

Development of a Fundamental Set of Quality Indicators for Evaluating HIV and AIDS Clinical Care: A Systematic Review

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Received May 12, 2023; Revised August 26, 2023; Accepted September 14, 2023

Cite This Paper in the Following Citation Styles

(a): [1] Tambwe Willy Muzumbukilwa, Manimani Riziki Ghislain, Edith Mofu Pascal, Rajesh Vikram Vagiri, Manimbulu Nlooto, "Development of a Fundamental Set of Quality Indicators for Evaluating HIV and AIDS Clinical Care: A Systematic Review," *Universal Journal of Public Health*, Vol. 11, No. 6, pp. 901-920, 2023. DOI: 10.13189/ujph.2023.110615.

(b): Tambwe Willy Muzumbukilwa, Manimani Riziki Ghislain, Edith Mofu Pascal, Rajesh Vikram Vagiri, Manimbulu Nlooto (2023). *Development of a Fundamental Set of Quality Indicators for Evaluating HIV and AIDS Clinical Care: A Systematic Review. Universal Journal of Public Health*, 11(6), 901-920. DOI: 10.13189/ujph.2023.110615.

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Abstract Background: Numerous authors were interested in investigating and identifying the quality indicators for assessing clinical care in HIV and AIDS management. Most of these indicators were established in developed countries settings. Nevertheless, an appropriate fundamental core set of quality indicators for assessing clinical care in HIV and AIDS management for low and middle-income countries' settings is crucial. This study aims to identify existing quality indicators for monitoring and evaluating HIV and AIDS clinical care and propose a fundamental set of quality indicators, considering indicators' local usefulness and relevance. **Methods:** The authors used CINAHL, PubMed, Google Scholar, and Cochrane database, along with the official websites of organizations dedicated to HIV and AIDS care, aiming to identify relevant articles and information about HIV and AIDS clinical care quality indicators. All studies only based on services set and/or patient insight were excluded, as well as articles without available full text. Each study was assessed using the appropriate Critical Appraisal Skills Programme. (CASP) checklist. The GRADE methodology was applied to rate the quality of evidence. **Results:** A total of 180 studies were identified through this study; among them, 20 were selected as relevant studies, and 88 AIDS

AIDS clinical care quality indicators were retrieved. These quality indicators were distributed in domains as follows: Functional organizational structure (9), initial evaluation and diagnosis (14), screening for opportunistic diseases (17), prevention (7), immunization (5), HIV monitoring (20), and therapy (16). **Conclusions:** In summary, developing a core set of quality indicators for assessing AIDS clinical care is important in promoting high-quality healthcare services. It can help to standardize the evaluation of care quality, promote transparency and accountability, and identify areas where improvements are needed. However, careful consideration must be given to ensure that the indicators chosen are relevant, feasible, and reliable.

Keywords Observational Studies, Quality Indicator, HIV and AIDS

Systematic review registration: PROSPERO CRD42022353675

1. Introduction

The availability of more active regimen treatments for individuals living with HIV prompted a growing interest in evaluating the overall quality of care provided to this population [1]. Donabedian [2] defined **quality of care** as the degree of attention given to each patient's unique needs, highlighting the common limitation of healthcare evaluations that only describe the actions taken without considering their impact on health or the degree to which they meet patient needs. The Institute of Medicine in the United States of America (USA) considers that quality of care is the degree to which health services, both for individual patients and populations, enhance health outcomes while remaining aligned with contemporary professional knowledge [3]. This evaluation can be accomplished through measures that assess the extent of the quality of care.

Mainz [4] defines **indicators** as tools used to monitor, evaluate, and improve the quality of patient care, clinical support services, and organizational functions that influence patient outcomes.

In evaluating and improving healthcare quality, Donabedian [5] proposed a three-component structure, process, and outcome approach. According to Donabedian, "structure" refers to the characteristics of the care setting, including financial, material, intellectual, and human resources. "Process" encompasses all the activities and components involved in delivering care, using resources to improve care quality and clinical and organizational processes. Lastly, "outcome" refers to the effects of healthcare on patients' health status and the population as a whole [6]. Thus, applying Donabedian's three-component approach to the evaluation of HIV and AIDS clinical care would involve assessing the adequacy and accessibility of resources and services (structure), the consistency and appropriateness of healthcare activities (process), and the effectiveness and impact of healthcare interventions (outcome). This approach can provide a comprehensive

assessment of the quality of HIV and AIDS clinical care and help identify areas for improvement. The author contends that measures of structure affect measures of process and outcome and that efforts to enhance healthcare systems and patient health outcomes are influenced by local political (public health policies), social (community engagement), cultural (education and awareness), and institutional factors (access to care, funding, quality of care) [7].

Overall, developing a core set of quality indicators for assessing HIV and AIDS clinical care can be used to improve the overall quality of care provided to this population by identifying gaps in care, setting performance goals, and monitoring progress. By using these indicators to guide their practice, healthcare providers can work to ensure that patients living with HIV and AIDS receive high-quality care that meets their needs. These indicators can help healthcare providers identify areas for improvement and ensure that patients receive the best possible care.

1.1. Methods for Developing and Validating Quality Indicators

Mainz [4] outlined a six-step process for developing high-quality clinical indicators. These steps include identifying the clinical area under assessment, assembling a measurement team, reviewing existing evidence and practices, selecting appropriate clinical indicators and standards, designing measure specifications, and conducting a pilot test. The objective of the pilot test is to discern the domains that necessitate additional elaboration of the quality measures. On the other hand, the validation process gauges the extent to which an indicator measure effectively captures its intended construct, i.e., whether the measured outcomes correspond to the genuine condition of the phenomenon under scrutiny, as depicted in Figure 1.

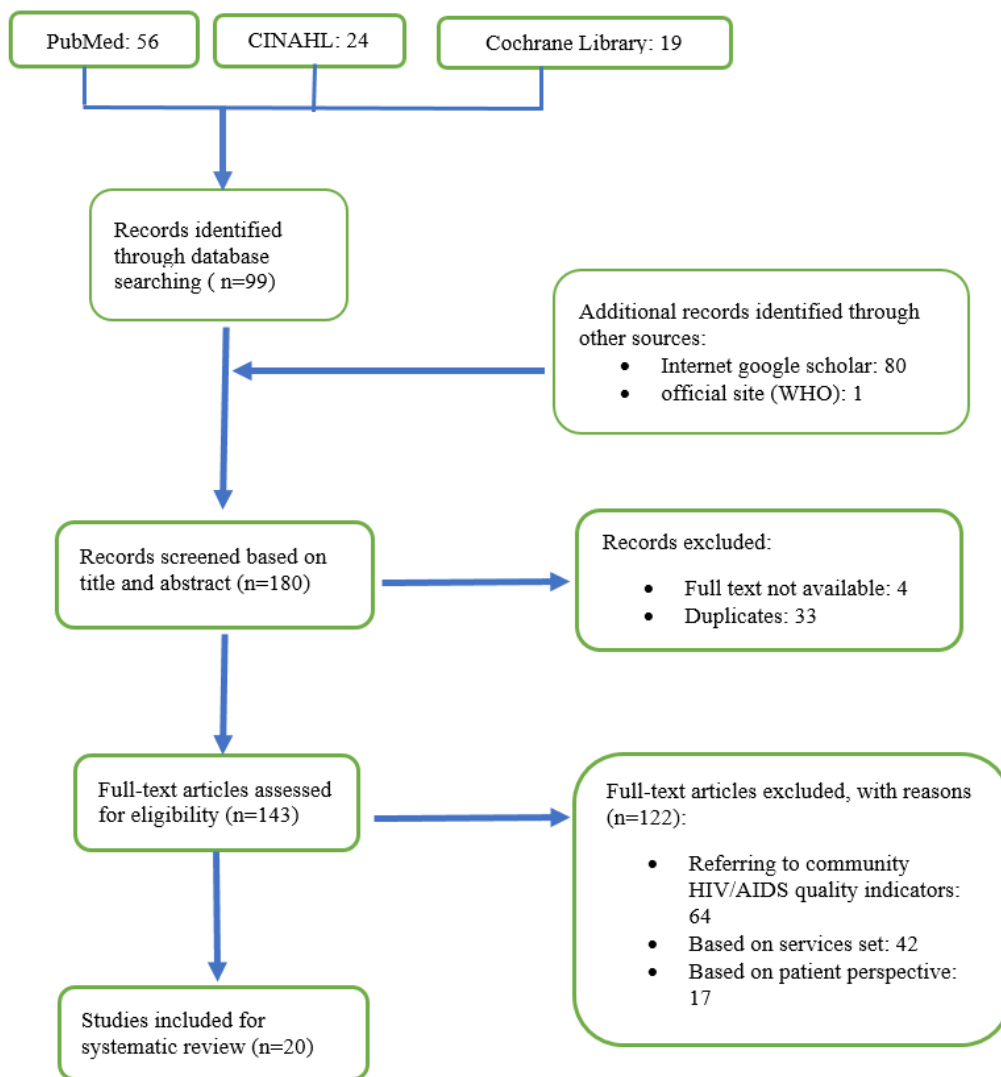


Figure 1. Flowchart for the search selection of studies for systematic review

Additionally, the author asserted that quality indicators must meet certain critical characteristics to be deemed ideal. These critical characteristics include validity, reliability, relevance, feasibility, applicability to clinical practice, evidence-based, high sensitivity and specificity, comparability, and discriminative ability.

In response to the ongoing global burden of HIV and AIDS, evaluating the quality of clinical care remains a key priority. Quality indicators are essential tools for measuring the effectiveness of healthcare interventions and facilitating quality improvement initiatives [8]. Numerous investigations were conducted to identify the quality indicators for clinical practice performance and the enhancement of HIV and AIDS care. In this context, Agins et al. [9] established a set of metrics that evaluate HIV and AIDS clinical care through tuberculosis screening, prophylactic therapy, and pneumocystis prophylaxis. et al. [10] introduced and delineated metrics that appraise clinical care predicated on viral load and CD4+ count, which gauge the patient's progression. Badri and Wood

[11] presented an argument and demonstrated the significance of indicators that rely on the total lymphocyte count as a means of monitoring highly active antiretroviral therapy in resource-constrained environments. In 2010, the Spanish Study Group on AIDS (Grupo Español de Estudio de SIDA), also known as GESIDA, undertook the validation of 22 quality indicators aimed at evaluating clinical care for HIV/AIDS, which were derived from the clinical practice guidelines as outlined by Von Wichmann et al. [12]. Catumbela et al. [13] identified a fundamental group of indicators employed for monitoring and evaluating inpatient and outpatient clinical care of individuals living with HIV and AIDS. These indicators were selected based on their clinical significance and practical usefulness within the healthcare contexts of the United States and Spain. Delgado-Mejia et al. [14] identified quality indicators related to mortality and hospital admission within the GeSIDA framework. These indicators were linked with delayed diagnosis, routine monitoring, infection

prevention, and management of comorbidities. In their 2020 study, Gimeno-Garcia et al. [15] evaluated the adherence to quality indicators as determined by GeSIDA in a cohort of individuals living with HIV. The study also examined the potential impact of such indicators on patient satisfaction. This investigation revealed that compliance levels with the quality indicators were generally high, and patient satisfaction with healthcare was also found to be satisfactory. Notably, the study found a limited association between adherence to quality indicators and patient-reported satisfaction.

Furthermore, the Department of Health in Washington instituted some metrics to assess the quality of care provided for HIV and AIDS patients in relation to prevention, treatment, and clinical services. These indicators can be readily accessed via the following webpage: <http://kff.org/state-category/hivaids/>.

Therefore, most of these indicators were established in developed countries settings. Few studies to improve the quality of HIV and AIDS care in developing countries only assessed the processes and failed to provide interventions to reduce the negative care outcome [16]. However, the lack of standardized and appropriate quality indicators for HIV and AIDS care posed a significant challenge to quality assessment and improvement efforts. This systematic review aims to address this gap by identifying existing quality indicators that are evidence-based and employed for monitoring and evaluating HIV and AIDS clinical care. Through observational studies, we proposed a fundamental core set of indicators, considering the local usefulness and relevance of indicators.

2. Materials and Methods

This systematic review was reported following an updated guideline for reporting Systematic Reviews (PRISMA 2020) checklist [17].

Population: Articles and scientific reports that set up an academic standard of quality indicators for HIV and AIDS in the clinical care setting.

Intervention: Search and identify articles and information on quality indicators for monitoring and evaluating HIV and AIDS clinical care.

Comparison: N/A

Outcome: Develop a core set of quality indicators for assessing HIV and AIDS clinical care.

2.1 Information Sources and Search Strategy for Identifying Relevant Studies

A comprehensive investigation of quality indicators related to clinical care for HIV and AIDS and the development and validation methods utilized for these indicators was undertaken through a systematic review of observational studies. Electronic databases such as CINAHL, PubMed, and the Cochrane Library, along with

official websites of organizations specializing in HIV and AIDS care, were scoured without restrictions based on language and Geographical limits. Additionally, a Google Scholar search was conducted. Our study employed peer-reviewed articles as a means to identify eligible studies. We developed and implemented a search strategy based on relevant terms and Medical Subject Headings (MeSH) to accomplish this. Specifically, we utilized a combination of key search terms, including "observational studies," "quality indicators," "validation study," and "HIV and AIDS" to search for publications related to HIV and AIDS clinical care quality indicators. The primary search strategy was conducted via PubMed and is detailed in Table 1. This approach was adapted for use in other databases. Additionally, we performed a manual search that involved reviewing the reference lists of eligible papers and relevant review articles.

Table 1. PubMed search query

Search	Query	Items found
#6	#1 AND #2 AND #3 AND #4 AND #5	28,904
#5	AIDS	14,719
#4	HIV	24,686
#3	Validation study	3,260
#2	Quality indicators	17,024
#1	Observational study	74,193

2.2. Study Eligibility Criteria

2.2.1. Inclusion Criteria

All studies, regardless of language, were included in the systematic review if they satisfied all the following:

- 1 Peer-reviewed literature-published articles, including scientific reports about HIV and AIDS clinical care quality indicators;
- 2 Articles that set up an academic standard of quality indicators for HIV and AIDS in the clinical care setting;
- 3 Articles that describe or validate HIV and AIDS clinical care quality indicators.

2.2.2. Exclusion Criteria

- 1 Articles on the animal study;
- 2 Studies based only on services set and/or patient insight;
- 3 All articles without available full text;
- 4 Studies that did not provide sufficient details in the methods and results sections.

2.3. Study Selection

Following removing duplicated articles, a screening process was conducted on all studies identified using

designated keywords. The inclusion criteria for this study primarily relied on titles and abstracts, except when the title failed to provide relevant information pertinent to our research. Before screening articles, a thorough analysis of full-text articles was performed per the predetermined inclusion criteria. Ultimately, articles meeting the aforementioned eligibility criteria were identified and incorporated into the systematic review. The inclusion of studies in the review was evaluated independently by two reviewers, and any discrepancies between the reviewers were reconciled through consensus. A flow diagram (Figure 1) depicts the review study selection process, including the total number of excluded studies and the rationale for their exclusion.

2.4. Data Collection Process

To ensure comprehensive data acquisition, the primary author developed a data extraction form using Microsoft Excel, which underwent revisions based on feedback from three distinct reviewers. Two reviewers performed independent data extraction procedures. The present study encompassed a data extraction process that incorporated essential study characteristics such as the first author's name, publication year, country of origin, study design, research objectives, number of clinical indicators, and selection criteria. Moreover, pertinent information such as its name, type (process or outcome), and validation criteria was extracted for each indicator. To address any discrepancies in the collected data, the authors resolved them through mutual discussion and consensus and, if needed, by engaging a third author as an arbitrator. However, such an intervention was ultimately unnecessary. It is important to note that no attempts were made to contact the authors for additional information.

2.5. Data Analysis

The present study entailed the determination of specific parameters for each quality indicator pertaining to HIV and AIDS clinical care. To streamline the process, we categorized similar indicators. Further, we differentiated them according to Donabedian's [5] framework of quality of care dimensions, precisely "process indicators," which pertain to the actions undertaken by healthcare providers, encompassing activities such as measurements or screenings. Conversely, "outcome indicators" refer to the results of healthcare provider actions, exemplified by

outcomes like achieving a non-detectable viral load at 48 weeks of treatment in the case of viral infections. Moreover, we assessed the endorsement of each indicator by the World Health Organization [18] and South African guidelines [19]. To create a comprehensive set of HIV and AIDS clinical care indicators, we included only those concurrently utilized in at least two studies and endorsed by both guidelines and those endorsed by both guidelines only but most relevant.

2.6. Quality Appraisal of Studies and Quality of Evidence

In this review, the quality assessment of the included studies was conducted using the Critical Appraisal Skills Programme (CASP) checklist for systematic review, cohort study, and qualitative studies [20-22]. The results were analyzed and discussed using a narrative synthesis approach. The systematic review and qualitative studies were evaluated using a checklist comprising ten questions each [20,22], while the cohort study underwent assessment based on a checklist containing 12 questions. Within the cohort study checklist, two questions were allocated a maximum score of 2 points, resulting in a total possible score of 14 points when all criteria were met [21]. Two authors independently reviewed each paper, and subsequently, all authors engaged in thorough discussions to arrive at a consensus on the assigned scores for each paper. Notably, no studies were excluded based on the quality appraisal process. The detailed CASP scores are available in Table 2 for reference.

Additionally, The Grading of Recommendation, Assessment, Development, and Evaluation (GRADE) guideline was applied to assess the quality of evidence of the review [23]. Two reviewers independently evaluated evidence quality according to Meader et al.'s GRADE checklist of questions [24,25] in 2014. In accordance with Bezerra et al. [26], the responses to these questions were expected to exhibit the following variations: 1 = yes; 0 = uncertain; -1 = no; NA1 = not evaluated; and NA2 = not applicable. In accordance with the GRADE guidelines for diagnostic test accuracy, we included the criteria of risk of bias (limitations), comparison of patients, setting, outcome across studies (indirectness of comparisons), imprecision of the results, and publication bias. As we abstained from calculating point estimates for multiple studies combined, the assessment of inconsistency was omitted (Table 3).

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Table 2. Description of studies by author, year, country, study design, objective, number of clinical care indicators, selection criteria, and CASP scores

Author	Year of publication	Country	Study design	Objective	Number of clinical care indicators	Selection criteria	CASP
Mathews et al. [19]	1997	USA	Retrospective cohort	To investigate patients whose care episode for pneumocystis pneumonia was initiated upon hospital admission, with a focus on scrutinizing both outcomes and processes of care, specifically limited to the patient-related aspects within the care episode.	11	Undefined	10/14
Wu et al. [20]	2000	USA	Review	To conduct a comprehensive examination of concepts associated with the quality of care.	17	Expert panel	8/10
Asch et al. [21]	2004	USA	Cross-sectional study	To evaluate the effectiveness of a quality improvement collaborative in improving the quality of healthcare services for individuals who are living with HIV.	12	Expert panel	9/14
Landon et al. [22]	2004	USA	Cross-sectional study	To assess the quality of care for individuals living with HIV by employing a symptom-based, patient-centered framework.	13	Expert panel	11/14
Salomon et al. [23]	2005	USA	Retrospective Cohort study	To evaluate the influence of patient volume on the quality of care provided to AIDS patients within a state's Medicaid-managed care system.	15	Guidelines	13/14
Wilson et al. [24]	2007	USA	Cross-sectional study	To ascertain the feasibility of employing a specific set of indicators as a comprehensive representation of a singular quality construct.	8	Guidelines	9/14
UNGASS et al. [25]	2008	USA	Project	To serve as a central repository of information pertaining to indicators utilized for monitoring the AIDS epidemic and the corresponding national, regional, and global response efforts.	9	Guidelines and Expert panel	8/10
Alemayehu et al. [26]	2009	Ethiopia	Cross-sectional study	To evaluate the quality of clinical care rendered to patients diagnosed with HIV at Felege Hiwot Referral Hospital.	14	Guidelines and Expert panel	12/14
Horberg et al. [27]	2010	USA	Project	To create a unified and cohesive set of HIV quality measures that are aligned with care processes and intermediate outcomes. These measures will be designed to serve the purposes of external accountability and individual quality improvement in the context of HIV care.	17	Guidelines and Expert panel	12/14
Hoskins et al. [28]	2010	Malawi	Conceptual modeling	To address the complexities involved in monitoring the progress of the treated population in low-income countries. It focuses on two primary challenges: firstly, the absence of consensus regarding suitable indicators; and secondly, the onerous burden associated with compiling and managing these indicators.	5	Expert panel	12/14
Wichmann et al. [12]	2010	Spain	Project	To develop a set of contemporary quality of care indicators tailored specifically for individuals living with HIV/AIDS.	25	Expert panel	7/10

Table 2 continued

Korthuis et al. [29]	2011	USA	Observational cohort	To investigate the effects of buprenorphine/naloxone (bup/nx) treatment on the quality of HIV care among a diverse group of patients with concurrent opioid dependence and HIV infection in a multisite cohort.	16	Guidelines and Expert panel	10/14
Thanprasertsuk et al. [30]	2012	Thailand	Program evaluation	To present a comprehensive account of the implementation experience of HIVQUAL-T in Thailand.	14	Guidelines	11/14
Ahonkhai et al. [16]	2012	USA	Review	To help care delivery programs better utilize quality improvement methods by providing them with a better ability to assess their own performance.	24	Expert panel	7/10
Catumbela et al. [13]	2013	Spain	Review	To identify and characterize clinical care indicators relevant to HIV/AIDS through a rigorous systematic literature review. Furthermore, the study aims to propose a concise model by selecting and prioritizing the most commonly employed indicators in the field.	23	Guidelines and Expert panel	
Catumbela et al. [31]	2016	Spain	Cross-sectional study.	To evaluate the clinical relevance and practice utility of quality indicators assessing HIV and AIDS clinical care from the point of view of HIV and AIDS physician experts.	21	Guidelines and Expert panel	7/10
Delgado-Mejia et al. [14]	2017	Spain	Retrospective cohort.	To determine which of GESIDA quality care indicators are associated with mortality and hospital admission and to perform a preliminary assessment of a prediction rule for mortality and hospital admission in patients on treatment and follow-up.	19	Guidelines and Expert panel	11/14
Aliyu et al. [32]	2019	Nigeria	Project	To determine the performance trend on HIV/AIDS quality management indicators of health facilities providing ART over 5 years.	10	Guidelines and Expert panel	10/14
Gimeno-Gracia et al. [15]	2020	Spain	Cross-sectional study.	To assess the level of adherence to GeSIDA Health quality indicators concerning the care provided to individuals living with HIV/AIDS. Additionally, it aims to analyze whether compliance with these standards correlates with the patients' perception of care quality, specifically gauging their satisfaction with the received healthcare services.	34	Guidelines and Expert panel	9/14
Riera et al. [33]	2022	Spain	Review	To review the main information taken into account for the update of the GESIDA PLWH quality indicators	25	Expert panel	8/10

Table 3. GRADE criteria for assessing the quality of evidence

Outcome: Develop a core set of quality indicators for assessing HIV and AIDS clinical care.		
GRADE criteria	Checklist items	GRADE evaluation
Study limitations (risk of bias)	Was random sequence generation used (i.e. no potential for selection bias)?	NA1
	Was allocation concealment used (i.e. no potential for selection bias)?	NA1
	Was there blinding of participants and practitioners (i.e. no potential for performance bias)?	NA2
	Was there blinding of the outcome assessment (i.e. no potential for detection bias)?	NA1
	Were objective outcomes used?	1
	Were more than 80% of the participants enrolled in the trial included in the analysis (i.e. no potential reporting bias)?	1
	Was the data reported consistently for the outcome of interest (i.e. no potential selective reporting)?	1
	Did the tests finish as scheduled (i.e. they did not stop early)?	1
	Was random sequence generation used (i.e. no potential for selection bias)?	NA1
Inconsistency	N/A	NA2
Indirect evidence	Does the population included in the study have applicability in the context of decision-making?	1
	Do the interventions in the studies included have applicability in the context of decision-making?	1
	Is the outcome included a surrogate outcome?	1
	Was the outcome assessment time sufficient?	NA1
	Were the conclusions based on direct comparisons?	NA2
Imprecision	Is the confidence interval for the pooled estimate (meta-analysis) consistent with benefit or risk?	NA1
	What is the magnitude of the median sample size (high: > 300 participants; intermediate: 100-300 participants; low: < 100 participants)?	NA1
	What is the magnitude of the number of studies included (large: > 10 studies; moderate: 5-10 studies; small: < 5 studies)?	Large
	Is the outcome a common event (e.g. more than 1/100 occurrences)?	1
Publication bias	Was a broad search performed?	1
	Was gray literature sought after?	1
	Were there no restrictions on study selection based on language?	1
	Is there no industry influence on the studies included in the review?	1
	Is there evidence of asymmetry in the funnel plot?	NA1
	Are there no discrepancies between the published and unpublished findings of the studies?	1

The responses are as follows: 1 = yes; 0 = uncertain; -1 = no; NA1 = not evaluated; and NA2 = not applicable

3. Results

3.1. Study Selection

The search of Pubmed, CINAHL, Cochrane, Scholar, and ISI web knowledge provided 180 citations. After adjusting for duplicates and removing four articles with full text unavailable, 143 remained. The 143 remaining citations were subjected to a comprehensive examination,

wherein the full texts were meticulously reviewed. Of these, 122 studies were deemed ineligible based on the inclusion criteria and were subsequently discarded. Among the excluded studies, 64 were disregarded as they focused on the community, 42 were excluded for being service-oriented, and 17 were based on the patient's perspective. Ultimately, 20 studies that satisfied the inclusion criteria were subsequently incorporated into the systematic review. The study selection process is visually

represented in Figure 1.

3.2. Studies Characteristics

This systematic review covered a range of 25 years between the first publication in 1997 and the last study, published in 2022. Ten studies represent experiences made in the USA [16]; [27-33]; [35,37], six in Spain [12-15]; [39,41], one in Ethiopia [34], one in Malawi [36], one in Thailand [38], and one in Nigeria [40]. According to the study design, six are cross-sectional studies that aimed to assess the clinical care given to HIV/AIDS patients [15,29,30,32,34,39], four are projects to develop HIV/AIDS quality indicators [12,33,35,40], four are reviews [13,16,28,41], three are retrospective cohorts [14,27,31], one is a program evaluation [38], one is an observational cohort [37], and one is conceptual modeling aimed to discuss the validity of indicators within routine programs and their predictive value for ART care [36]. Experts proposed several indicators through a panel; others were taken from guidelines (see Table 2).

3.3. Quality Indicators

Among the 20 selected studies, 88 clinical care quality indicators, encompassing both process and outcome measures, were extracted concerning HIV and AIDS. Of these 88 indicators, 62 pertain to process-related aspects, while the remaining 26 are associated with outcome indicators. These indicators collectively encompass various clinical care domains: Functional organizational structure (9), initial evaluation and diagnosis (14), screening for opportunistic diseases (17), prevention (7), immunization (5), HIV monitoring (20), and therapy (16). These clinical areas' boundaries are not delimited; therefore, some indicators could be easily changed from one area to another (Table 4).

3.4 Selection and Validation Methods

The utilization of a literature review as a means of identifying HIV and AIDS quality indicators was used in all studies. A subset of these studies was anchored on the established protocols articulated in national guidelines concerning managing individuals living with HIV and AIDS [13-15]; [31]; [33-35]; [37-40], or on the utilization of proficient HIV clinician panels to improve and standardize the assistance provided to people infected with

HIV [12-16]; [28-30]; [33-37]; [40,41]. However, the methods employed for quality selection are not distinctly explicated in one study (1).

Through an internet search (2), we have successfully identified an official website containing a fundamental compilation of HIV and AIDS indicators. We have selected 22 indicators for further investigation by applying our inclusion criteria. Each of these indicators was thoroughly assessed for its respective definition, measurement, data type, and level of indicator type to identify those pertinent for evaluating hospital care. Our comprehensive analysis revealed that nine quality indicators were deemed suitable for assessing clinical care relating to HIV and AIDS.

Certain indicators that were exclusively referenced in the South African guidelines for managing HIV and the WHO guidelines on HIV were incorporated into the proposed roster of essential quality indicators for assessing clinical care relating to HIV and AIDS. This is attributed to the perception that these indicators are particularly pertinent and, thus, deemed necessary to be included. Those indicators are as follows: indicators number 5 (Availability of Voluntary Medical Male Circumcision), 6 (Experience of HIV-related discrimination in healthcare settings), 7 (Conditions of privacy and structural Confidentiality), 8 (Sexual and reproductive health services, including contraception, must be integrated with HIV services), 30 (Assessment and management of depression and other mental health), 32 (Screening for cryptococcal infection and fungal prophylaxis when appropriate), 34 (Sexually transmitted disease (STD) screening), 35 (Assessment for Primary non-communicable chronic disease), 43 (Promote voluntary medical male circumcision as an additional efficacious HIV prevention), 44 (Promote the dapivirine vaginal ring as an additional prevention choice for women), and 46 (Regular physical activity for all adults on ART).

A systematic selection process was employed to identify a fundamental set of quality indicators suitable for evaluating clinical care relating to HIV and AIDS. Specifically, the process involved a rigorous assessment of indicators utilized across multiple studies, exhibited notable distinctions in scope and context, and was endorsed by both the World Health Organization (WHO) and the South African guidelines. Furthermore, emphasis was placed on prioritizing the most relevant indicators that appeared in both sets of guidelines.

Ultimately, 66 quality indicators relating to HIV and AIDS care were chosen for clinical evaluation (Table 5).

Table 4. Quality indicators for assessing HIV and AIDS clinical care by name, type, indicators, and selection criteria

N°	Indicator name	Type	WHO guidelines on HIV	South African guidelines for the management of HIV	Reference
A. Functional organizational structure					
1	Attention by specialized healthcare professionals	P	+	-	[12,15,41]**
2	Specific nursing consultation	P	-	+	[12,41]**
3	Availability of specialized pharmaceutical care for dispensing drugs	P	-	+	[12,14,15,41]**
4	Availability of diagnostic resources	P	+	+	[12,15]*
5	Availability of Voluntary Medical Male Circumcision	P	+	+	[18,19]***
6	Experience of HIV-related discrimination in healthcare settings	P	+	+	[18,19]***
7	Conditions of privacy and structural confidentiality	P	+	+	[18,19]***
8	Sexual and reproductive health services, including contraception, must be integrated with HIV services	P	+	+	[18,19]***
9	Diabetes and hypertension must be integrated with HIV services.	P	+	-	[19]
B. Initial evaluation and diagnosis					
10	Relevant anamnesis contents in the initial assessment	P	-	+	[12,31]**
11	Delay in referral to specialized care	P	+	+	[12,15,41]*
12	Late diagnosis of HIV infection in specialized care	P	+	-	[12,14,15,41]**
13	Complementary tests in the initial assessment	P	+	+	[12,14,15,41]*
14	Plasma HIV viral load (In the initial and follow-up)	P	+	+	[13-15]; [31,34]; [38-41]*
15	Determination of CD4 cell count in the initial assessment	P	+	+	[12-15]; [28,30,31,35]; [37-39]; [41]*
16	Renal basic assessment (Blood urea nitrogen and Creatinine)	P	+	+	[13,15,38,41]*
17	Bilirubin assessment	O	-	-	[13,29]
18	Calculation of body mass index (BMI)	O	+	+	[13,29,39,41]*
19	Monitor the patient's weight	P	+	+	[13,19,29,39,40]*
20	A chest X-ray was performed on the patient at the initial assessment	P	+	-	[8,39]**
21	ECG performed in patients and Cardiovascular risk assessment	P	-	+	[13,38]**
22	Health education at initial assessment	P	+	+	[15,41]*
23	Nutritional assessment and counseling at the baseline	P	+	+	[15,40]*

Table 4 continued

C. Screening					
24	Assessment of resistances in case of virologic failure	O	+	+	[14,15,41]*
25	Detection and treatment of latent tuberculosis infection (LTBI)	O	+	+	[12,13,28,29]; [31-33]; [35,37,38,41]*
26	Cervical cancer screening	P	+	+	[12,13,32,37,39,41]
27	Hepatitis C screening	P	+	+	[13,31,35,38,41]*
28	Hepatitis B screening	P	+	+	[13,31,35,40,41]*
29	Syphilis screening	P	+	+	[12,13,15,31,35]*
30	Assessment and management of depression and other mental health	O	+	+	[12,18,19]***
31	Injection drug use screening	P	+	-	[13,28,35,37]**
32	Screening for cryptococcal infection and fungal prophylaxis when appropriate	P	+	+	[18,19]***
33	High-risk sexual behavior screening	P	+	-	[13,28,36,37,41]**
34	Sexually transmitted disease (STD) screening	P	+	+	[18,19]*
35	Assessment for primary non-communicable chronic disease	P	+	+	[18,19]*
36	Screening for Anal cancer	P	-	-	[41]
37	Detection of metabolic syndrome in the HIV population	P	-	-	[15,41]
38	Evaluation of Cardiac Risk	P	+	+	[13,15,38,41]*
39	Alcohol intake assessment	P	-	-	[12,15]
40	Test for HIV, syphilis and HBsAg for all pregnant women	P	+	+	[12,41]*
D. Prevention					
41	Primary prophylaxis against Pneumocystis jiroveci in patients with <200 CD4 lymphocytes	P	+	+	[14,15,39,41]*
42	Treatment and prevention of smoking	P	-	-	[15,41]
43	Promote voluntary medical male circumcision as an additional efficacious HIV prevention	P	+	+	[18,19]***
44	Promote the dapivirine vaginal ring as an additional prevention choice for women	P	+	+	[18,19]***
45	Oral pre-exposure prophylaxis (PrEP) containing TDF as an additional prevention for people at substantial risk of HIV infection	P	+	+	[15,39,41]*

Table 4 continued

46	Regular physical activity for all adults on ART	P	+	+	[18,19]*
47	Co-trimoxazole prophylaxis for adults (including pregnant women) with severe HIV clinical disease (WHO stage 3 or 4) and/or with CD4 cell count ≤ 350 cells/mm ³	P	+	+	[15,39,41]*
<i>E. Immunisation</i>					
48	Vaccination against hepatitis A	P	-	-	[13-15]; [37,38,41]
49	Vaccination against hepatitis B	P	-	-	[13-15]; [31,35,37,38,41]
50	Vaccination against pneumococcal infection	P	+	-	[13,15,31,35,37,38,41]**
51	Vaccination against papillomavirus	P	-	-	[12,41]
52	Vaccination against Covid-19	P	+	-	[18]
<i>F. HIV monitoring</i>					
53	Evaluation of frailty in patients older than 60 years	O	+	-	[41]
54	Therapeutic conciliation in the poly-medicated patient older than 60 years	O	+	-	[41]
55	Monitoring of adverse pregnancy outcomes related to exposure to ARV drugs	O	+	+	[15,39,41]*
56	Monitoring adverse drug reactions	O	+	+	[15,39,41]*
57	Monitoring toxicity of ARVs	O	+	+	[15,41]*
58	Ultrasound control of cirrhosis	P	-	-	[15,41]
59	Patients with regular follow-up	P	+	+	[14,15,39,41]*
60	Loss to follow-up	O	-	-	[14,15]; [39-41]
61	Recovery from failed appointments	O	-	+	[12]
62	Incidence of vertical transmission	P	+	+	[12,15,39,41]*
63	The overall AIDS-related mortality rate in patients in follow-up	O	+	-	[12,15,41]**
64	Follow-up in the outpatient clinic after hospital discharge	P	-	-	[12,15,41]
65	The mortality rate due to AIDS-related causes	O	-	-	[15,41]
66	Continuing education	P	+	+	[12,15]*
67	Evidence of previous HIV serology in men who have sex with men	P	+	-	[12,41]**
68	Incidence of admissions due to AIDS-defining illnesses	O	-	+	[12,15]**
69	Patients with discharge reports after hospitalization	O	-	-	[12,15]

Table 4 continued

70	Diagnosis of HIV with previous negative serology	P	-	-	[12,15]
71	Incidence of admissions in patients under follow-up	O	-	-	[12,15]
72	Discharge reports in patients who died in the hospital	O	-	+	[15,41]**
G. Therapy					
73	Surveillance of the safety of new ARV drugs for adults	P	-	+	[19]
74	Managing pain and symptoms when appropriate.	P	+	+	[15,41]*
75	People on ART have clinical visits every 3-6 months	O	+	+	[12,13]*
76	People on ART have refills of ART lasting 3–6 months	O	+	-	[12]
77	Tenofovir prophylaxis to prevent the mother-to-child transmission of HBV	O	+	+	[12,39,41]*
78	Adaptation of the initial ART to the national antiretroviral treatment guidelines	P	+	+	[12,14,15,41]*
79	Starting ART after the first visit	P	+	+	[12,13,41]*
80	Treatment changes during the first year	O	-	+	[12,41]**
81	Specific treatment of chronic HCV hepatitis	P	+	+	[12,14,41]*
82	Undetectable viral load (<50 copies/mL) at week 48 of treatment	O	+	+	[12,14,41]*
83	Assessment of treatment adherence	O	+	+	[12,14,15]; [39-41]*
84	ART in pregnant women infected with HIV	P	+	+	[12,15,39,41]*
85	Treatment with abacavir (ABC) without previous HLA-B * 5701	P	+	+	[15,41]*
86	Initiating ART after 8 weeks from the initiation of corticosteroids treatment for patients living with HIV coinfectd with TB meningitis	O	+	+	[12,15,41]*
87	Co-management of tuberculosis with HIV treatment	P	+	+	[31,41]*
88	Initiating ART after 4–6 weeks from the initiation of antifungal treatment for patients living with HIV coinfectd with cryptococcal meningitis	P	+	-	[18]

Type of indicator: P – Process (62) and O – Outcome (26);

WHO and South African guidelines for managing HIV: (+) present; (-) absent.

Number of indicators by clinical area: A (9); B (14); C (17); D (7); E (5); F (20); G (16).

* Indicators that are in both guidelines and are used in more than one study.

** Indicators that are only in one guideline and are used in more than one study

*** Indicators that are in both guidelines only but most relevant.

Table 5. A fundamental set of quality indicators proposed for evaluating HIV and AIDS clinical care

N°	Indicator name
	<i>A. Functional organizational structure</i>
1	Attention by specialized healthcare professionals.
2	Specific nursing consultation
3	Availability of specialized pharmaceutical care for dispensing drugs.
4	Availability of diagnostic resources
5	Availability of Voluntary Medical Male Circumcision
6	Experience of HIV-related discrimination in healthcare settings
7	Conditions of privacy and structural confidentiality
8	Sexual and reproductive health services, including contraception, must be integrated with HIV services.
	<i>B. Initial evaluation and diagnosis.</i>
10	Relevant anamnesis contents in the initial assessment.
11	Delay in referral to specialized care
12	Late diagnosis of HIV infection in specialized care.
13	Complementary tests in the initial assessment.
14	Plasma HIV viral load (In the initial and follow-up).
15	Determination of CD4 cell count in the initial assessment.
16	Renal basic assessment (Blood urea nitrogen and Creatinine)
18	Calculation of body mass index (BMI)
19	Monitor the patient's weight.
20	A chest X-ray was performed on the patient at the initial assessment.
21	ECG performed in patients and Cardiovascular risk assessment.
22	Health education at initial assessment.
23	Nutritional assessment and counseling at the baseline.
	<i>C. Screening</i>
24	Assessment of resistances in case of virologic failure.

Table 5 continued

25	Detection and treatment of latent tuberculosis infection (LTBI).
26	Cervical cancer screening.
27	Hepatitis C screening.
28	Hepatitis B screening.
29	Syphilis screening.
30	Assessment and management of depression and other mental health.
31	Injection drug use screening
32	Screening for cryptococcal infection and fungal prophylaxis when appropriate
33	High-risk sexual behavior screening.
34	Sexually transmitted disease (STD) screening.
35	Assessment for primary non-communicable chronic disease.
38	Evaluation of Cardiac risk
40	Test for HIV, syphilis and HBsAg for all pregnant women.
	<i>D. Prevention</i>
41	Primary prophylaxis against <i>Pneumocystis jiroveci</i> in patients with <200 CD4 lymphocytes
42	Treatment and prevention of smoking.
43	Promote voluntary medical male circumcision as an additional efficacious HIV prevention.
44	Promote the dapivirine vaginal ring as an additional prevention choice for women.
45	Oral pre-exposure prophylaxis (PrEP) containing TDF as an additional prevention for people at substantial risk of HIV infection.
46	Regular physical activity for all adults on ART.
47	Co-trimoxazole prophylaxis for adults (including pregnant women) with severe HIV clinical disease (WHO stage 3 or 4) and/or with CD4 cell count ≤ 350 cells/mm ³
	<i>E. Immunisation</i>
50	Vaccination against pneumococcal infection.
	<i>F. HIV monitoring</i>
55	Monitoring of adverse pregnancy outcomes related to exposure to ARV drugs.
56	Monitoring adverse drug reactions.
57	Monitoring toxicity of ARVs.

Table 5 continued

59	Patients with regular follow-up
62	Incidence of vertical transmission.
63	The overall AIDS-related mortality rate in patients in follow-up.
66	Continuing education
67	Evidence of previous HIV serology in men who have sex with men
68	Incidence of admissions due to AIDS-defining illnesses
72	Discharge reports in patients who died in the hospital
	<i>G. Therapy</i>
74	Managing pain and symptoms when appropriate.
75	People on ART have clinical visits every 3-6 months.
77	Tenofovir prophylaxis to prevent the mother-to-child transmission of HBV.
78	Adaptation of the initial ART to the national antiretroviral treatment guidelines.
79	Starting ART after the first visit.
80	Treatment changes during the first year.
81	Specific treatment of chronic HCV hepatitis.
82	Undetectable viral load (<50 copies/mL) at week 48 of treatment.
83	Assessment of treatment adherence.
84	ART in pregnant women infected with HIV.
85	Treatment with abacavir (ABC) without previous HLA-B * 5701.
86	Vertical transmission incidence
87	Co-management tuberculosis with HIV treatment.

4. Discussion

This review aimed to identify existing quality indicators for monitoring and evaluating HIV and AIDS clinical care and propose a fundamental set of quality indicators, considering indicators' local usefulness and relevance. Most available studies are categorized as either process or outcome indicators, per Mainz's characterization of these terms [4]. Specifically, the concept of "process" refers to the actual methods employed in providing and receiving healthcare, while "outcomes" are intended to capture the effects of care on patients' health status and broader populations [4]. So, this review provides a comprehensive overview of the salient factors that warrant consideration in evaluating HIV clinical care. The selection methods employed, namely guidelines and expert panels, are consistent with the documented procedures delineated in the extant literature [42].

The present study identified 62 process indicators that evaluate diverse facets of clinical care pertaining to HIV and AIDS alongside 26 outcome indicators.

According to Wollersheim et al. [42], a certain discrepancy exists between the number of indicators chosen and the corresponding workload required for data collection. They argue that selecting approximately twelve clinical indicators for the care process is recommended to attain a favorable equilibrium.

To identify a fundamental suite of indicators deemed efficacious in evaluating HIV and AIDS clinical care, a comparative analysis was conducted between the quality indicators obtained from the South African guidelines and the World Health Organization. Some indicators do not doubt their relevance because they are endorsed by both South African and WHO guidelines and more than one study; For others, the difference is that they are only mentioned in one guideline; but this does not diminish their significance level.

Indicators like "relevant anamnesis contents in the initial assessment and ECG performed in patients, and Cardiovascular risk assessment" are also critical even though the WHO guidelines do not endorse them.

Another noteworthy facet of this comparison between indicator studies and guidelines is that while both guidelines endorse certain indicators, they remain unmentioned in any of the included studies. For example, "the availability of Voluntary Medical Male Circumcision and Sexual and reproductive health services, including contraception, must be integrated with HIV services" are important indicators.

However, it is important to note that developing a core set of quality indicators is not without challenges. One challenge is determining which indicators are most relevant and meaningful for HIV and AIDS patients and healthcare settings.

Table 5 has the fundamental indicators proposed to evaluate HIV and AIDS clinical care. Of 66 indicators selected, only 16 are outcome indicators. Although it is

also recommended to obtain outcome indicators, it is not always possible because many processes contend for the same outcome [43], and surrogate measures are used due to the time needed to obtain the desired result.

Several indicators are derived through a multifaceted process encompassing multiple data elements or are subject to various factors, such as age or gender, requiring adjustment measures. Currently, hospitals encounter a significant obstacle pertaining to the caliber of data they gather [44,45].

Certain variables may contain missing values, exhibit bias due to their primary purpose, or may not be feasible to gather, posing challenges for adjusting.

However, disseminating quality indicators throughout hospitals should ensure that healthcare services are consistently provided across different settings and providers. It can also help identify areas where care improvements may be needed, improving the measurement of the HIV and AIDS care process and patient outcomes.

By analyzing the validity of the quality indicators, we found that most of the studies assess the quality of care, not the quality indicator's validity. So, evaluating each indicator's relevance, feasibility, and reliability is relevant.

5. Conclusions

We sought to identify a fundamental set of quality indicators that will provide a standardized way of measuring the quality of care across different healthcare settings and help to ensure that all patients living with HIV and AIDS receive the same level of care, regardless of where they receive treatment. The major observations of this systematic review are that many selected studies represent experiences made in USA and Spain. Nevertheless, some countries like Ethiopia, Malawi, Thailand and Nigeria were weakly represented. Evaluating HIV/AIDS clinical care must consider different domains including: Functional organizational structure, initial evaluation and diagnosis, screening for opportunistic diseases, prevention, immunization, HIV monitoring, and therapy. Sixty-six quality indicators were selected to assess HIV and AIDS clinical care.

6. Future Works

Numerous institutions have employed quality indicators related to HIV and AIDS to evaluate the standard of clinical care and facilitate comparison among caregivers. A significant amelioration in the quality of care was attained, as evidenced by the favorable outcomes obtained by some authors [15,38].

This review identified the current quality indicators used for monitoring and evaluating HIV and AIDS clinical care, considering the indicators' local usefulness and relevance. We proposed a core set of indicators through observational

studies.

The next step will consist of testing the measures with accurate data by analyzing each quality indicator's reliability and validating a fundamental set of quality indicators that can be used to assess HIV clinical care based on clinical pertinence and practical usefulness.

The review has some limitations, notwithstanding the extensive exploration of diverse databases and search terms conducted during the study. The scope of the inquiry was restricted by the limited inclusion of gray literature and the exclusion of articles without accessible full text. Notably, we are unaware of any other published systematic review that endeavors to establish a foundational set of locally relevant quality indicators for evaluating clinical care in the context of HIV and AIDS. To augment the breadth of our investigation, we incorporated insights gleaned from a range of countries, including the United States, Spain, Thailand, Ethiopia, Malawi, and pertinent organizations operating within the purview of the World Health Organization.

Authors' Contributions

TWM conducted the systematic review, conceptualized the study, participated in its design, analyzed the results, and drafted the manuscript. MRG and EMP participated in the data collection process and analysis of the results. RV participated in the study's design and revised the manuscript for its intellectual content. MN participated in conceptualizing the study, designing, and revising the manuscript for its intellectual content.

Acknowledgments

Not applicable.

Conflict of Interest Statement

The authors declare no conflict of interest.

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