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A comprehensive review of portable retinal cameras: Technical features, ai integration, and clinical potential

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ABSTRACT

Purpose: To evaluate and compare commercially available portable retinal cameras with a focus on technical specifications, clinical applications, and the integration of artificial intelligence (AI) for ophthalmic screening, especially in low- and middle-income countries (LMICs). Design: Systematic review of the literature. Methods: Systematic searches of PubMed and OpenAlex were conducted up to September 2025, without language restrictions, using terms such as portable retinal camera, handheld retinal camera, and smartphone-based fundus camera. Devices were included if they were commercially available and described in peer-reviewed publications with technical or clinical data. Prototypes and systems relying solely on external smartphone lenses without integrated optics were excluded. Data extracted included imaging specifications, ergonomics, power sources, AI functionalities, quality control features, and reported clinical applications. Devices were categorized as smartphone-attached or standalone handheld systems. Results: The search retrieved 870 records (PubMed = 277; OpenAlex = 593). After removing duplicates and screening, 509 articles were included in the review, collectively reporting on 38 portable retinal cameras, of which 17 were commercially available. The most frequently reported devices were the Volk Pictor Plus, Phelcom Eyer, Optomed Aurora, ZEISS VISUSCOUT 100, and Remidio FOP. Smartphone attached systems offered greater portability and affordability, whereas standalone handheld systems provided integrated functionality, higher imaging stability, and smoother clinical integration. AI features varied across devices, encompassing referable diabetic retinopathy detection, abnormality triage, systemic risk prediction, and automated image-quality assessment. Clinical applications extended beyond diabetic retinopathy and retinopathy of prematurity to include glaucoma, AMD, and exploratory use in systemic conditions such as sepsis and COVID-19. Conclusion: Portable retinal cameras already demonstrate clear utility in extending ophthalmic screening and diagnostic services, particularly for diabetic retinopathy and retinopathy of prematurity, while also showing potential in broader clinical and systemic applications. Their portability and cost-effectiveness make them valuable for outreach and telemedicine programs, especially in LMICs. The integration of artificial intelligence further enhances their functionality, though variability in device design, regional availability, and regulatory status highlights the need for standardized validation, recurring local assessments, and head-to-head comparative studies. Real-world evaluations remain essential to ensure effective, safe, and equitable deployment.

Introduction

Imaging plays a critical role in ophthalmology, serving as an essential tool for diagnosing and monitoring ocular diseases.[1,2] Ancillary exams, such as retinal imaging, enable ophthalmologists to make informed decisions about patient care and are important in detecting ocular conditions that could otherwise lead to irreversible vision loss.[2] From routine screenings to complex diagnostics, imaging technologies provide insights into ophthalmological clinical decision-making.

Over the years, ophthalmic imaging technologies have undergone significant evolution. Traditional tabletop retinal cameras, while effective, are often costly and complex, limiting their accessibility in

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resource-constrained settings. In contrast, portable retinal cameras offer an alternative by being more affordable, lightweight, and user-friendly.[3,4] These devices are particularly advantageous for low- and middle-income countries (LMICs), where healthcare infrastructure may be limited.[5,6] By bridging the gap in accessibility, portable cameras have the potential to revolutionize ocular healthcare delivery.[7]

Diseases such as diabetic retinopathy (DR), age-related macular degeneration (AMD), and Retinopathy of Prematurity (ROP) stand to benefit particularly from advancements in retinal imaging. Early detection and timely management are crucial for mitigating the progression of these conditions, and robust screening programs are vital in achieving this goal. Portable retinal cameras improve access to essential screening services, facilitate telemedicine initiatives, and enable follow-up care in underserved regions, enhancing disease outcomes.[5,8,9]

Additionally, the integration of artificial intelligence (AI) into portable retinal cameras amplifies its utility, particularly in large-scale screening programs.[10–12] AI algorithms can enhance diagnostic accuracy, streamline workflows, and enable the detection of subtle pathological changes. AI further enhances its versatility and efficiency when embedded in portable devices.

This review aims to describe and compare commercially available portable retinal cameras, examining their technical specifications, clinical applicability, and AI integration, while providing insights into their current role and potential impact on ocular healthcare.

Methods

This review focused on commercially available portable retinal cameras. The literature review search included PubMed and OpenAlex databases with no language restrictions and up to September 2025. PubMed was selected for its comprehensive coverage of biomedical literature, while OpenAlex was included to broaden the scope to interdisciplinary sources and ensure that relevant publications not indexed in PubMed were also captured.

In PubMed, the following query was applied: ((portable[tiab] OR handheld[tiab] OR "hand-held"[tiab]) AND (retina[tiab] OR retinal [tiab] OR fundus[tiab] OR "Retina"[Mesh]) AND (camera[tiab] OR "fundus camera"[tiab] OR "Photography"[Mesh])). In OpenAlex, the search strategy was: (portable OR handheld OR "hand-held") AND (retina OR retinal OR fundus) AND (camera OR "fundus camera" OR photography). The search strategies were designed to maximize the sensitivity by including variations of the keywords "portable retinal camera," "handheld retinal camera," "portable fundus camera," "handheld fundus camera," and "smartphone-based fundus camera."

Two reviewers (LFN and LZR) independently screened titles and abstracts, with the initial assessment excluding non-related studies as well as comments, letters, and editorials. Full texts of potentially relevant articles were then retrieved and assessed for eligibility, and discrepancies were resolved by consensus. From the set of eligible studies, we extracted the list of retinal cameras evaluated. Only devices classified as commercially available portable retinal cameras, either standalone handheld systems or smartphone-attached cameras marketed as integrated products, were included in the final synthesis.

Exclusion criteria were: (i) non-academic sources such as blogs, news articles, and opinion pieces; and (ii) prototypes or smartphone-lens adapters not available as commercial systems. For this review, technical data were defined as specifications describing device characteristics (e.g., field of view, resolution, minimum pupil size, battery, imaging modalities, ergonomics, image format, and AI features), collected from peer-reviewed publications when available or, when absent, from manufacturers' official documentation. Clinical and ophthalmological data were extracted from the included studies and referred to the disease focus addressed in each article, either ocular conditions (e.g., diabetic retinopathy, glaucoma, retinopathy of prematurity) or systemic associations investigated through retinal imaging (e.g., sepsis, COVID-19, cardiovascular disease). Device names were extracted from the articles, while technical specifications were complemented with manufacturer-reported information when peer-reviewed sources were unavailable. Devices were categorized based on their design: smartphone-attached or standalone systems.

For the purpose of this review, AI features were defined as functionalities integrated into the cameras for automated image analysis or diagnostic support. Although this review summarizes AI performance metrics reported in peer-reviewed studies, an in-depth performance evaluation was considered beyond the scope of this review. Key variables emphasized in the synthesis included device resolution, imaging technology, portability, power requirements, and clinical effectiveness in various healthcare settings. Comparative insights were drawn to evaluate the strengths and limitations of smartphone-attached versus standalone portable cameras.

Results

A PubMed search conducted on 21 September 2025 identified 870 records (PubMed = 277; OpenAlex = 593). After the removal of 240 duplicates, 630 unique articles remained for screening.

From these, 509 articles were selected for detailed analysis, encompassing 38 retinal cameras and 17 commercially available, focusing on ophthalmic diseases and systemic conditions (Fig. 1).

Portable cameras

The analysis revealed a division between devices attached to external smartphones and standalone, standalone systems. Both categories demonstrated advantages and limitations tailored to varying clinical and operational requirements. The reviewed cameras included devices from various manufacturers, such as AirDoc, Carl Zeiss, MediWorks, Optomed, Phelcom, Remidio, Riester, Nidek, MiiS (Horus), Bosch, and Volk (Table 1).

In total, the review identified 38 different portable retinal cameras cited across the literature. Among these, a smaller group of commercially available devices accounted for the majority of references. The most frequently reported were the Volk Pictor Plus (33 articles), Phelcom Eyer (27), Optomed Aurora (24), Zeiss Visuscout 100 (16), Remidio FOP (16), and Optomed Smartscope (15). Together, these six devices represented the dominant share of citations, underscoring their central role in both clinical research and practical applications. Other devices, such as Kowa Genesis-D, MiiS Horus DEC200, oDocs Nun, RetinaVue 700, and Volk VistaView, were cited less frequently.

Clinical and systemic applications

The selected articles predominantly evaluated the use of portable cameras for retinal and optic disc diseases. Diabetic retinopathy was by far the most frequent focus, reported in 92 articles,[14–18] followed by glaucoma (10),[19–23] retinopathy of prematurity (7),[24–28] and, to a lesser extent, age-related macular degeneration (1),[29] optic disc edema (1),[30] nerve fiber layer abnormalities (1),[31] and hypertensive retinopathy (1).[32] These findings reinforce the central role of portable retinal cameras in the screening and management of major vision-threatening diseases.

Beyond ocular disorders, several studies examined systemic or cross-disciplinary applications, including COVID-19 ($n = 7$),[33–39] malaria ($n = 3$),[40–42] occupational health ($n = 2$),[43,44] neurology ($n = 2$), and sepsis ($n = 2$). Single-study use cases included cardiovascular disease ($n = 1$),[45] delirium ($n = 1$),[46] depression ($n = 1$),[47] emergency department assessments ($n = 1$),[48] HIV ($n = 1$),[49] high-altitude exposure ($n = 1$),[50] hypertension ($n = 1$),[51] neonate fundus triage ($n = 1$),[52] papilledema ($n = 1$),[53] transcatheter aortic valve implantation ($n = 1$),[54] and visceral leishmaniasis ($n = 1$).[55] Collectively, these findings underscore the broader applicability of retinal imaging for screening, risk stratification, and exploratory biomarker discovery that extends beyond

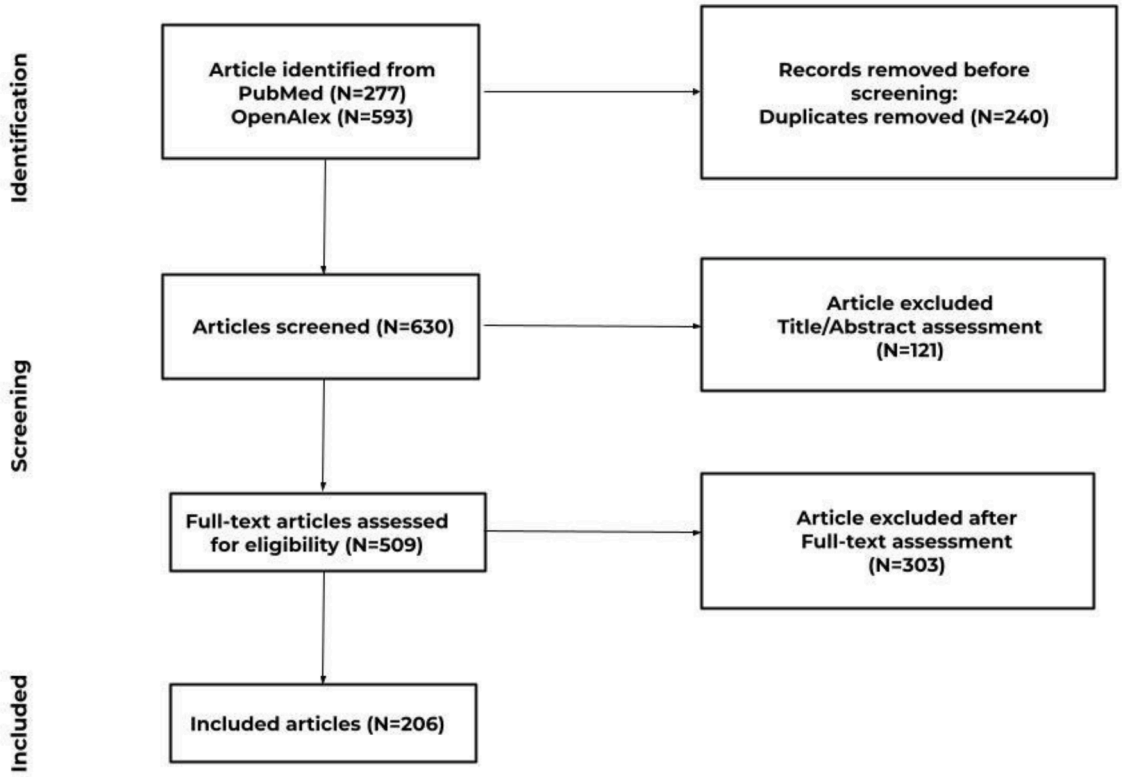

Fig. 1. PRISMA 2020[13] flow diagram illustrating the article selection process, including identification, screening, eligibility assessment, and inclusion of studies.

ophthalmology into general and systemic health domains.

Comparison of smartphone-attached and standalone retinal imaging devices

Portable retinal cameras are available in two main designs: those that attach to a smartphone and those built as standalone devices.

Smartphone-attached devices, such as the Eyer by Phelcom, FOP NM-10 by Remidio, and oDocs Nun, utilize the computational power and display capabilities of smartphones like iPhones or Samsung Galaxy models. These devices are highly portable, leveraging existing mobile infrastructure, and typically provide imaging fields ranging from 40 to 50 degrees. Equipped with high-resolution sensors of up to 12 MP, they deliver detailed retinal images. However, they rely on the smartphone's battery or separate rechargeable units for power, requiring thoughtful management during extended use to ensure uninterrupted operation. Additionally, their performance and long-term usability depend on the hardware and software updates of the connected smartphone, which may introduce challenges over time.

In contrast, standalone or standalone devices, including the ZEISS VISUSCOUT 100, Pictor Plus by Volk Optical, and Remidio NMFOP, are self-contained systems designed for dedicated diagnostic purposes. These devices offer similar imaging fields of 40 to 60 degrees and feature high-resolution sensors of up to 60MP. Unlike smartphone-attached devices, standalone systems are equipped with dedicated rechargeable batteries, ensuring extended operational time and independence from external power sources, making them suitable for diverse clinical and field environments.

Artificial intelligence systems in portable retinal cameras

AI-powered systems integrated into portable retinal cameras are transforming ophthalmic diagnostics by enhancing accuracy and optimizing clinical workflows.[10,11] These systems are primarily designed for the automated detection of retinal diseases (Table 2).

The Remidio FOP NM-10, combined with the Medios AI, incorporates cloud-based algorithms for the detection of referable DR. External validations conducted in India and the United States demonstrated high sensitivity and specificity when compared with ophthalmologist grading standards.[56] The Medios AI system holds a CE mark under the EU MDR framework, representing regulatory clearance for its autonomous use in DR screening.

The Optomed Aurora, integrated with the AEYE-DS system, supports both on-device and cloud-based inference for the detection of referable DR. Peer-reviewed studies in European populations have reported high diagnostic accuracy.[57] AEYE-DS received FDA clearance as an autonomous AI system, while the Aurora hardware itself is CE-certified.

The AirDoc FD16af, powered by the AIFUNDUS AI, extends beyond ophthalmology by combining DR grading with systemic risk prediction, such as cardiovascular risk stratification. Although no peer-reviewed external validation has yet been published, the AIFUNDUS 1.0 system received Class III approval from the NMPA (China).

The Eyer system (Phelcom) integrates EyerMaps AI, designed to automate triage by distinguishing normal from potentially abnormal retinal images. Peer-reviewed validation in Brazilian populations has demonstrated high sensitivity for the detection of more-than-mild diabetic retinopathy using a simplified single-image protocol.[58] EyerMaps AI is approved by ANVISA (Brazil) for assisting in the detection of referable abnormalities but not for autonomous diagnostic use.

Together, these systems illustrate the diversity of AI integration in portable fundus cameras: from referable DR detection to multi-disease triage and systemic risk assessment. They also highlight key trade-offs between cloud-based and on-device inference, the availability of visual explanations (heatmaps), and the scope of regulatory clearance. An additional consideration is the incorporation of automated image quality analysis, which is integrated in some systems (e.g., AEYE-DS, Medios AI) but is not consistently available across all devices. Such functionality is critical to ensure that only gradable images are processed, thereby reducing false negatives and optimizing real-world usability.

Table 1
Commercially available portable retinal cameras and their key technical features.

Camera	Brand	FOV (°)	Resolution (MP)	Min. pupil size (mm)	Battery	Focus Range	Imaging modalities	Non-mydriatic	Ergonomics	Image format	AI Integrated	Smartphone Attached
AirDoc FD16 G	AirDoc	35	12	3	N/A	−20 to +20	Color	Yes	Two-hand	Cloud export	Yes	No
ZEISS VISUSCOUT 100	Carl Zeiss	40	5	3.5	3.6V/ 2,350mAh	−20 to +20	Color, Red-free, Infra-red	Yes	One-hand	JPEG, MPEG4/1, DICOM	No	No
Horus DEC200	MiiS	45	5	3.5	3.6 V/ 3350 mAh	−20 to +20	Color, Red-free, Infra-red	Yes	One-hand	JPEG/H.264	No	No
FC161 Handheld camera	MediWorks	45	12	3	3.7V/ 3,400mAh	−20 to +20	Color	Yes	One-hand	JPEG	No	No
Aurora	Optomed	50	12	3.1	3.63V/2600 mAh	−20 to +20	Color, Red-free, Infra-red	Yes	One-hand	JPEG/MPEG-4	Yes	No
Smartscope PRO	Optomed	40	5	3,5	N/A	−20 to +20	Color, Red-free, Infra-red	Yes	One-hand	JPEG/DICOM/ MPEG-4/MPEG-1	No	No
Eyer	Phelcom	45	12	3	3400 mAh	−20 to +20	Color, Red-free, anterior segment	Yes	One-hand	Cloud export	Yes	Galaxy
FOP NM-10	Remidio	45	12	3	7.4v/ 1,500mAh	−30 to +30	Color, Red-free, Infra-red	Yes	One-hand	DICOM	Yes	iPhone SE
VersaCam	Nidek	45	5	3.5	N/A	−20 to +20	Color, Red-free	Yes	One-hand	JPEG/H.264	No	No
VistaView	Volk	55	48	4	4630 mAh	−15 to +15	Color, Red-free	Yes	One-hand	DICOM	No	Motorola or Nokia
Pictor Plus	Volk	40	5	3	N/A	−20 to +20	Color, Red-free, Anterior	Yes	One-hand	JPG/ DICOM/ MPEG-4/MPEG-1	No	No
Pictor prestige	Volk	50	5	3	3.63V/2600 mAh	−20 to +20	Color, Red-free, Infra Red, Low-Red, Anterior	Yes	One-hand	JPG/ DICOM/ MPEG-4/MPEG-1	No	No
VIVA	Volk	45	16	3	5000 mAh	−15 to +15	Color, Filters	Yes	One-hand	JPEG/BMP/DICOM	No	No
RetinaVue 700	Baxter	60	5	2.5	7.2V/3200 mAh	−20 to +20	Color	Yes	Two-hand	JPEG/DICOM/ Encrypted	No	No
oDocs Nun IR Fundus Camera	oDocs	45–55	13	2	3.6V/3500 mAh	−20 to +20	Color, Infra-red	Yes	One-hand	JPEG	No	Yes – Android
Bosch Portable Handheld Fundus Camera	Bosch	40	5	N/A	N/A	−20 to +20	Color	Yes	One-hand	DICOM	No	No
Genesis-D	Kowa	30	2	N/A	Power input	−15 to +15	Color	Yes	One-hand	JPEG/BMP	No	No

Table 2
Artificial intelligence functionalities of commercially available portable retinal cameras.

Camera	AI system	AI Scope	Inference type	Image Quality control	Validation population	Best reported metrics	Regulatory Status
AirDoc FD16af	AIFUNDUS	Diabetic retinopathy grading, systemic risk predictions	Cloud-based	No	No peer-reviewed validation identified.	No peer-reviewed validation identified.	NMPA (China) - autonomous
Aurora	AEYE-DS	Referable diabetic retinopathy detection	On-device and cloud	Automatic image quality analysis	Europe	High specificity and sensitivity for referable DR[57]	CE (Europe), FDA (USA) - autonomous
Eyer	EyerMaps	Automated detection of retinal abnormality	On-device and cloud	No	Brazil	High sensitivity and moderate specificity for DR[58]	ANVISA (Brazil) – not for autonomous detection
FOP NM-10	Medios DR	Referable DR	Cloud-based	Automatic image quality analysis	India, USA	High specificity and sensitivity for referable DR[56]	CE (Europe) - autonomous

Despite promising performance, the effectiveness of these algorithms depends heavily on the representativeness of their training datasets. External validation across populations with diverse ethnic, socioeconomic, and disease profiles remains essential to ensure reliability and fairness. Without such efforts, there is a risk of bias and reduced generalizability in real-world deployments.

Image quality and preprocessing

Portable retinal cameras incorporate rule-based quality control and preprocessing techniques that enhance their diagnostic utility. These include autofocus, alignment adjustments, adjustable illumination, and on-screen prompts that evaluate sharpness, exposure, or centration in real time. For example, the Pictor Prestige by Volk Optical includes instant quality checks to ensure only diagnostically suitable images are uploaded for grading.[59] These devices often include automatic eye detection and alignment adjustments to minimize errors during image acquisition.

The ZEISS VISUSCOUT 100 and the FC-161 Handheld Fundus Camera incorporate autofocus functionality and on-screen targeting aids for real-time quality control. Both devices also feature nine internal fixation LEDs to assist with patient alignment, ensuring images are clear, centered, and diagnostically appropriate.[60,61] Similarly, the VistaView enhances the imaging process with adjustable illumination levels and voice-activated image capture, optimizing image clarity even in challenging lighting conditions.[62]

The Welch Allyn RetinaVue 700 Imager automates critical aspects of image quality control, including auto-alignment, autofocus, and auto-capture, making it particularly effective in capturing high-quality images through small pupils without requiring dilation. These automated features streamline the imaging process and ensure diagnostic accuracy, even in resource-constrained environments.[63]

Discussion

The findings underscore the transformative potential of portable retinal cameras in advancing ocular healthcare. Their role in enhancing accessibility and improving diagnostic capabilities is particularly critical for addressing the growing global burden of ocular diseases. By providing cost-effective and portable solutions, these devices are instrumental in extending screening and diagnostic services to underserved populations, especially in LMICs[8,10].

Portable retinal cameras, encompassing both smartphone-attached and standalone handheld systems, demonstrate unique advantages in terms of affordability, portability, and flexibility.[8] These devices are highly suitable for telemedicine initiatives, fieldwork in remote areas, and point-of-care applications where mobility and rapid deployment are essential. Their ability to leverage smartphone computing power or operate as compact standalone systems enables on-the-go retinal imaging and facilitates task-shifting to non-specialist operators. Nonetheless, limitations remain, including variable image quality depending on operator expertise, battery dependence, and, in smartphone-attached models, compatibility constraints. Recent innovations, such as the oDocs Nun and the Volk VistaView (48 MP), illustrate how portable designs are expanding the reach of retinal screening in both community and primary care contexts.

In contrast, tabletop retinal cameras continue to provide the highest level of imaging stability, reproducibility, and integration with hospital information systems. These devices offer wide fields of view, high optical quality, and advanced functionalities that make them particularly valuable in specialized centers and high-volume clinics. Their main drawbacks are the high cost and reduced accessibility in resource-limited environments. Despite these limitations, tabletop cameras remain the benchmark for image quality and are essential where detailed documentation and long-term follow-up are required, such as in tertiary care and research settings.

AI integration further enhances the utility of portable cameras by automating detection tasks and streamlining workflows.[10,58] Systems embedded in these devices primarily target referable DR, with some extending to broader triage functions. While AI can support task shifting to non-specialist operators and increase throughput, its reliability depends on the quality, representativeness, and deployment context of the training data. Persistent challenges include maintaining performance across diverse populations and imaging conditions, mitigating bias, and ensuring transparent validation and monitoring.[64–67] Where available, automated image-quality analysis (e.g., focus/centration/exposure checks) is valuable to ensure only gradable images are processed; however, this functionality is not uniformly implemented across devices.

Another important consideration is that the availability of portable retinal cameras varies considerably across different countries and regions. Regulatory approval pathways, distribution strategies, and local market dynamics influence whether specific devices are accessible for clinical use. Consequently, some of the cameras reviewed in this study may not be commercially available in all settings, particularly in LMICs where the burden of avoidable blindness is highest. This variability highlights the importance of contextual assessment when selecting and implementing these technologies.

Although many AI algorithms integrated into portable retinal cameras have shown promising results in studies, their generalizability across diverse populations remains limited.[68,69] Most have been developed and validated in restricted geographic or healthcare contexts, often lacking representation of broader demographic and disease variability. In this review, we provide a broad overview of AI performance as reported in peer-reviewed studies; however, a detailed performance evaluation was considered beyond the scope of this review. Local validation in target populations remains essential prior to widespread clinical deployment.[66] Ensuring equitable performance across different ethnicities, imaging conditions, and healthcare environments is essential to prevent exacerbating existing disparities in access and quality of

eye care.[67] Furthermore, most available validations were conducted under controlled acquisition by trained personnel; additional studies are required to confirm effectiveness in real-world workflows involving non-specialist operators.

This review has several limitations that should be acknowledged. First, while every effort was made to compile comprehensive technical and clinical information, in some instances, data relied on manufacturer-reported specifications when peer-reviewed evidence was unavailable. Second, despite extensive searches, coverage may be incomplete, and some discontinued models were excluded. Third, AI-related studies often relied on geographically restricted cohorts or small datasets, raising concerns about selection bias and limited diversity. Fourth, AI systems demonstrated heterogeneity in validation methodologies, reference standards, and outcome measures, limiting comparability. Fifth, regulatory approvals and market availability differ across regions, which constrains generalizability. Finally, standardized head-to-head comparative studies across portable devices, or between portable and tabletop cameras, remain scarce. This evidence gap restricts the strength of direct comparative conclusions and limits our ability to provide definitive guidance for programmatic decision-making

Beyond these methodological considerations, another key aspect is the practical implementation of retinal cameras in different healthcare contexts. Practical guidance is essential for policymakers to ensure that device functionalities align with programmatic priorities. Portable devices are particularly suited for field-based DR screening, mobile telemedicine, pediatric programs, and emergency outreach, where portability and cost are critical.[4,70,71] Tabletop cameras, by contrast, remain more appropriate for specialized centers and high-volume clinics, where imaging consistency, throughput, and system integration are prioritized (Table 3).

For general clinical use, the decision between portable and tabletop devices should consider operator expertise, infrastructure, and budgetary constraints. In outreach campaigns or emergency triage, portable systems enable rapid deployment. In specialized centers, tabletop cameras provide greater clinical reliability and integration. A cross-cutting consideration is regulatory context: where AI is embedded, systems should be deployed as decision-support rather than autonomous diagnostic tools unless regulatory clearance is explicitly granted.

Future research should focus on evaluating the long-term impact of portable retinal cameras in real-world settings. Comparative studies assessing user acceptance, cost-effectiveness, and clinical outcomes will be crucial for guiding policy decisions and fostering the adoption of these technologies. Furthermore, initiatives to standardize AI validation protocols and promote data sharing across regions can enhance the scalability and effectiveness of these solutions, ultimately contributing to equitable and accessible ocular healthcare.

Table 3
Practical implementation guidance for portable retinal cameras in different healthcare contexts.

Use-case scenario	Preferred device type	Key strengths	Main limitations / considerations
Field-based DR screening and mobile telemedicine	Portable	Low cost, high portability, integration with smartphones, suitable for task-shifting.	Variable image quality if operators not well trained, battery dependence, device robustness may vary.
Pediatric/ neonatal programs	Portable	Stable optics in handheld models, ergonomic design, suitable for bedside use, can integrate with hospital systems.	Reduced image consistency compared with tabletop, higher training requirements, limited field of view in some devices.
General outpatient clinics	Context-dependent (portable or tabletop)	Tabletop: higher throughput, stable image quality, better EHR integration. Portable: flexible, cost-effective, suitable for smaller or satellite clinics.	Tabletop: costly, less accessible outside major centers. Portable: variable reproducibility, durability issues, compatibility constraints.
Emergency triage and outreach campaigns	Portable	Rapid deployment, lightweight, easy transport, offline capture possible.	Limited autonomy in prolonged campaigns, susceptibility to artifacts in uncontrolled environments.
Specialized high-volume centers	Tabletop	High imaging consistency, robust ergonomics, integration with advanced infrastructure.	High cost, reduced portability, requires dedicated space and operator training.

Disclosure statement

FM is a consultant for Phelcom Technologies, and has received consulting fees for medical advice and travel support for attending meetings from Phelcom Technologies.

Data availability statement

There is no data generated from this study.

Author contributions statement

LFN - conceptualization, data analysis, visualization, manuscript writing
LZR - data collection, data interpretation, manuscript writing
CLT - data collection, data interpretation, manuscript writing
FM - data interpretation, project leading, manuscript writing
CR - data interpretation, project leading, manuscript writing

Toc

This review compares commercially available portable retinal cameras, with a focus on technical features, artificial intelligence integration, and clinical applications. Practical considerations for real-world implementation are discussed, emphasizing the strengths and limitations of different devices. The synthesis provides clinicians and policymakers with concise insights into contexts of use, supporting informed adoption of imaging technologies that can expand access to retinal disease detection and improve eye care delivery.

Declaration of competing interest

FM is a consultant for Phelcom Technologies, and has received consulting fees for medical advice and travel support for attending meetings from Phelcom Technologies.

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