defined fibrinogen thresholds, with < 0.5 g/L as a common cutoff. Consultation practices, including the services consulted, are reported in the [Supplementary Table](#).

Finally, respondents identified several diagnostic and therapeutic challenges in their practices ([Table 6](#)). Most found DIC diagnosis difficult due to its association with multiple underlying disorders

(59%), variable clinical presentation (47%), and a lack of a consensus scoring system (25%). Compared with high-income countries, a significantly higher proportion of respondents from middle-income countries reported test costs and limited availability (57% vs 20%; $P < .001$), a lack of transfusion supply (54 vs 7%; $P < .001$), and a lack of critical care support (38% vs 0%; $P < .001$) as challenges in the management of DIC.

TABLE 6 Challenges in diagnosing and managing DICdisseminated intravascular coagulation.

	All	High income	Middle income	
Category	N = 153 (%)	n = 97 (%)	n = 56 (%)	P value
Challenges faced in diagnosing and/or managing DIC in the participant region ^a				
Caused by a variety of disorders	90 (59)	66 (68)	24 (43)	.002
Variety of clinical manifestations	72 (47)	50 (52)	22 (39)	
No specific treatment	61 (40)	40 (41)	21 (38)	
Complex complications	53 (35)	32 (33)	21 (38)	
Diagnostic testing constraints (cost/availability)	51 (33)	19 (20)	32 (57)	<.001
Lack of consensus on a diagnostic scoring system	39 (25)	24 (25)	15 (27)	
Lack of transfusion support or supply	37 (24)	7 (7)	30 (54)	<.001
Low sensitivity and specificity of diagnostic criteria	28 (18)	18 (19)	10 (18)	
Lack of critical care support	21 (14)	0 (0)	21 (38)	<.001
Lack of specialists	17 (11)	8 (8)	9 (16)	

DIC, disseminated intravascular coagulation.

^a Respondents could select >1 option.

4 | DISCUSSION

This survey provides an initial overview of current global practices in the diagnosis and management of DIC. Although the sample is modest, the findings highlight notable variability in both diagnostic and therapeutic strategies across countries, stratified by income level. Our data suggest practice may be influenced by uncertainty about optimal care and by differences in the availability of laboratory testing, blood products, and critical care infrastructure.

Our finding that many respondents rely primarily on clinical features such as bleeding, shock, and skin manifestations aligns with established descriptions of DIC's variable presentation [1,6]. While most clinicians routinely measure platelet count, PT/INR, fibrinogen, and D-dimer, which are central to current diagnostic frameworks [2,3,6], significant disparities emerged between high- and middle-income countries. Reduced access to fibrinogen testing, peripheral smears, and serial monitoring among middle-income respondents underscores the persistent resource limitations documented in prior assessments of DIC management in low-resource settings [11,16]. Such limitations likely contribute to delayed diagnosis and suboptimal risk stratification, reinforcing calls for simplified, resource-adapted diagnostic pathways [3,11].

Despite broad familiarity with the ISTH definition of DIC, approximately one-third of respondents reported using formal scoring systems, such as the ISTH or sepsis-induced coagulopathy scoring systems. This pattern mirrors earlier surveys highlighting slow adoption of validated diagnostic scores despite evidence of their prognostic value and performance across diverse populations [7,8,13–15]. The lack of a significant difference between high- and middle-income regions suggests that barriers to score utilization, such as complexity, perceived burden, or limited integration into clinical workflows, are global rather than resource-specific. Ongoing

efforts to improve education and awareness of the use of scoring systems [3] may help address some of these implementation gaps.

Management practices also varied considerably. Most respondents selected plasma, platelets, or cryoprecipitate as first-line therapy, consistent with current guideline recommendations emphasizing supportive transfusion based on bleeding and laboratory derangements [20–25]. However, clinicians in middle-income countries more frequently used whole blood and less frequently used factor concentrates, reflecting known disparities in access to blood components and specialized coagulation products [16,17]. The use of anticoagulation in nonbleeding DIC likewise differed, echoing the ongoing debate surrounding the benefits and risks of anticoagulation in sepsis-induced DIC [1,20,23]. The heterogeneity seen in anticoagulant use mirrors findings from both pediatric and adult surveys, suggesting persistent uncertainty, even among experienced clinicians [17,26].

Importantly, respondents identified multiple systemic challenges, including high test costs, limited laboratory capacity, transfusion shortages, and inadequate critical care support. These barriers disproportionately affect middle-income countries. These obstacles are consistent with global reports on resource-constrained DIC care and highlight the need for strategic health system strengthening [11,16]. Given the increased emphasis in updated ISTH guidance on early identification and standardized assessment of coagulopathy [3,20], improving access to essential laboratory testing and blood products is critical to narrowing global disparities in DIC outcomes.

A key limitation of our study is its relatively small sample size, which limits the ability to draw definitive conclusions about global practice patterns or international variability in the diagnosis and management of DIC. While our findings provide preliminary insights, they may not fully capture regional differences or represent all

healthcare settings. This limitation should be considered when interpreting the generalizability of our results.

Overall, our findings suggest that while survey respondents demonstrate high awareness of diagnostic principles, gaps remain between recommended and reported practice, with notable variation across resource settings. The data highlight opportunities for improved education on scoring systems, application of context-appropriate diagnostic laboratory testing and algorithms, and alignment of transfusion and critical care practices with available resources, particularly in middle-income countries. International collaboration and larger, more representative studies are needed to validate these observations and to assess emerging diagnostic tools, including biomarkers and artificial intelligence-based risk models, which have the potential to support real-time decision-making and refine phenotyping.

AUTHOR CONTRIBUTIONS

T.U.N. and M.O. devised the project. T.U.N., O.I.H., and M.O. designed the survey, conducted data analysis, and wrote the manuscript. All authors constructed and reviewed the survey questions, reviewed the data, and critiqued the manuscript.

DECLARATION OF COMPETING INTERESTS

There are no competing interests to disclose.

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REFERENCES

- [1] Iba T, Helms J, Connors JM, Levy JH. The pathophysiology, diagnosis, and management of sepsis-associated disseminated intravascular coagulation. *J Intensive Care*. 2023;11:24.
- [2] Taylor FB Jr, Toh CH, Hoots WK, Wada H, Levi M. Scientific Subcommittee on Disseminated Intravascular Coagulation (DIC) of the International Society on Thrombosis and Haemostasis (ISTH). Towards definition, clinical and laboratory criteria, and a scoring system for disseminated intravascular coagulation. *Thromb Haemost*. 2001;86:1327–30.
- [3] Iba T, Levy JH, Maier CL, Helms J, Umemura Y, Moore H, Othman M, Thachil J, Connors JM, Levi M, Scarlatescu E. Updated definition and scoring of disseminated intravascular coagulation in 2025: communication from the ISTH SSC Subcommittee on Disseminated Intravascular Coagulation. *J Thromb Haemost*. 2025;23:2356–62.
- [4] Squizzato A, Gallo A, Levi M, Iba T, Levy JH, Erez O, Ten Cate H, Solh Z, Gando S, Vicente V, Di Nisio M. Underlying disorders of disseminated intravascular coagulation: communication from the ISTH SSC Subcommittees on Disseminated Intravascular Coagulation and Perioperative and Critical Care Thrombosis and Hemostasis. *J Thromb Haemost*. 2020;18:2400–7.
- [5] Umemura Y, Scarlatescu E, Nwagha TU, Levy JH, Othman M, Moore H, O'Reilly D, Helms J, Iba T. Mortality, diagnosis, and etiology of disseminated intravascular coagulation - a systematic review and meta-analysis: communication from the ISTH SSC Subcommittee on Disseminated Intravascular Coagulation. *J Thromb Haemost*. 2025;23:2663–79.
- [6] Yang H, Ma X, Li X. The diagnosis of DIC: a current overview. *Front Med (Lausanne)*. 2025;12:1502628. <https://doi.org/10.3389/fmed.2025.1502628>
- [7] Toh CH, Hoots WK. SSC on Disseminated Intravascular Coagulation of the ISTH. The scoring system of the Scientific and Standardisation Committee on Disseminated Intravascular Coagulation of the International Society on Thrombosis and Haemostasis: a 5-year overview. *J Thromb Haemost*. 2007;5:604–6.
- [8] Gando S, Iba T, Eguchi Y, Ohtomo Y, Okamoto K, Koseki K, Mayumi T, Murata A, Ikeda T, Ishikura H, Ueyama M, Ogura H, Kushimoto S, Saitoh D, Endo S, Shimazaki S, Japanese Association for Acute Medicine Disseminated Intravascular Coagulation (JAAM DIC) Study Group. A multicenter, prospective validation of disseminated intravascular coagulation diagnostic criteria for critically ill patients: comparing current criteria. *Crit Care Med*. 2006;34:625–31.
- [9] Kobayashi N, Maekawa T, Takada M, Tanaka H, Gonmori H. Criteria for diagnosis of DIC based on the analysis of clinical and laboratory findings in 345 DIC patients collected by the Research Committee on DIC in Japan. *Bibl Haematol*. 1983;265–75.
- [10] Lee JH, Song JW, Song KS. Diagnosis of overt disseminated intravascular coagulation: a comparative study using criteria from the International Society versus the Korean Society on Thrombosis and Hemostasis. *Yonsei Med J*. 2007;48:595–600.
- [11] Iba T, Umemura Y, Watanabe E, Wada T, Hayashida K, Kushimoto S. Japanese Surviving Sepsis Campaign Guideline Working Group for disseminated intravascular coagulation. Diagnosis of sepsis-induced disseminated intravascular coagulation and coagulopathy. *Acute Med Surg*. 2019;6:223–32.
- [12] Erez O, Othman M, Rabinovich A, Leron E, Gotsch F, Thachil J. DIC in pregnancy – pathophysiology, clinical characteristics, diagnostic scores, and treatments. *J Blood Med*. 2022;13:21–44.
- [13] Kiya GT, Abebe G, Mekonnen Z, Tadasa E, Milkias G, Asefa ET. A comparison of disseminated intravascular coagulation scoring systems and their performance to predict mortality in sepsis patients: a systematic review and meta-analysis. *PLoS One*. 2025;20:e0315797.
- [14] Zafar A, Naeem F, Khalid MZ, Awan S, Riaz MM, Mahmood SBZ. Comparison of five different disseminated intravascular coagulation criteria in predicting mortality in patients with sepsis. *PLoS One*. 2024;19:e0295050. <https://doi.org/10.1371/journal.pone.0315797>
- [15] Helms J, Severac F, Merdji H, Clere-Jehl R, François B, Mercier E, Quenot JP, Meziani F. CRICS TRIGGERSEP Group (Clinical Research in Intensive Care and Sepsis Trial Group for Global Evaluation and Research in Sepsis). Performances of disseminated intravascular coagulation scoring systems in septic shock patients. *Ann Intensive Care*. 2020;10:92.
- [16] Wada H, Matsumoto T, Yamashita Y. Diagnosis and treatment of disseminated intravascular coagulation (DIC) according to four DIC guidelines. *J Intensive Care*. 2014;2:15.
- [17] Solh Z, Rajagopal R, Thachil J, Chan AK, Monagle P. International survey of the management of disseminated intravascular coagulation among pediatric and neonatal health care practitioners. *J Pediatr Hematol Oncol*. 2023;45:e784–8. <https://doi.org/10.1097/MPH.0000000000002703>
- [18] Edwards P, Roberts I, Clarke M, DiGuseppi C, Pratap S, Wentz R, Kwan I, Cooper R. Methods to increase response rates to postal

- questionnaires. *Database Syst Rev*. 2007;MR000008. <https://doi.org/10.1002/14651858.MR000008.pub3>
- [19] World Bank. World Bank country and lending groups: country classification. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>; 2025. [accessed December 4, 2025].
- [20] Iba T, Levi M, Thachil J, Helms J, Scarlatescu E, Levy JH. Communication from the Scientific and Standardization Committee of the International Society on Thrombosis and Haemostasis on sepsis-induced coagulopathy in managing sepsis. *J Thromb Haemost*. 2023;21:145–53.
- [21] Levi M, Toh CH, Thachil J, Watson HG. Guidelines for the diagnosis and management of disseminated intravascular coagulation. British Committee for Standards in Haematology. *Br J Haematol*. 2009;145: 24–33.
- [22] Müller MCA, Meijers JC, van Meenen DM, Thachil J, Juffermans NP. Thromboelastometry in critically ill patients with disseminated intravascular coagulation. *Blood Coagul Fibrinolysis*. 2019;30:181–7.
- [23] Levi M, Scully M. How I treat disseminated intravascular coagulation. *Blood*. 2018;131:845–54.
- [24] Stanworth SJ. The evidence-based use of FFP and cryoprecipitate for abnormalities of coagulation tests and clinical coagulopathy. *Hematology Am Soc Hematol Educ Program*. 2007:179–86.
- [25] Toh CH, Alhamdi Y. Current consideration and management of disseminated intravascular coagulation. *Hematology Am Soc Hematol Educ Program*. 2013;2013:286–91.
- [26] Helms J, Iba T, Connors JM, Gando S, Levi M, Meziani F, Levy JH. How to manage coagulopathies in critically ill patients. *Intensive Care Med*. 2023;49:273–90.

SUPPLEMENTARY MATERIAL

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