



Care and Public Health Research Institute

A Healthy Society for Everyone

Self Evaluation Report

Part B5: Optimising Patient Care

1 Mission, strategy and ambition

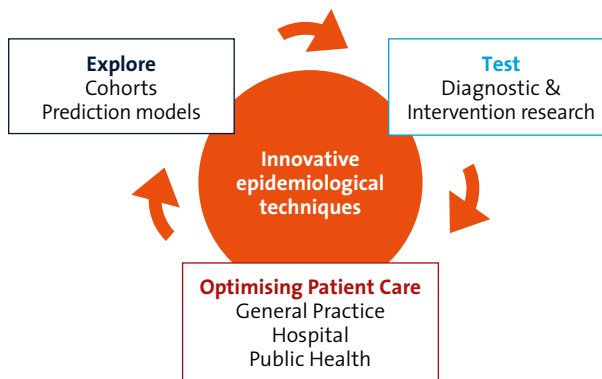
1.1 Vision, mission, and objectives

Vision

By applying state-of-the-art clinical epidemiological methods, we unlock new insights for health care.

Mission

Our mission is to drive innovation in health care by conducting pioneering studies in various settings, including general practice, hospital care and public health. By transforming clinical and public health questions into actionable evidence-based insights, our ultimate goal is to enhance clinical practice locally and globally.



1.2 Strategy and Research Area

Our objective is to translate questions that arise from clinical and public health practice, into actionable evidence that can be applied in practice itself. To achieve this, we employ state-of-the-art epidemiological techniques within cohort studies, diagnostic research, intervention research, prediction modelling, and meta-research. Our focus is on identifying new targets for prevention and treatment, as well as the development and evaluation of diagnostic tools. We also apply clinical epidemiology knowledge in various contexts outside the medical field, such as legal matters. Our studies encompass patients in general practice, hospital, and public health settings. We conduct research on population-based cohorts to uncover novel prevention targets, with a particular emphasis on strengthening prevention efforts in our region. By leveraging these advanced techniques, we not only create innovative quantitative methodology, but also contribute to the broader field of clinical and epidemiological research.

Research teams

Optimising Patient Care works with four research teams. The mission statements and information on the research areas of the research teams can be found below.

Team 'Clinical Epidemiology'

Led by *prof. dr. Luc Smits*

Mission: To apply and improve cutting-edge methods for clinical studies, and to use these methods to discover new targets for diagnosis and prevention.

The team is active in patient-centred research in a broad sense, working closely together with clinical departments from the Maastricht UMC+ and participating in national and international clinical studies. Although the team has expertise in all subareas of Clinical Epidemiology (diagnosis, prognosis, intervention), its methodological focus is on prediction research. Members of the team have been giving a successful yearly postgraduate course on clinical prediction modelling since 2015. The team has strong research and publication records in cardiovascular disease (thrombosis),

dermatology, radiology, oncology (breast cancer), and obstetrics and gynaecology. In addition to its involvement in multi-disciplinary clinical studies, the team has the ownership of several important and long running population-based cohorts (The Netherlands Cohort Study on Nutrition and Cancer, the KOALA birth cohort study, the LucKi birth cohort study) and is strongly involved in others (i.a. the Maastricht Study). The team offers a range of strong selling points that set it apart from others in the field. These include its methodological expertise, its strong commitment to improving health care outcomes, its active participation in multidisciplinary teams, the availability of its long-running population-based cohorts, and its impressive publication record in high-end journals including the Lancet, BMJ, New England Journal of Medicine, and JAMA.

Team 'Prevention of chronic diseases'

Led by *prof. dr. Onno van Schayck*

Mission: To enhance prevention efforts and reduce the prevalence of chronic conditions by modifying risk factors and promoting appropriate management and innovation in health care.

Prevention, early identification of risk factors and appropriate management are important topics in the research agenda of the research team 'Prevention of chronic diseases'.

Furthermore, the determinants of susceptibility, early diagnosis and burden of illness and integrated care are studied. After the successful development of the Assessment of Burden of COPD tool, this tool was adapted towards the Assessment of Burden of Chronic Conditions (ABCC). This tool facilitates the communication between patient and health care provider, including shared decision-making. By means of the ABCC tool the patient is supported in life-style behaviour in the self-management of their chronic condition(s). A large successful 5-year program, called the Healthy Elementary School of the Future, was set up in order to tackle the obesity epidemic starting in early childhood by providing healthy food and stimulating physical activity in 2400 children. Together with investigators of the CAPHRI research line 'Promoting Health and Personalised Care' research on smoking cessation

strategies is being performed, including trials on pharmacotherapy of nicotine addiction and using eHealth. Finally, an evaluation into the legislation banning smoking in public areas was carried out in the programme and a trial to investigate the role of stop smoking in commercial companies. Case-finding and early identification of risk factors for asthma and COPD in high-risk populations remain important topics. The team cooperates with MUMC+, with the departments of Pulmonology and with the department of Paediatrics and of Health Promotion. International projects will be continued in India concerning the reduction of fine dust exposure and COPD. In the past 5 years many publications have been published in high impact journals such as the Lancet and BMJ.

Team ‘Diagnosis and Treatment in Primary Care’

Led by prof. dr. Jochen Cals

Mission: To improve and evaluate innovative diagnostic testing for use in primary care and optimise diagnostic test-treatment strategies for common conditions in general practice.

The primary objective of the team is to enhance the diagnostic process and associated treatment strategies through cutting-edge clinical research in primary care, with the ultimate aim of improving patient health in both developed and developing countries. At present, we run research projects in general practice within the domains of infectious diseases (respiratory tract infections, urinary tract infection and Covid-19), cardiovascular diseases (angina pectoris, atrial fibrillation, venous thromboembolism) and musculoskeletal disorders (arthritis, common joint conditions). The projects include and evaluate innovative diagnostic tools, such as point of care blood and urine tests, as well as point of care ultrasound modalities. The team collaborates with the departments of radiology, medical microbiology and laboratory medicine of MUMC+, as well as primary care diagnostic centres across The Netherlands. More than 80% of team members combine clinical (general) practice with research roles, and the team has an extensive track record of running successful randomised trials in the challenging primary care setting. The team has scientific impact by publications in the major international medical and primary care journals, but just as important national clinical journals (e.g. NTvG) as well as clinical impact by achieving swift uptake of research findings in multiple national guidelines for general practitioners. The international orientation of this team is reflected by the ongoing PhD programme in Ethiopia, the supervision of PhD candidates from abroad and the close cooperation with leading international groups.

Team ‘Applied Epidemiology’

Led by prof. dr. Maurice Zeegers

Mission: To improve epidemiological methods and to translate these methods across disciplines to societal applications.

The key element that forms the base of this team is the unraveling of causality in multi-causal situations. The team is conducting meta-research, meta-analyses, pooled analyses and systematic reviews to substantiate expected cause-effect associations. To further develop the field of epidemiology new techniques from OPC and beyond are adopted and data are gathered and analysed to improve both real world applications and the scientific process itself. This team has coined the term citation bias and has a joint PhD programme with the BMJ on Evidence-based Publishing. The team leads the UM-wide platform on Research Ethics and Integrity and performs research in this domain. “Applied Epidemiology” is also internationally leading in the field of Forensic Epidemiology, which is directed at filling the gap between clinical judgment and epidemiological data for determinations of causality in civil lawsuits and criminal prosecution and defense. Example projects are on the development of reporting guidelines in Forensic Medicine, injury causation analyses or on trends in police use of force-related hospital admissions. The team leads another UM-wide platform: Maastricht Science in Court. Because of its focus on outreach, the team has strong links with other UM Research Institutes (i.e. NUTRIM) and other UM faculties.

1.3 Specific targets of the past six years (2017-2022)

The focus of the research line has been on maintaining the very high levels of success in terms of research quality and output, including publications, dissertations, and earning power, as well as achieving clinical impact as a result of uptake of innovations in national clinical guidelines, and achieving societal relevance through reports, participation in committees, public appearances, and other means. We invested in new talent, taking into account the retirement of some of the key figures of our research line. In addition, we facilitated the coherence and collaboration between the different research teams, by organising several research line meetings.

2 Description of the Research Line's organisation, composition and financing

2.1 Organisation and embedding of the Research Line

The Research Line 'Optimising patient care' is one of six research lines within CAPHRI (Part A §2). Its daily board consists of the chairs of the Research Teams and has a chair and vice-chair. The board meets monthly to discuss managerial issues. The organisation chart of the research line is presented in figure 2.1.

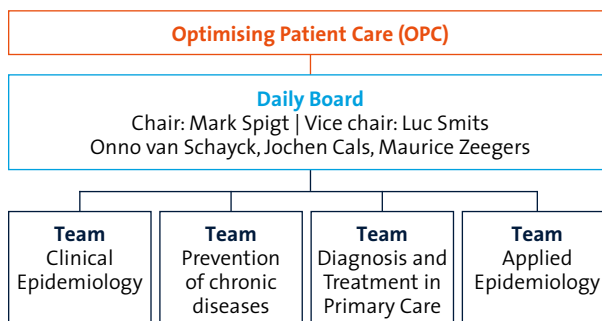


Figure 2.1: organisation chart research line 'Optimising Patient Care'

2.2 Composition

Table 2.2: Research staff at Research Line level (2017 - 2022)

	2017	2018	2019	2020	2021	2022
Research staff	#/fte	#/fte	#/fte	#/fte	#/fte	#/fte
Scientific staff FHML ¹	22/8.45	24/7.00	20/7.56	21/7.6	21/7.6	25/7.2
Scientific staff azM	5/1.34	5/1.30	4/1.24	3/0.7	3/0.7	3/0.7
Postdocs ²	8/3.60	11/3.20	11/4.85	10/4.0	12/6.2	13/6.2
Internal PhD candidates ³	6/6.00	8/7.50	13/10.72	11/8.3	8/7.3	7/6.5
	41/19.39	38/19.00	48/24.37	45/20.6	44/21.8	48/20.5
External PhD candidates ⁴		74	81	92	80	85

¹ Categories Prof / Assoc. Prof / Assist. Prof; tenured and non-tenured staff appointed at the FHML.

² Category Researcher (1, 2, 3, 4), with completed PhD, not belonging to scientific staff (note 1)

³ Standard PhD (employed)

⁴ External PhD (externally or internally funded but not employed)

2.3 Financing

Table 2.3a: Funding at Research Line level (2017-2022)

Funding	2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
	fte	% ⁶	fte	% ⁶	fte	% ⁶	fte	% ⁶	fte	% ⁶	fte	% ⁶
Direct funding ¹	7.8	43%	9.3	53%	10	43%	10.6	57%	8.1	39%	8.0	40%
Research grants ²	3.2	18%	2.2	12%	3.4	15%	3.9	21%	5.3	25%	5.0	25%
Contract research ³	6.7	37%	6.1	34%	9.8	42%	3.9	21%	7.5	36%	6.8	35%
Other ⁴	0.5	3%	0.1	1.0	0.0	0%	0.1	1%	0.1	0%	0.0	0%
Total funding⁵	18.05	100%	17.7	100%	23.13	100%	18.5	100%	21.0	100%	19.8	100%

¹ Direct funding by FHML/ Maastricht University ('basis financiering' / lump sum budget).

² Research grants obtained in national scientific competition (e.g. grants from NWO, ZonMw and KNAW)

³ Research contracts for specific research projects obtained from external organisations, such as industry, governmental ministries, European organisations, including ERC, and charity organisations

⁴ Funds that do not fit the other categories.

⁵ The funding in fte includes the total research staff but excludes the academic hospital-staff

⁶ the funding in % in the research programme should be compared to the total within each research programme

Table 2.3b Research Grants at Research Line level (2017-2022)

Funding	Order	Grant title	Principal Investigator	2017	2018	2019	2020	2021	2022
Grants	30951213N	ZonMw PalliArts	M.H.J. van Everdingen		€85.271				
	30952015N	IMDI-E-manager CD	A.H.M. Gidding - Slok		€847.537				
	30952018N	ZonMw CHIMP	J.W.L. Cals		€249.600				
	30952019N	ZonMw - Tabak ontmoediging	C.P. van Schayck		€314.511				
	30952021N	ZonMw ADEM II	E. Dompeling		€319.428				
	30952029N	VIMP_Kinderen-Koorts	E.G.P.M. de Bont			€49.900			
	30952034N	ZonMw - Outcomes of COVID-19	E.G.P.M. de Bont				€374.458		
	30952035N	ZonMw - DOCPAL	A.M. Courtens				€49.650		
	30952036N	ZonMw - TRACE II	J.D. de Korte - de Boer				€43.077		
	30952039N	ZonMw - Succesvol Stoppen	C.P. van Schayck				€3.884		
	30952040N	ZonMw - Outcomes	L.J.M. Smits				€34.829		
	30952032N	BeNefit trial	J.W.L. Cals					€34.094	
	30952037N	ZonMw UTI-project	E.G.P.M. de Bont					€460.835	
	30952048N	IMDI - Breath Analyser	E. Dompeling					€280.816	
	30952052N	ZonMw - COR-FU-studie	S.M.J. van Kuijk					€460.127	
	30952053N	ZonMw - GRIP3	M.G. Spigt					€609.510	
	30952054N	ZonMw-Kphag Complex	J.W.L. Cals					€156.315	
	30952056N	ZonMw-POB-HELP	R.T.A. Willemsen					€57.865	
	41150529022N	ZonMw-Diagnostiek Bijsluiter	J. Janssen						€249.954
	41150531005N	ZonMw - DRY MOUTH	M.H.J. van Everdinge						€221.045
	41150532004N	Check de Test	M.P.A. Zeegers						€10.502
Grants Total					€1.816.347	€49.900	€505.897	€2.059.561	€ 481.501
Contracts	30952005N	PhD traject Login	R.P.G. Ottenheijm	€87.000					
	30952010N	ABR zorgnetwerk	J.W.L. Cals		€26.690				
	30952016N	PL-Lekker in je Vel1	C.P. van Schayck		€66.779				
	30952017N	Lekker in je vel-2	C.P. van Schayck		€780.985				
	30952020N	EIT Grant 2019	M. Willeboordse		€50.000				
	30952022N	Longfonds ADEM II	E. Dompeling		€400.000				
	30952023N	TKI Longfonds ADEM2	E. Dompeling		€150.000				
	30952024N	TKI LSH-ADEM2	E. Dompeling		€150.000				
	30952025N	ABCC tool-Hartstichting	C.P. van Schayck		€119.484				
	30952027N	Aangeboren afwijking	L.J.M. Smits			€253.335			
	30952028N	EIT_HEALTH_PEPRECO	M.P.A. Zeegers			€138.964			
	30952041B	ICS bij COPD	C.P. van Schayck				€39.828		
	30952042N	Provincie Groene GBT	C.P. van Schayck					€99.705	

	30952044N	Schools@Once_ EIT2021	M. Willeboordse						€58.362	
	30952046N	SDM-EBM_SBOH	M.G. Spigt						€180.954	
	30952050N	Shirati Food - WUN	C.P. van Schayck						€0	
	41150531032N	Effectonderzoek Stoptober 2022	C.P. van Schayck						€32.560	
	41150531029N	NASH project	J. Muris						€108.032	
	41150531030N	Health in Slums (WG)	C.P. van Schayck						€47.500	
Contracts Total				€87.000	€1.743.938	€392.299	€39.828	€339.021	€188.092	
Other	30952047B	Exhale - Chiesi	C.P. van Schayck						€35.000	
	30952049B	Dutch Spark	C.P. van Schayck						€36.100	
	30952055B	Digitale zorg HApraktijk (VWS)	J.W.L. Cals						€163.000	
	41150531031B	ZLM Corona - Pfizer	A.H.M. Gidding-Slok						€144.124	
Other Total									€234.100	€144.124
Grand Total				€87.000	€3.560.285	€442.199	€545.725	€2.632.683	€813.717	



3 Research Quality and Societal Relevance

3.1 Research Quality

3.1.1 Research products for peers

Main categories of research output at Research Line level

Table 3.1a: Main categories of research output (2017-2022)

Since 2021 FHML is using the KUOZ categories for the P&C reports regarding publications. Publications classified as KUOZ category A 'Refereed journal article' are presented below. Please note that - in contrast to KUOZ reports - items do not have to be printed to be included for P&C reports; e-publications are also included.

Research output	2017	2018	2019	2020	2021	2022
Refereed journal articles	258	240	217	235	226	190
PhD theses involved/accounted	11/7.8	11/8.9	9/4.8	13/8.6	15/11.8	19/16.7

Most important scientific publications

Table 3.1b Most important scientific publications (2017-2022 top-10)

Year	Publication
2017	Frequency of chest pain in primary care, diagnostic tests performed and final diagnoses. Hoorweg BB, Willemsen RT, Cleef LE, Boogaerts T, Buntinx F, Glatz JF, Dinant GJ. <i>Heart</i> . 2017 Nov;103(21):1727-1732. doi: 10.1136/heartjnl-2016-310905.
2017	The Lancet Commission on pollution and health. Landrigan PJ, Fuller R, Acosta NJ, Adeyi O, Arnold R, Baldé AB, Bertollini R, Bose-O'Reilly S, Boufford JJ, Breysse PN, Chiles T, van Schayck OCP. <i>The Lancet</i> . 2017 Oct 19. https://doi.org/10.1016/S0140-6736(17)32345-0
2018	Booklet for Childhood Fever in Out-of-Hours Primary Care: A Cluster-Randomised Controlled Trial. Eefje G.P.M. de Bont, Geert-Jan Dinant, Gijs Elshout, Gijs T. van Well, Nick A. Francis, Bjorn Winkens, et al. <i>Ann Fam Med</i> . 2018;16(4):314-321.
2019	Long-term follow-up of autologous fat transfer vs conventional breast reconstruction and association with cancer relapse in patients with breast cancer. T Krastev, A van Turnhout, E Vriens, L Smits, R van der Hulst. <i>JAMA Surg</i> . 2019 Jan 1;154(1):56-63. doi: 10.1001/jamasurg.2018.3744.
2019	Randomised Trial of Four Treatment Approaches for Actinic Keratosis. Jansen MHE, Kessels JPHM, Nelemans PJ, Kouloubis N, Arits AHMM, van Pelt HPA, Quaadvlieg PJF, Essers BAB, Steijnen PM, Kelleners-Smeets NWJ, Mosterd K. <i>N Engl J Med</i> . 2019 Mar 7;380(10):935-946. doi: 10.1056/NEJMoa1811850. PMID: 30855743.
2019	Tuberculosis case detection by trained inmate peer educators in a resource-limited prison setting in Ethiopia: a cluster-randomised trial. Adane K, Spigt M, Winkens B, Dinant GJ. <i>Lancet Glob Health</i> . 2019 Apr;7(4):e482-e491. doi: 10.1016/S2214-109X(18)30477-7.
2019	Association of Gestational Weight Gain With Adverse Maternal and Infant Outcomes. LifeCycle Project-Maternal Obesity and Childhood Outcomes Study Group; Voerman E, Santos S, Inskip H, Amiano P, Barros H, Charles MA, Chatzi L, Chrousos GP, Corpeleijn E, Crozier S, Doyon M, Eggesbø M, Fantini MP, Farchi S, Forastiere F, Georgiu V, Gori D, Hanke W, Hertz-Picciotto I, Heude B, Hivert MF, Hryhorczuk D, Iñiguez C, Karvonen AM, Küpers LK, Lagström H, Lawlor DA, Lehmann I, Magnus P, Majewska R, Mäkelä J, Manios Y, Mommers M, Morgen CS, Moschonis G, Nohr EA, Nybo Andersen AM, Oken E, Pac A, Papadopoulou E, Pekkanen J, Pizzi C, Polanska K, Porta D, Richiardi L, Rifas-Shiman SL, Roeleveld N, Ronfani L, Santos AC, Standl M, Stigum H, Stoltenberg C, Thiering E, Thijs C, Torrent M, Trnovec T, van Gelder MMHJ, van Rossem L, von Berg A, Vrijheid M, Wijga A, Zvinchuk O, Sørensen TIA, Godfrey K, Jaddoe VVW, Gaillard R. <i>JAMA</i> . 2019 May 7;321(17):1702-1715. doi: 10.1001/jama.2019.3820.
2020	Pan-cancer image-based detection of clinically actionable genetic alterations. Kather JN, Heij LR, Grabsch HI, Kooreman LFS, Loeffler C, Echle A, Krause J, Muti HS, Niehues JM, Sommer KAJ, Bankhead P, Schulte JJ, Cipriani NA, Ortiz-Brüchle N, Patnaik A, Srisuwananukorn A, Brenner H, Hoffmeister M, van den Brandt PA, Jäger D, Trautwein C, Pearson AT, Luedde T. <i>Nature Cancer</i> 2020; 1: 789-99.
2020	Opportunistic screening versus usual care for detection of atrial fibrillation in primary care: cluster randomised controlled trial. Uittenbogaart SB, Verbiest-van Gorp N, Lucassen WAM, Winkens B, Nielen M, Erkens PMG, Knottnerus JA, van Weert HCPM, Stoffers HEJH. <i>BMJ</i> . 2020 Sep 16;370:m3208. doi: 10.1136/bmj.m3208.PMID: 32938633
2020	Prediction models for diagnosis and prognosis of covid-19: systematic review and critical appraisal Wynants L, Van Calster B, Collins G S, Riley R D, Heinze G, Schuit E et al. <i>BMJ</i> 2020; 369 :m1328 doi:10.1136/bmj.m1328

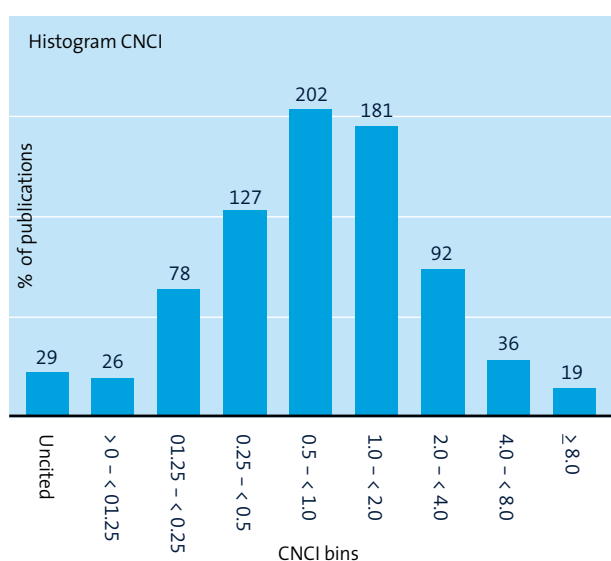
3 Research Quality and Societal Relevance

3.1.2 Use of research products by peers

In the years 2017-2022 we published 1423 refereed journal articles. The figure below provides an overview of the Category Normalised Citation Impact (CNCI) of our Research Line, showing how much our work has been cited over the years. The CNCI is a good indicator of usage of our research by our peer researchers. For this evaluation, only the publications before 2020 have been taken into account. The CNCI is the ratio of citations received by an output, against the average for other outputs of the same age, publication type and subject

area. The strength of this indicator is that it corrects for differences in citation frequencies that are attributable to age, document type and subject area, which makes it suitable for benchmarking. A CNCI of 1 means that a publication is cited as frequent as the world average regarding its publication year, document type and subject area.

The figure shows that 41.5% of the publications of OPC have a CNCI of 1 or higher. Nineteen publications (2.4%) score very high. These publications are usually cited between 100 (the newer) and 400 (the older) times.



3.1.3 Marks of recognition from peers

Scientific Awards or Public Societal prizes

Table 3.1c Most important scientific awards or Public Societal prizes (2017-2022 top-10)

Year	Name	Scientific Awards/Public Societal prizes
2017	R. Willemsen	PhD defense cum laude March 23d 2018
2018	A. Gidding-Slok	NRS Science award, Netherlands Respiratory Society (NRS).
2018	M. Freeman	Fulbright fellowship, US Department of State
2019	E. de Bont	NHG-Wetenschapsprijs 2019, NHG.
2019	F. van den Brand	CAPHRI societal relevance award, CAPHRI.
2019	K. Peetoom	Catherina Pijls Award, best PhD thesis in Health Sciences
2020	N. Bartelink	CaRe Award - The Netherlands School of Public Health and Care Research (CaRe)
2020	D. Hertroijs	Karolinska Medical Management Centre & EHMA Research Award
2020	L. Wynants	Edmond Hustinx Prize 2020, Stichting Edmond Hustinx
2021	F. van den Brand	Catharina Pijls Prize, Stichting Catharina Pijls

Invited lectures

Table 3.1e: Most important invited lectures (2017-2022 top-10)

Year	Name	Which organisation	Name event	Name lecture/workshop
2017	O. van Schayck		Brussels Lancet Commission Report Launch 26 October 2017	A Presentation of the finding of the Lancet commission on pollution and Health
2017	R. Willemsen	Nederlands Huisartsengenoederschap	Kaderopleiding Hart-vaatziekten	Kaderopleiding Hart-vaatziekten
2018	A. Voogd	Jeroen Bosch Ziekenhuis	Bossche Mammacongres	Update of breast cancer epidemiology in the Netherlands, with a focus on HER2-positive disease
2018	L. Smits	GGD Zuid-Limburg, UM	Academische Werkplaats: De Gezonde Generatie: de eerste 1000 dagen	Risk-based care: successful use of prediction models in obstetric care
2019	E. de Bont	NAPCRG	Invited plenary speaker at the annual conference by The North American Primary Care Research Group (NAPCRG), Toronto, Canada.	Booklet for Childhood Fever in Out-of-Hours Primary
2019	C. Thijs	Maastricht Infection Centre MINC	Is een beetje vies gezond? MINC symposium, Maastricht, 28 November 2019	Is een beetje vies gezond? Opening lecture and chair
2019	J. Cals & O. van Schayck	Zuyderland Ziekenhuis en huisartsen westelijke mijnstreek	Keynote during meeting of GPs and hospitals specialists in Athens, Greece	Prevention in general practice and public health
2019	P. van den Brandt	US National Cancer Institute	NCI Cohort Consortium, Rockville/ Washington, November 2019	Anthropometry and breast cancer risk
2019	L. Wijnants	IOTA	4 th International Ovarian Tumor Analysis Congress, Leuven	Two-step algorithm for detecting endometrial cancer and for preoperative staging (invited talk)
2021	J. Cals	Anna Ziekenhuis Geldrop	Invited lecture for board of directors	Effe(ctieve) diagnostiek

Memberships of scientific committees, boards, or editorships

Table 3.1f: Most important memberships of scientific committees, boards or editorships (2017-2022 top-10)

Year	Name	Which organisation	Which role
2017	O. van Schayck	Global commission on Pollution and Health, an initiative of The Lancet and the UN.	Member
2017	J. Cals	Nederlands Tijdschrift voor Geneeskunde	Section editor for primary care
2017	A. Voogd	Dutch Cancer Society	member scientific board
2017	P. van den Brandt	World Cancer Research Fund (London)	Member Grant Panel
2019	S. Eussen	Nutrients	Editorial board member and guest editor special issue
2019	E. de Bont	Antibiotic resistance coordination team in Limburg	Primary care representative
2020	J. Stoffers	European Journal of General Practice	Editor in Chief
2020	M. Zeegers	European Epidemiology Federation	Vice-chair
2020	L. Smits	Gezondheidsraad (Health Council of the Netherlands)	Member of Subcommittee on the Classification of Substances Toxic to Reproduction
2022	J. Cals	Hartstichting	Scientific Advisory Board

3 Research Quality and Societal Relevance

3.2 Relevance to Society

3.2.1 Research products for societal target groups

Public Events

Table 3.2a: Public events: lectures/workshops for health care professionals and/or general public/patients (2017-2022 top-10)

Year	Name	Public event
2017	R. Willemsen	NHG Kaderopleiding Hart- Vaatziekten
2017	L. Smits	Yearly course on Clinical Prediction Models. Course Organiser, Principal Lecturer
2017	O. van Schayck	Chair Symposium Healthy Elementary School of the Future; and plenary speaker
2018	A. Gidding-Slok	Stichting Eerstelijns Zorggroep, workshop about the ABC-tool
2018	E. de Bont	Invited speaker on infections in children at the Dutch LOVAH conference for all GPs in training in the Netherlands
2017	R. Ottenheim	Health care insurance company CZ; Symposium: 'optimalisatie anderhalvelijnszorg orthopedie'
2019	M. Zeegers	Course Leader: Systematic Reviews (Open Medical Institute Salzburg)
2021	L. Wynants	AI in tackling Covid 19 crisis: opportunities and challenges, Digital Transition and Single Market Observatory Webinar, European Economic and Social Committee, Brussels, Belgium
2021	Ilse Mesters	Course leader: Health Communication & Health Promotion course. Open medical Institute, Salzburg, Switzerland
2022	J. Stoffers	NHG Advanced training course Cardiovascular Diseases for GPs.

Cohorts based within the research line

Table 3.2b Cohorts based within the research line

Cohorts based within CAPHRI	Name principal investigator	Department
KOALA Birth Cohort Study	Dr. Thijs	Epidemiology
LucKi Birth Cohort Study	Dr. Mommers	Epidemiology
Research Network Family Medicine	Prof. Muris	Family Medicine
Expect study	Prof. Smits	Epidemiology
Cardiovascular Registry Maastricht (CAREMA) cohort study	Prof. van de Brandt	Epidemiology
Influenza Cohort	Prof.em. Knottnerus / Prof. Dinant	Family Medicine
Asthma/COPD cohort in ZIO region	Prof. Wesseling	Pulmonology
Bladder Cancer Pooled Consortium	Prof. Dr. Zeegers, Dr Evan Yu	Epidemiology
Cohorts based elsewhere shared with CAPHRI investigators	Name CAPHRI investigator	Department
The Maastricht Study	Prof. Stehouwer CAPHRI researchers: Prof. Dagnelie, Dr. Koster, Dr. Eussen	Epidemiology, Social Medicine
Netherlands Cohort Study on Diet and Cancer epi.grants.cancer.gov/Consortia/members/nlcs.html	Prof. van den Brandt	Epidemiology

Most important societal publications/outputs

Table 3.2c: List of the most important societal publications of the research programme (2017-2022, top-10)

Year	Publications/outputs
2017	Kanker nazorg wijzer (www.kanker.nl/bibliotheek/artikelen/11691-de-kanker-nazorg-wijzer)
2018	Antibiotica resistentie campagne ministerie van VWS
2018	Paper: Scientific citations favor positive results: a systematic review and meta-analysis. J Clin Epidemiology 2017
2019	Book: Textbook of Epidemiology (Nature - Springer) - Together with Zielhuis & Bouter
2017	Expect calculator (www.zwangerinlimburg.nl)
2020	Strömmer, E. M. F., Leith, W., Zeegers, M. P. & Freeman, M. D. The role of restraint in fatal excited delirium: a research synthesis and pooled analysis. Forensic Sci Med Pathol (2020) doi:10.1007/s12024-020-00291-8.
2020	Thuisarts.nl Koorts bij kinderen: www.thuisarts.nl/sites/default/files/Mijn%20kind%20heeft%20koorts%20stoplichtboekje.pdf
2020	Covid-19 death and palliative care by GPs in The Netherlands, nationwide project within 2 weeks with extensive media coverage (NOS 20:00 hour jnews)
2017	E-diagnostiek voor psychische stoornissen; les Dijkman, Geert-Jan Dinant, Mark Spigt. Huisart Wet 60(9) september 2017
2021	E-book Effective Scientific Writing and Publishing (www.degruyter.com/document/doi/10.1515/9783110721621/html)

3.2.2 Use of products by societal groups

Advisory reports

Table 3.2d: Advisory reports for policy makers and/or clinical guidelines (2017-2022 max. top-10)

Year	Name	Advisory reports
2017	C.P. van Schayck	Global commission on Pollution and Health, an initiative of The Lancet and the UN.
2017	L. Smits	Limburg Obstetric Quality System Zorgpaden; document is updated yearly
2019	R. Ottenheijm	Dutch College of General Practitioners guidelines: shoulder complaints
2019	J. Muris	Dutch College of General Practitioners guidelines: <ul style="list-style-type: none"> • Asthma in adults • Asthma in children • Quit Smoking in primary care
2019	J. Muris	Dutch Federation of Medical Specialists (FMS) guidelines: <ul style="list-style-type: none"> • Coeliac disease and gluten hypersensitivity • Asthma in secondary care • COPD in secondary care • Acute asthma attack
2020	L. Wynants	Invited member of the expert group AI in Health, Dutch Ministry of Health, Welfare and Sports.
2022	E. de Bont	Dutch College of General Practitioners guideline; Acute cough
2021	J. Cals	Collation of 33 advisory reports of Begeleidingscommissie Digitale Ondersteuning Bestrijding COVID-19 to the Dutch minister of health (VWS)
2022	J. Cals	Dutch College for General Practitioners guideline; Acute covid-19
2022	R. Ottenheijm	Dutch Federation of Medical Specialists (FMS) guideline; Subacromial pain syndrome

Collaborative projects

Table 3.2e: Collaborative projects implemented with/for professionals, non-scientific organisations, companies or public entities (2017-2022 top-10)

Year	Project	Non-scientific partner organisation
2017	Aquacycling (project on mild knee osteoarthritis)	Maastricht Sport
2017	Expect Calculator and Associated Care Paths	All midwifery practices and gynecologists participating in the Limburg Obstetric Consortium (n=190)
2017	De Gezonde Basisschool van de Toekomst	MUMC+, Provincie Limburg, Onderwijsstichting MOVARE, Kinderopvang Humanitas, Kinderopvang Parkstad, The Move Factory, gemeente Landgraaf, Gemeente Brunssum, Stichting Peuterwerk Limburg, GGD Zuid Limburg, Friesland Campina,
2017	Health Potential: Offering DNA tests and lifestyle assessments for personal prevention to premium prevention clinics	premium prevention clinics
2018	Zorgnetwerk Antibioticaresistentie	Hospitals, primary care physicians, microbiological labs and nursing homes in Limburg
2018	Development FFQTOOL™	WUR Wageningen, RIVM
2017	LucKi	GGD Zuid-Limburg, Zuyderland Jeugdgezondheidszorg
2019	Cancer aftercare guide	9 universities in Australia
2020	ePIDEMic: The physiological impact of dietary methylglyoxal	Technical University Dresden Germany, International Agency for Research on Cancer (IARC, France)
2021	Innovatieve diagnostiek voor de huisarts	MCC Omnes

3 Research Quality and Societal Relevance

Patents/Spin-offs

Table 3.2f: Patents/Spin-offs (2017-2022)

Year	Name	Describe patent/spin-off	Title patent/spin-off	Status patent/spin-off
2017	-	-	-	-
2018	Maurice Zeegers	Preventative genetic test	Health Potential	On the market
2018	Maurice Zeegers	Preventive genetic testing service	MyBasePair/Health Potential	On the market
2019	Eefje de Bont	Implementation of booklet on childhood fever at Thuisarts.nl	Implementation of booklet on childhood fever at Thuisarts.nl	Implemented online
2019	Maurice Zeegers	Providing evidence-based DNA algorithms for third parties	MyBasePair BV	Start-up
2020	-	-	-	-
2021	Onno van Schayck	Trademark Exhale stoves	Exhale Stove	
2022	-	-	-	-

3.2.3 Marks of recognition by societal groups Memberships of civil society advisory boards

Table 3.2g: Memberships of civil society advisory bodies (2017-2022, top-10)

Year	Name	Which advisory body	What kind of membership
2017	L. Smits	Medical Ethical Committee azM / UM	Deputy Member
2017	P. van den Brandt	Gezondheidsraad, Beraadsgroep Volksgezondheid Advisory council Task force on nutrition and cancer for cancer survivors, KWF	Member Member 2013-present
2018	C. Thijs	National Health Council	Member of Advisory Committee "Nutrition in the first 1000 days of life"
2019	A. Voogd	Dutch Cancer Society (KWF)	Member Scientific Board
2019	E. de Bont	Antibiotic resistance coordination team in Limburg (LINK)	Board member
2019	C. Thijs	Health Council of the Netherlands. Dietary recommendations for pregnant women.	Member of Advisory Committee
2019	M. Zeegers	Police: Landelijke deskundigheids makelaar	Member advisory board
2020	O. van Schayck	Verbindingstafel preventieakkoord	Scientific advisor
2020	J. Cals	Begeleidingscommissie Digitale ondersteuning Covid-19 ministerie VWS	Member committee

3.3 Case studies

OPC	KOALA study and LucKi Gut study : Complementary feeding during the first six months of life. Yes or no? ⁰¹	Good example of research coming from our cohorts. It also shows the impact epidemiological observational studies can have.
OPC	Studying the Healthy Primary School of the Future; "Children have more energy and behave more socially" ⁰²	Example of research in very close collaboration with societal partners, with a huge regional and national societal impact.
OPC	COVID precise: Living systematic review of diagnostic and prognostic prediction and machine learning models for COVID-19; the COVID PRECISE consortium ⁰³	This work had, and still has, huge scientific impact. It was published in BMJ, and very highly cited.

⁰¹ | www.maastrichtuniversity.nl/research/caphri/our-research/optimising-patient-care/complementary-feeding-during-first-six-months

⁰² | www.maastrichtuniversity.nl/research/studying-healthy-primary-school-future

⁰³ | www.maastrichtuniversity.nl/research/caphri/our-research/optimising-patient-care/covid-precise-living-systematic-review

4 Collaborations, strategic partnerships and infrastructure

Research line OPC is an active participant in the global research community, and as such, we collaborate with many national and international partners. At Research line OPC, we recognise that collaborative research is essential to achieving meaningful progress and impact in our work. The foundation of our collaborations usually rests upon our expertise in clinical epidemiological methods. In the following sections, we will describe some of the most prominent national and international partners with whom we collaborate on a structural basis.

Collaboration with MUMC+ departments

The collaboration between Maastricht University and the Maastricht University Medical Center (MUMC+) is a valuable partnership that brings together academic research and medical expertise. The collaboration allows for a seamless exchange of knowledge and expertise, with researchers and clinicians working together to tackle some of the most pressing health challenges of our time. This collaboration has led to many important innovations and publications, which have the potential to improve patient outcomes. The departments of Oncology, Obstetrics and Gynaecology, Dermatology are where the most dynamic collaborations take place. Moreover, there is an extensive collaboration with the departments of medical microbiology, laboratory medicine and medical imaging on effective diagnostic testing in general practice.

Consortium General Practice Netherlands

The Consortium Research in General Practice was formed in 2013 and will be a very important strategic partnership in the coming future. Its aim is to create and maintain optimal conditions for research in the field of primary care medicine and, in particular, General Practice in the Netherlands, including large-scale multicentre research. In 2021, ZonMw awarded a 3 million euro grant to the Consortium. This is for three studies on Covid-19 treatment in primary care and strengthening the infrastructure for research from GP practices in the Netherlands. One of the work packages in this project that was awarded to our team is a Platform trial on COVID-19 medications. This study will recruit patients from General Practice nationwide. The infrastructure that has been established during this study will be used for future large-scale trials in the Netherlands.

Collaborations with universities from Low-Income countries

Over the past decade, our team has successfully graduated several PhD candidates from low-middle-income countries, particularly those in India and Ethiopia. These PhD candidates typically hold tenured positions at their respective universities, while being supervised by researchers from OPC, often in conjunction with researchers from other faculties or research lines. In many cases, obtaining a PhD degree is a vital stepping stone for foreign university staff to advance in their careers, and Maastricht University provides the necessary supervision and grant of the degree. These collaborations have led to significant achievements in large-scale projects and top-tier publications. Upon graduation,

these PhD candidates become ambassadors for the university and serve as mentors to identify new talents for future collaborations. This process gradually strengthens and expands the network of partnerships.

Collaboration with province Limburg

The collaboration between “Gezonde Basisschool van de Toekomst” (Healthy Elementary School of the Future) and Provincie Limburg is a positive step towards improving the health and well-being of children in the region. Gezonde Basisschool van de Toekomst is a Dutch initiative that aims to create a healthy school environment by promoting physical activity, healthy eating habits, and social-emotional development. Provincie Limburg is a regional government body that is committed to sustainable development, innovation, and social cohesion. By working together, these two organisations can leverage their respective strengths and resources to achieve their common goals. The collaboration can also help to inspire other schools and communities to adopt similar initiatives and create a healthier future for everyone.

Infrastructure

OPC possesses several infrastructures that facilitate ongoing research projects. Although these infrastructures necessitate significant structural investments, their revenues are substantial. Consequently, we expend considerable effort to sustain these structures. The KOALA Birth Cohort Study is a long-term cohort study that focuses on the health and development of children. The study began in 2000 and involves following a large group of mothers and their children from before birth until adulthood. The study collects data on a wide range of factors that can affect health and development, including diet, lifestyle, genetics, and the environment. The aim of the study is to improve our understanding of how these factors interact and influence child health outcomes, with the ultimate goal of promoting better health and well-being for future generations. The Lucki Gut Study is an ongoing, dynamic, prospective birth cohort study, embedded in the Child and Youth Health Care (CYHC) practice in the Limburg region that started in 2006. Within this cohort the establishment of the infant microbiome is closely monitored and linked to health and disease throughout childhood. The GP Registration Network (RNH) was established in 1988. GPs recorded their patients’ medical data, such as illness and medication. Every quarter, these data were copied to the RNH’s research database. In 2018, the name changed to Research Network Family Medicine (RNFM) Maastricht. Consultation data and test results were added to the dataset. The number of GP practices increased to 28 by 2022; the number of active patients in the database grew to over 150,000. The RNFM cooperates intensively with the networks of the UMCs of Amsterdam, Utrecht and Groningen. These so-called ‘Intercity’ networks use a uniform database structure, making it easier for researchers to retrieve data from different networks, including around 1.5 million patients. The dataset continues to be updated quarterly with the latest health care data.

5 Trends, SWOT, strategic plans and viability

5.1 Trends, SWOT and strategic plans

5.1.1 Trends

The modern society we live in is constantly evolving in terms of its demographics, participation, and medical and health care advancements. These dynamic changes present an array of exciting research opportunities to enhance the optimisation of patient care. Personalised medicine is a growing trend that is gaining prominence, with health care providers increasingly tailoring interventions to individual patients. Personalised medicine uses a patient’s genetic makeup, medical history, and lifestyle factors to develop personalised treatment plans that are more effective, efficient, and safe. With advances in technology, personalised medicine is becoming more accessible and affordable, enabling health care providers to provide more precise and effective treatments.

The proliferation of electronic health data in recent years has necessitated the development of novel methods for analysing and utilising the vast amount of information contained within these datasets. The sheer quantity of data can be overwhelming, and traditional methods of analysis are often inadequate for extracting meaningful insights. By using the right analytic tools, health care providers and researchers can gain a deeper understanding of complex diseases, identify patterns and trends in patient data, and develop more effective treatment plans. As the volume of health data continues to grow, the role of data science in health care will only become more important, providing new opportunities for improving patient outcomes and driving progress in the field of medicine.

When it comes to prevention, we need both personalised approaches and community efforts. The need for personalised

prevention in health care is driven by the fact that each person has unique risk factors (determined for example by genes and early childhood characteristics) and health needs that require customised approaches to achieve optimal health outcomes. By providing personalised prevention strategies, health care providers can help individuals reduce their risk of disease and promote better health throughout their lives. As we move forward, community prevention programs are likely to gain greater prominence. This shift is due to the fact that people are not isolated entities, but rather integral members of a broader community. Consequently, the collective actions and attitudes of the community can have a significant impact on an individual’s ability to adopt and maintain a healthy lifestyle. Therefore, it is imperative that efforts be made to foster healthy communities and promote community-wide initiatives that promote wellness.

As low-income countries continue to develop, there is an urgent need for health care innovation to address the unique challenges that these nations face. With limited financial and technological resources, many low-income countries struggle to provide basic health care services to their populations.

The burden of communicable diseases, such as HIV/AIDS and malaria, remains high in many of these nations, while non-communicable diseases such as cancer and diabetes are also becoming more prevalent. Additionally, there is a shortage of health care professionals and facilities, making it difficult for individuals to access the care they need. Health care innovation is therefore critical in improving health care access, affordability, and quality for people living in low-income countries. New pharmaceutical and non-pharmaceutical interventions, new diagnostic tools, and improved health care

5.1.2. SWOT analysis

Table 5.1: SWOT analysis of the Research Line

Strengths

- Extensive knowledge spanning various clinical and public health domains
- High impact on health care; for example, medical guidelines
- Many staff members integrate clinical with research work
- Strong tradition of interdisciplinary collaboration in and outside UM
- High output, also in high-impact journals, high scores in citation analyses
- Expertise in all fields of epidemiology, meta-research and scientific integrity
- Networks in the Netherlands, Europe and worldwide
- Availability of population-based and clinical cohorts
- Financially sound
- Strong ties with the region and awareness of regional issues in both care and research

Weaknesses

- Given our extensive expertise in research methods, we frequently offer our valuable insights and knowledge to various clinical and laboratory groups. However, as a consequence, we often receive a relatively smaller portion of the overall funds and scientific output. This trend can be observed, for instance, in terms of the number of PhD theses produced by our research line
- Funds for specifically methodological studies are scarce, so such studies often have to be self-funded
- Large diversity in research topics may make it difficult to see the research focus
- Each researcher in OPC has rather specific expertise. Often, we provide our expertise to other teams, while we could aim to create groups within OPC to start shared research projects

Opportunities

- Increasing demand for translational and implementation research, requiring staff that is rooted in medicine
- Increasing demand for expert epidemiological knowledge
- Synergy between the four research teams to acquire funding
- Increasing demand for personalised medicine/prevention
- Increasing demand for efficiency in health care
- Availability of large amounts of health records opens new opportunities for research and methods development

Threats

- Lack of funding for large-scale, long-term studies, especially cohorts
- Lack of funding for the methodological research
- Increased (data) legislation and related ethical procedures, slows down the research process and makes it more expensive
- Reduced budgets for research due to increased demands for health care costs



processes can help address the unique health care challenges facing low-income countries. For OPC, it is crucial to keep abreast of these changes in health care and society and anticipate their impact. To achieve this, we rely on cutting-edge scientific researchers who are at the forefront of their respective fields. Through rigorous experimentation, data analysis, and collaboration with colleagues from diverse disciplines, OPC can continue to provide new leads for optimising patient care.

5.1.3 Strategic plans

- 1 We will continue to exploit existing (cohort) data available within OPC, both for grant applications and for expanded collaboration.
- 2 We anticipate further growth of prediction research as a means of facilitating personalised medicine, shared decision-making, and better efficiency in health care. Therefore, we have appointed one assistant professor with specific expertise in prediction research methods.
- 3 We will continue doing methodologic research in all epidemiological subdisciplines (aetiology, prognostics and prediction, diagnosis, intervention and meta-research).
- 4 We will continue to evaluate innovative diagnostic techniques and treatments in primary care as well as in hospitals for effectiveness and cost-effectiveness. In particular, we will continue developing, testing, and implementing point-of-care diagnostics in different fields of primary care and transmurals care (interface clinics), in order to further improve effectiveness and efficiency of care.
- 5 We actively organise regular sessions dedicated to the exploration of potential avenues for collaborative grant applications. These sessions serve as a platform for harnessing the diverse expertise and knowledge held by the members of our research line. By doing so, we are able to not only

establish a consistent stream of funding but also foster the discovery of common shared research interests among our team members.

- 6 New, young, high-potential staff members are being recruited (depts. of Epidemiology, General Practice, and Complex Genetics) in anticipation of turnover of senior staff within the next 2-5 years. All of the new recruits will have to initiate or be involved in applications for research funds as a significant part of their job description.
- 7 The research line and overall activities of CAPHRI should aim to enhance the visibility of international research and recognise the contributions made by external PhD candidates.

5.2 Viability

The work of our research line is crucial to the advancement and improvement of medical care, as well as to address the challenges brought about by societal trends and developments. We take inspiration from these challenges and convert them into research, which we then translate into implementation and practice. Our research line is fueled by our inherent motivation, combined with our strong methodological expertise in epidemiology and primary care. We are confident that our research line will remain viable for the next decade, as long as we continue to collaborate with our reliable research partners and secure new research grants. However, we acknowledge the potential staff turnover due to retirement within the next 2–5 years, which is why we will be focusing on sustaining our earning power. This priority will be of particular importance for the younger members of our research line, and we will be paying special attention to their progress in this regard.



Maastricht University



Maastricht UMC+



Maastricht University

Care and Public Health Research Institute

Universiteitssingel 40, 6229 ER Maastricht
P.O. Box 616, 6200 MD Maastricht, The Netherlands
T: +31(0)43 388 2314, E: secretariaat-caphri@maastrichtuniversity.nl

www.caphri.nl

Our aim is to create a healthy society for everyone. We are doing this by providing high quality research to improve the individual quality of life and innovate healthcare and public health. Building a bridge between our research and society has our highest priority.

