

# Status of rehabilitation of the dizzy patient in France: focus on vestibular physiotherapy

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## Abstract

This study was designed to inventory vestibular rehabilitation practices in France. We conducted a survey by means of a questionnaire sent to a set of French vestibular physiotherapists (FVPs). The questionnaire was composed of 47 questions divided into six different items that allowed the exploration of different topics, such as the clinical examination and the rehabilitation protocol currently used. We observed independent therapeutic behaviours, with 79.6% of the participants adapting vestibular rehabilitation within the framework of prescription from the neurological contingent and 82.5% adapting to the care of the elderly population. It should be noted that 91.3% of the FVPs reported receiving dizzy patients as a first-line therapy. Otolaryngologists and general practitioners represent more than 50% of the prescribers. The FVPs know how to adapt their clinical evaluations and have a good instrumental evaluation practices. Videonystagmoscopy, rotary chair testing

and optokinetic stimulation are the gold-standard methods used by the FVPs. The use of measurement scales remains systematic for only 14.6% of them. FVPs have developed specific practices that may be considered as the practices of re-educators/clinicians of vertigo. Nevertheless, the continuing education of a FVP remains heterogeneous and is not sanctioned by a national diploma resulting from standardized and adapted teaching. In conclusion, the FVP is a central player in the therapeutic management of dizzy patients and is closely connected with general practitioners and ENTs. Of the surveyed FVPs, 72.8% define themselves as “vertigologists”. This study is a snapshot of the vestibular physiotherapist profession in France in 2019. It reveals a population of dynamic practitioners who question their actions in health and their role vis-à-vis their prescribers, colleagues and other paramedical professions (osteopaths, orthoptists, etc.). The FVP is lucid and committed to the training they must receive to carry out their mission in good conditions. This work is the first report of its kind in France.

## Introduction

In France, the profession of physiotherapist was created by law no. 46.857 on April 30, 1946 (1) in the course of a long historical process whose genesis started in 1880 (2). The profession of vestibular physiotherapist appeared gradually in the years 1960-1970, under the impetus of the work of Sterkers, Coorksey and Cawthorne (3). Currently, this profession is gathering more than 500 specialized practitioners. French vestibular physiotherapists (FVPs) are part of an ecosystem made up of first-line practitioners (emergency doctors, general practitioners, otolaryngologists, neurologists) involved in the management of the unstable and dizzy patients. At the present time, vestibular physiotherapy is not recognized as a proper specialty of physiotherapy. However, its particular intervention in access to care, and its support required both by the general practitioner and the ENT vertigo specialist have conducted to a specificity of training. The FVP designs and uses physical therapy protocols established by physiotherapists, and rehabilitation protocols established by physicians, to reduce the intensity of the vestibular syndrome of unilateral or bilateral peripheral origin (5,6,7,8) and of central origin (9,10). He or she evaluates the capacity for multi-sensory integration which can be defined by the ability to establish balance and gait in situations of sensory deprivation. It consequently determines the use of a perceptual motor style for processing (11, 12) in which visual and proprioceptive sensors act (13). He also assesses the consequences of neurological, psycho-cognitive and emotional disorders (14) on the functioning of the vestibular system (15,16). The FVP stimulates the central compensation process for improving the functional recovery of vertiginous and

unstable patients displaying impairments in equilibrium and walking (referred as VUDIEW patients, 17), when one or more abilities (gaze stabilization, postural ability, static and dynamic equilibrium function, spatial cognition...) depending on the vestibular system is altered. Professionally, the FVP is part of a network composed of general practitioners, nurses and medical specialists who have a direct prerogative with Vertigo, such as ENT doctors and Neurologists. (1,2). The FVPs also have the particularity of being located in public institutions, such as University hospitals, as well as in cities at the countryside, under a legal form peculiar to the French system known as private or liberal practice (18). Its particularity is that the payment of care provided by the physiotherapist is reimbursed at 60% by the primary health insurance fund (CPAM) and the remaining 40% by mutual insurance companies. The titles of the rehabilitation acts and the consultation fees are fixed by the CPAM in a document called "The general nomenclature of professional acts" (NGAP). All accounting management, purchase and maintenance of equipment, management of premises (rent, insurance, compliance with accessibility standards, health and safety) is the responsibility of the physiotherapist. The act of physiotherapy is evaluated only by the time spent with the patient, and not by the real investment costs. This is also a second obstacle to the practice of vestibular rehabilitation by French physiotherapists. Contrary to Australia, where vestibular physiotherapists act as first-line actors and contribute to patient orientation (19), the KVP only acts as a third level, after emergency and medical prescription (20). However, since 2015 the physiotherapy diploma is recognized by an academic level of grade 7 (European level) and grade 1 (French exam "Baccalauréat" level +4 by Universities) and a change in

the skills of the FVP has been observable for several years. There are two reasons for this. The first is linked with medical demographics in France. According to the summary report of regular activity published by the National Council of the Order of Physicians in 2018 (21), the average age of doctors in France is 50.7 years, and a gap is observable between the demographic growth of the general population and the provision of care (1/4 of the territory is in medical decline whereas the population increases). Moreover, the renewal of specialist doctors is in default, with a renewal index of 0.99 (data including all specialties without general medicine; the ENT is in low density on 1/2 of the territory). The decrease in medical population density, or even medical desertification, leads the population and the medical world to change their behaviour. In this context, it seems that the FVP sometimes positions itself as second or even first intention when some patients try to consult in the urgency of a vertigo crisis situation. Legally, the FVP can only establish a functional clinical assessment and a differential diagnosis. In the acute phase of vertigo, the notion of vital emergency may appear (22), and in the chronic phase, clinical signs are often uncorrelated with the topography of the lesion and the prognosis for recovery (23). In France, the FVP intervenes after the medical prescription, with variable delays depending on the patient's medical history. Its action in the care process results in little feedback to other practitioners and access to patient care data is controlled and limited. Rehabilitation research is the exclusive intellectual property of medicine in France and French physiotherapy does not have a proper research discipline, unlike some countries (24). Finally, only the physician can be an investigator in clinical research,

because "only the physician is exempt from the principle of protection of body integrity" from a penal point of view, which closes the debate. Nevertheless, certain research actions could be undertaken. For example, in France, omitting the observation of the ageing of the French population (document n°1730 January 2019 INSEE site) only epidemiological data such as those reported by Hulse et al (25) are available and can only be extrapolated to the French population. The production of data by the FVP, on the long-term follow-up of patients, could be a good basis for a retrospective study over the whole territory.

Questions have been raised about the heterogeneity of the practices proposed by the FVP. FVP uses physical treatment methods established in the 1980s by precursors such as Sémont and Epley (26). Currently, FVPs are becoming increasingly important in the management of VUDIEW patients through a growing range of interventions, including the use of behavioural psychology and motivational interviewing. FVP leads the patient towards functional rehabilitation by integrating protocols adapted to different age groups (from paediatrics to elderly; 27-28) and to pathologies in which vertigo is a symptom of comorbidity (such as multiple sclerosis, stroke, cerebellar ataxia...; 29). FVP combines its specific approaches with those of other fields, such as neurology, and is led to conceptualize complex rehabilitation programs. Vestibular rehabilitation protocols also vary according to the levels of peripheral or central impairments and compensatory capacities that are specific to each individual. FVP could therefore be directly involved in the phenotyping of the vestibular patient. It is questionable how the FVP population adapts to the range of practices that go well beyond the role

initially assigned to more general (muscular and postural) physiotherapists; extending to broader areas of investigation such as oculomotor function, cognition and affective-emotional.

The idea of this survey was born to try to answer these different questions. It was carried out on a large sample of FVP throughout France. It was designed in the form of a questionnaire composed of 47 questions, which were distributed to a heterogeneous population of practitioners (gender, age and geographical location). The questions covered training concepts, medical devices and therapeutic practices used, as well as clinical and instrumental evaluation methods. Additional questions on the practitioner's perception of his/her task/mission were provided, as well as questions on the evolution of the profession. This audit was therefore carried out with the aim of providing a snapshot, a kind of photograph of the FVP profession in 2019.

## **Methods**

### **Research methodology**

This survey was carried out between October and December 2018 among physiotherapists specializing in vestibular rehabilitation. The research methodology applied to the study is of descriptive type. It's a method derived from psychological research that addresses differentiation factors. It uses as a principle: the stability of inter individual variables and the correlational approach of the observations. In addition to the standardisation of tests in the search for individual differences, it makes it possible to create heterogeneous groups based on contextual or situational criteria. It falls within the framework of observational studies and can be assimilated to a "practice survey" in its construction. The

shape of the chosen sample is called "theoretical". In other words, even if the research device is planned upstream, this method leaves room for the inclusion of variables discovered during the research (especially for open or semi-open questions). Three types of variables are constituted: intergroup variables, inter-individual variables and intra-individual variables. We used the descriptive method because it allows not to define a hypothesis, but to start from one or more questions they focus on a type of functioning and aptitudes of the subjects.

### **Population**

Our research was directed to practising French vestibular physiotherapists (FVPs) who had expertise in the field of vestibular rehabilitation, and were adherents to the International Society of Vestibular Rehabilitation (SIRV) and/or the French Society of Vestibular Kinesitherapy (SFKV). FVPs who did not receive specific training in the field of vestibular rehabilitation (e.g. continuing education and/or university diploma recognized in the field) and any physiotherapist who did not receive an initial training in France were excluded from the study. Indeed, the survey only highlights the situation of initial training (which remains at a level of 3 hours of lectures, 3 hours of clinical examination courses and 3 hours of tutorials on average), and of continuing and University training, which, to date, is not standardized in content. Physiotherapists trained in initial training outside France have different theoretical and practical backgrounds and could cause a recruitment bias (e.g. the training of physiotherapists from Belgium, Australia, Canada, etc.). This selection was made possible thanks to the support of the two learned societies (SIRV and SFKV). Indeed, FVPs registered at these institutions have

an obligation to provide both training and specific equipment to Vestibular Rehabilitation Therapy (VRT).

In addition, the confirmation of training and the title is checked by the questionnaires and the non-inclusion of these items is a reason for exclusion.

### **Questionnaire building**

The questionnaire was built upon 47 questions. It consisted the six parts, and each part could be treated separately; thus, the management of the answers depended on the available time of the FVPs. The questions were oriented in the form of closed-ended, semi-open-ended and open-ended questions. The first aim was to analyse the opinion of the FVPs on the following topics: 1) the profiles and training of the FVPs, 2) their situation in the ecosystem of the dizzying patient clinical management, 3) their position regarding the inclusion criteria of the dizzy patient, and 4) their position in terms of the satisfaction, success, failure, evolution of the profession. The second aim was to collect specific markers of the "technician or clinician" behaviour of the FVP during his intervention. For the analysis of these variables, three models of health education were used (30-34).

### **Pre-test questionnaire**

Prior to sending the questionnaire to all FVPs, a committee of 8 expert practitioners with long-term experience in the profession was set up to validate its contents and relevance. A pre-test was performed by sending the questionnaire to a professional website for medical discussions between health professionals ([www.docadoc.com](http://www.docadoc.com)) to limit the biases of comprehension and interpretation. This pre-test consisted of removing the first

ten questionnaires received from the survey, checking the sources of bias and eliminating the effects of group submission (halo effect).

### **Questionnaire operating procedure**

The questionnaire was given through a hosting website to prevent many biases and to allow a transfer of the raw data to Excel files. This process allowed remain anonymous the respondents. The process could also be consulted at any time for control of the data by a third party and respected the laws in force on the rights of the participants. It also allowed us to control the composition of the sample, the participation rate, the data collection and the monitoring and abandonment rates. After eliminating duplicates (people enrolled in both learned societies), the studied population added up 512 inquiries. To date, no accounting traceability or traceability by practice speciality has been carried out by either the CPAM or the CNOMK in order to determine the exact number of physiotherapists practicing Vestibular Rehabilitation Therapy (VRT). Moreover, the key letter corresponding to the VRT act practiced by French physiotherapists and allowing coding at the CPAM (AMK 7.6) is the same as for 8 other acts. As a result, it is impossible to justify a number of practitioners other than by membership of learned societies, and for our studies criteria, the figures announced on other platforms seem to be only approximations. We provided three reminders by mail and published ads of the advertising type to bring visibility to the survey. Announcements were posted on professional websites and in the French review "Kinésithérapie Scientifique". The CNOMK was informed of the investigation. We received a total of 216 responses. A total of 113 questionnaires were excluded

from the analysis either because they were incomplete or because the respondent did not meet the inclusion criteria. A total of 103 questionnaires were fielded, completed and validated to be conformed to the protocol.

### **Encoding**

The questionnaire was coded and sorted into quantitative and qualitative data, using Excel<sup>R</sup> tables. A verification by one statistician and one post-doctoral researcher allowed us to correct the errors of writing and protocol.

### **Process for data extraction and analysis**

This process consisted of: 1) a descriptive analysis with a flat sorting of the data and a reading with conventional graphs (histogram, bar graph and pie, according to the variables identified (nominal, ordinal, numerical)); 2) a Pareto type analysis that highlights the 80/20 law (acting on 20% of the causes allows to solve 80% of the effects). The application of the Pareto principle makes it possible to identify 3 types of data: priority data, secondary data and residuals. This principle is drawn from the managerial and industrial world. The primary data generally represent 80% of the distribution of part of the data of a factor found in the population studied (example for FVPs: the rehabilitation equipment) and only 20% of the total number of data collected in the study for this same factor. This principle, although empirical, makes it possible to visualize and clearly reveal some of the strategies employed; 3) analysis with profiling and maturity index (MI). Three educational science models were used, namely posture, assessment and health models (29-33). A model or paradigm is a set defined by research in the humanities delineating a disciplinary

matrix, theory or stream of thought. The questions were theorized with the following research objective: to observe whether there is a specific profile in FVP and to learn about the practice patterns and needs of professionals in the field. The evaluation used here was carried out using qualitative measures. Like quantitative measures, qualitative measures can be transcribed and converted into relative scales using a maturity index, which is a simple linear scale (Likert scale; psychometric scale commonly used in research). Each criterion can be scored in 5 ways ranging from 0 (nothing) to 4 (best case). The three intermediate levels are 25%, 50% and 75% of maturity. Maturity indices are constructed from composite indices grouped in Supplementary Table 1 and subjected to a linear combination of variables. The maturity models applied to this research reveal the potential to inform university teaching institutions and departments of practice in physical medicine.

### **Parametric-type inferential analysis**

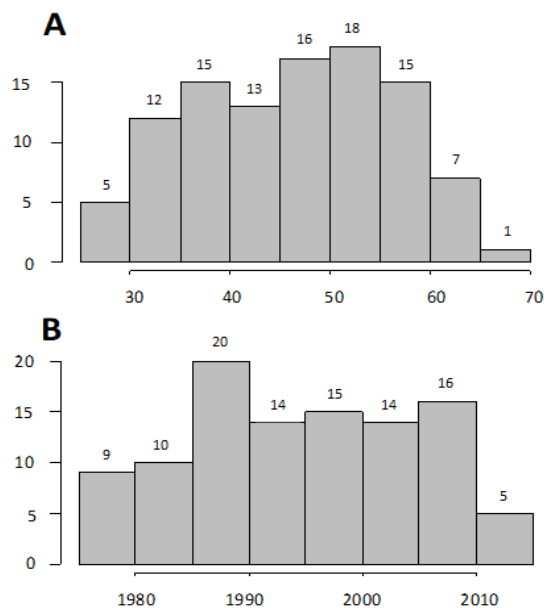
This analysis was carried out using the R software. It consisted of an analysis of 1) the sample and the conditions of application of the tests: normality of distribution or number of individuals greater than 30, variance and independence of individuals for the study of averages and theoretical number of individuals greater than or equal to 5 and independence of individuals for the study of percentages; 2) studies of the correlations between the variables (age of the therapists, year of graduation, year of initiation into practice and level of continuing education vs. university education) and studies of the quantitative data (in percentages) obtained in the different categories.

## Results

In France in 2018, the Professional Order of French Physiotherapist referred in its annual report to 87,462 professionals, of which 49.76% were men and 50.24% women, with 85.37% in private practice and 14.63% in wage labour practitioners. The representative sample in this study included 103 respondents out of 512 questionnaires sent. We assessed the number of participants required based on the number of variables under study to determine whether the sample we had could be representative of the population of 512 FVPs. To do this, we carried out a simulation on the R software, based on the number of respondents required to process our variables collected per individual, data collected anonymously from the databases of the learned societies. According to our research plan, the number of respondents planned for statistical validation was on average one-fifth of the respondents, i.e. 102.8 completed questionnaires. Our sample was therefore representative of 1/5 of the French vestibular physiotherapists (FVP) interviewed, following a Gaussian distribution. The resulting sample met the criteria for a normal distribution ( $N = 0.1$ ) in the Kolmogorov-Smirnov test. Parametric tests of the inferential type (e.g. Pearson correlation) could be applied.

### Description of the population under study

The age distribution was this one: the minimum age was 27, the maximum age was 67, and the median age was 48 (Fig. 1A). Eighty-one respondents were men, and 22 were women. The period of graduation of the FVPs ranged from 1976 to 2015, with a median date of 1994 (Fig. 1B).



**Fig. 1: Description of the study population. (A)** Distribution of the number of respondents FVP per age group (x-axis: Ranking by age group of 10 years, from 20 years to 70 years; y-axis: Number of FVP recorded by category). **(B)** Distribution by year of Physiotherapist degree completion (x-axis: Repartition by year from 1980 to the present; y-axis: Number of FVP recorded by category).

We observed that most respondents were in private practice (95 practitioners in private practice, 1 practitioner in wage labour, 7 respondents in mixed activities). The experience in vestibular rehabilitation (VRT) of the survey participants ranged between 1980 and 2018, with a median of 2009. The FVPs exercise a working time of between 1 and 11 half-days per week, with a median of 6 half-days per week. The duration of the reported treatment sessions was between 15 and 90 minutes, with a median of 30 minutes for 43.6% of the surveyed participants. It should be noted that 52.4% of the respondents worked in networks. Regarding the proposed treatment modalities, the FVPs reported performing individual management (supervision: one to one) in 93.2% of cases, combined care (supervision + home prescription) in 24.3% of cases, multistep management (circuit training session at the practice) in 23.3% of cases and group management (group therapy treatment with gymnastic practitioner) in only 13.6% of cases. The

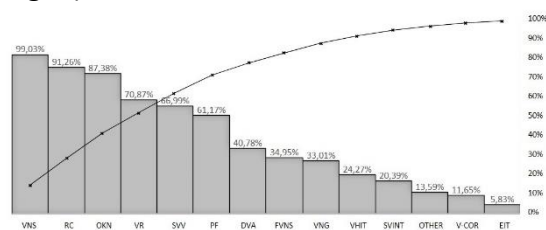
distribution of registrations in the different learned societies is given in Supplementary Table 2.

### Training of FVPs

We counted in the sample analysed, 9 University Degrees (UD; Supplementary Table 3), 20 training organizations (Supplementary Table 4). Out of the 103 FVPs, 63.1% had a UD, 82.5% had postgraduate training through continuous education, 0.97% had an orthoptist diploma, 6.8% had an osteopathic degree, less than 1% ad a master's 2, and less than 1% had a sophrology diploma.

### Equipment in FVPs offices

Video-Nystagmo-Scopy (VNS; 99%), rotary chair testing (RC; 91.3%), and Optokinetic Stimulation (OKN; 87.4%) are the gold-standard methods used by FVPs. Virtual reality (VR; 70.9%), subjective visual vertical (VVS; 67%), and multi-sensory posturography platform (PFM; 61.2%) are associated with the previous tools and account for nearly 80% of all FVP equipment (Supplementary Table 5 and 6; Fig. 2).



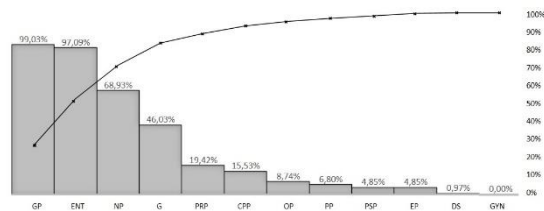
**Fig. 2: Equipment identified during the survey of FVPs: represents, as a percentage, the frequency of equipment in FVP offices.** On the x-axis the various materials listed in the FVP population during the survey [VNS: Video Nystagmoscopy / RC : Rotatory Chair / OKN: Optokinetic (ball of) / VR: Virtual Reality / SVV: Subjective Visual Vertical / PFM: Posturography Platform / DVA: Dynamic Visual Acuity / D VNS: Digital Video Nystagmoscopy / VNG: Vidéo-Nystagmo-Graphy / VHIT: Video Head Impulse Test / SVINT: Skull Vibration Induced Nystagmus Test / OTHER : Foam Plate, Instability Tray, Diode Bar, Treadmill / V COR: Fluoroscopic Video of the Cervical Oculo Reflex/ EIT: Electronic Instability Tray]. Y-axis: Effect of 'material' input values in percentage. Pareto diagram: percentage representation of the 'material' effect. For example, the VNS and the RC alone represent 30% of the total material for the FVP population under study.

### Prescription and addressing vertigo patients to the FVP

The FVP adapts his or her treatment in VRT according to prescriptions 1) for balance disorders of central neurological origin, as reported by 79.6% of the participants; 2) for balance disorders without neurological pathology but including ageing, as reported by 82.5% of the participants; 3) for rehabilitation for posture disorders and sensory integration system or sensory conflicts, as reported by 63.1% of the participants; 4) for walking disorders and the rehabilitation of lower limbs, as reported by 61.2% of the participants; and the rehabilitation of paediatric patients with psychomotor aims, as reported by 12.6% of the participants. Except for paediatric interventions, more than half of the surveyed FVPs provide VRT as part of non-specific VRT prescriptions. The FVP tends to integrate his or her practice into other aetiological contexts, adapting his or her management skills to the clinical manifestations. In addition, they use VRT outside the prescription framework for 68% of the cases. It should be noted that 91.3% of FVPs report receiving first-line dizziness patients. The main prescribers of the FVPs are ENTs (97%), general practitioners (GPs) (99%), neurologists (68.9%), and geriatricians (46%). Approximately 50% of FVPs work under the prescription of 3.5 different medical specialties (median: 3.48, extremes: 1-8). ENT and GP alone (without other correspondents or physicians involved in the care) account for 52% of the total VRT prescribers for the FVP population studied (Fig.3). People referred by "non-doctors" are carried out by other generalist physiotherapists in 31% of cases, patients in 26% of cases, osteopaths in 21% of cases, orthoptists in 15% of cases, psychologists in 4% of cases and



psychomotor therapists in 3% of cases. 50% of FVPs work on average with 3.1 paramedical collaborations (median 3.5, extremes 0-6). General physiotherapists and patients who are satisfied with their VRT represent 69% of people who recommend vestibular physiotherapy outside the medical prescription circuit.



**Fig. 3. The vertiginous patient's address to the FVP. Percentage representation of frequency of VRT prescribers.** On the x-side the different prescribers referenced during the survey [GP: General Practitioner/ ENT: Otolaryngologist Practitioner / NP: Neurologist Practitioner / G: Geriatrician Practitioner/ PRP: Physical and Rehabilitation Practitioner / CPP: Cardiologist-Pneumologist Practitioner / OP: Ophthalmologist Practitioner / PP: Pediatrician Practitioner / PSP: Psychiatrist Practitioner / EP: Emergency Physician / DS: Dentist-Surgeon / GYN: Gynecologist]. Y-axis: Effect of the values of the 'VRT prescriber' entries, in percentage. Pareto diagram: cumulative percentage representation of the 'prescriber'. For example, GP and ENT alone account for more than 50% of the total VRT prescriber's population in the study.

### Inclusion of the Dizzy patient: the clinical interview

This part of the questionnaire dealt with the holistic approach of the dizzy patient by the FVP.

The results show that FVPs adapt their care to different aspects: 1) 26.1% for the psychic aspect (dominant emotion and behaviour: anxiety, stress, fear, anger), 2) 19.4% for the environmental aspect (risk factor, e.g. fall's risk), 3) 20.4% for the quality of life aspect : material living conditions, physical health, moral well-being, well-being at work, well-being in society, quality of the environment (noise, green space, intense visual information (e.g. supermarket work) or nothing visual information (e.g. clean room work)), economic insecurity and physical insecurity, 4) 30.1% for the personal experience aspect (symbolic of vertigo in

the patient's personal history), 5) 19.4% for the medical history aspect. A large proportion of FVPs (39.8%) considered that the medical prescription is insufficient to establish the rehabilitation protocol. Few of these FVPs (10.7%) adapted the patient management according to the type of prescriber (Supplementary Table 7).

### Medical file

The medical reports (for more explains see the Supplementary Table 8) used by the FVP at the first inclusion of the patient are mainly medical transmission, all specialties combined (96.1%), vestibular assessment reports (89.3%), medical images (88.4%), reports from paramedics (68.9%) and assessment reports carried out by the medical specialties or the otoneurological sphere (75.7%). However, FVPs are more interested in reports from ENTs (99.3% of them), neurologists (84.5% of them) and GPs (69.9% of them). These reports added to those of the orthoptists (63.14%) and the MPs (61.2%) represent 80% of the medical reports used by the FVP. ENTs and neurologists alone account for approximately 40% of the total reports used for the studied FVP population (for more explains see the Supplementary Table 8).

### Clinical examination

The routine clinical examinations were distributed as follows: examination of the cochleo-vestibular function (88.4%), oculomotor function -saccades, pursuits, vergences- (68.9%) and visual function (60.2%). Some evaluations, such as the study of psychomotor function, maxillofacial examination and psychic evaluation, are less frequently used by FVPs (4.9%, 0% and 6.8% of FVPS report

using them systematically, respectively; Supplementary Table 9).

### **Measurement scales**

The surveyed FVPs use measurement scales systematically (14.6%), frequently (25.2%), rarely (38.8%) or never (21.4%). Only 1.9% consider that these scales are systematically adapted to their needs, 37.8% feel that they are frequently adapted, 47.6% feel that they are rarely adapted, and 12.6% feel that they are never adapted. Of the 21.4% who never use measurement scales, 38.1% do not have enough time, 23.8% feel that the scales are not useful for the assessment, 19.1% find no interest in rehabilitation, and 19.1% do not know the scales. For the FVP population who feel that the scales are not adapted (12.6%), the given reasons are as follows: irrelevance towards the FVP practice, they do not consider the scales useful for rehabilitation care, and they think that there are too many scales to know. Regarding the needs in terms of scale adaptations, the FVPs responded positively to an indicator of locomotion (63%), an indicator assessing balance (86.4%), a motivational indicator (55.3%) and a functional indicator (72.8%). In addition, 70.6% of the surveyed FVPs believe that evaluation by measurement scale should lead to a decision tree; 85.4% believe that it must allow a follow-up of the patient before, during and after the rehabilitation procedure; 54.4% believe that it must be used as a basis for a medical report; and 50.49% suggest that it should be used for statistical purposes (database).

### **Assessment by the instrumentation**

The gold standards of VRT are videonystagmography (VNG, 88.4% of

answers), oculomotor function examination by video oculography (VOG, 84.5%) and bithermal caloric tests (74.8%), which are associated with the video head impulse test (VHIT), the VVS test and the PF test, respectively. These gold standards represent 70% of the exams currently used by the FVPs to establish a rehabilitation protocol. The standardized instrumental evaluation primarily uses VNS (95.2% of responses), followed by digital video nystagmography (DVNS/VNG, 79.6%), the VVS test (65.1%) and the PF test (52.4%). Digital Video-Nystagmography (DVNS) was developed specifically for physiotherapists. It is a classic VNS assisted by software allowing the calculation of the directional preponderances, the slow phase speed, the frequency and the number of nystagmus. DVNS is used in rehabilitation for its practical side by instantaneous display of slow phase speed, frequency and number of nystagmus during manoeuvres while the VNG is used for evaluation. These four instrumental evaluations account for 70% of FVP assessments. To begin his or her rehabilitation protocol, the FVP preferably uses kinetic VNG/DVNS, according to 87.4% of respondents, followed by VNS, according to 82.5% of them. Thermal VNG, VHIT and posturography are also preferred. On the other hand, the strategy of using evaluation instruments remains highly heterogeneous, with a total of 57 different responses. To modify their management in VRT, FVPs use VNS, according 72.8% of the respondents; kinetic VNG/DVNS, according to 67%; VHIT, according to 38.8%; and thermal VNG, according to 38.8%. These four exams account for 70% of the FVP exams. Here, the use of evaluation instruments remains heterogeneous, with a total of 44 different responses. For discontinuing rehabilitation care, VNS remains the most

used tool for 72.8% of the surveyed FVPs. Kinetic VNG/DVNS, PF and bithermal VNG account for approximately 70% of the examinations used. Again, the strategy of using evaluation instruments remains heterogeneous, with a total of 41 different responses. For communication with the prescribers, kinetic VNG/DVNS (72.8% of the reported cases) and VNS (70.9% of the reported cases) remain the most used, followed by the PF test, thermal VNG and the VHIT test, which together represent more than 80% of the FVP practices for this item. On the other hand, the strategy of using evaluation instruments is very heterogeneous, with a total of 46 different responses.

### **Rehabilitation tools and techniques**

This part of the questionnaire intended to highlight the tools and techniques most commonly used by FVPs. The optokinetic stimulation (OKN) is used by 97.1% of the FVPs: it is a generator of light points projected in a dark room inducing illusions of screen's motion or self-motion in the 3 planes of space. The rotatory chair, (RC) used by 94.2% of the FVPs, is a French-style rehabilitation tool allowing to work on vestibular inputs by Coriolis effect. Videonystagmoscopy (VNS) is used by 87.4% of the FVPs: here the VNS is used like a tool for controlling the correct execution of positional correction manoeuvres and like a real-time feedback tool during rotator chair rehabilitation. Foam plates used by 80.6% of the FVPs, are an aid to proprioceptive stimulation exercises or sensory conflict. Instability trail is made by for 71.8% of them. This tool includes all the activities of medical gymnastics allowing to put the patient in situations of coordination, balance, taking into account his capacities of substitution, adaptation, or habituation. Finally, virtual reality (VR) is operated by 68% of the

FVPs. To this standard gold are added other tools and techniques (Supplementary Table10). OKN, VNG, RC, VR, foams and equilibration plates, a walking treadmill, oculo-cephalogyric rehabilitation and posturology techniques represent 60% of the techniques used by the surveyed FVPs. Finally, 90.3% of FVPs were satisfied with their rehabilitation and 20.4% responded that they were aware of a lack of knowledge and skills in specific aspects of care: oculomotor function, multisensory integration, and the motivational approach.

### **Therapeutic options**

According to the survey, on average, a FVP builds 57.3% of his or her rehabilitation protocol for the assumed pathology (diagnosis present in the prescription), 40.8% on the symptomatology (non-qualitative and non-quantitative doctor's prescription), and 1.9% admit to failing to build a targeted protocol. To the question "Are you able to make a request for an additional examination based on your physiological assessment?" 60.2% of FVPs respondents answered positively in order to refute or confirm a clinical hypothesis and 32% to target rehabilitation work. 7.7% of respondents were unable to make such a request. 33% of FVPs claim to be able to define a specific clinical profile from an instrumental assessment, while 54.4% of FVPs claim to be able to establish an overall clinical profile and 12.6% respond that they are unable to do either at this time. In addition, 43.7% of FVPs said they could identify a psychogenic disorder (anxiety, stress, anguish) in a patient, 31.1% said they could identify a psychiatric disorder (phobia, mood disorder and post-traumatic shock) in a patient, and 25.3% said they could not. Finally, in the field of therapeutic education, 36.9% of FVPs claimed the

ability to define a motivational state subjectively (e.g. family support, willingness to comply with therapy, state of dissonance...), 35.9% of them claimed to establish a motivational interview and 27.2% of them replied that they did not include the motivational field in their evaluation.

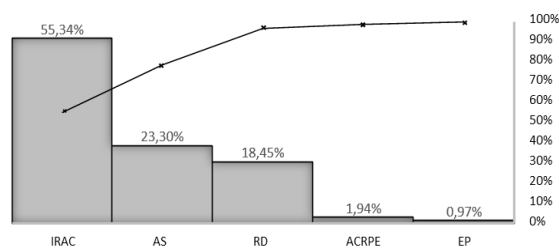
### **Exit: the patient, the physiotherapist, the profession**

When asked "Do you find your performance satisfactory?" FVPs responded favourably for 67.9% of respondents. However, when asked to give their opinion on areas of improvement, 30.1% of the FVPs made suggestions including "lack of consensus on instrumental tests" and "lack of relationship between symptoms and test results". Similarly, it is adapted to the re-education for 36.7% of the FVPs but requires other data for 57.3% of the FVPs. The respondents are, most of them, in favour of obtaining new data. Opinions on the needs of FVPs in regard to the instrumentalization available in 2019, given as a percentage of the answers collected from the study population, are as follow: 1) no opinion - 69.9%; 2) lack of consensus, too many tests, no relationship between symptoms and test results - 6.8%; 3) instrumental assessments are necessary and objective - 6.8%; 4) instrumental FVP examination is insufficient - 3.9%; 5) lack of vestibulometry assessments - 5.9%; 6) clinical review, scales (psychic, motivational, behavioural) - 5.8%; 7) material prices- 1%. Opinions on the expectations of the FVPs regarding future instrumental data, given as a percentage of the answers collected, are as follows: 1) without opinion - 45.6%; 2) instrumental limits (problems regarding the norms, metrology, specificity, sensitivity,

reproducibility of instrumental diagnosis not compliant and not correlated with symptomatology or quality of life) - 20.4%; 3) simple, fast, functional, validated scales (including patient evolution, spatial cognition, emotional evaluation, behavioural evaluation) - 10.7%; 4) clinical assessment, initial survey, examination, inventory, differential diagnosis - 6.8%; 5) what assessment should be given during emergency and first-line situations - 5.8%; 6) examinations that the physiotherapist should do (e.g. bithermal caloric system, VNG, cVEMPS, oVEMPS) - 5.8%; 7) recommendations, common data, software with database, patient classification and rehabilitation tool adaptation - 4.9%.

To the item "What do you do if you observe that the reason for sending the patient is not in line with your assessment?", the FVP responded: 55.3% of cases establish an initial report and perform the rehabilitation care adapted to clinical reasoning, 23.3% of cases refer to a specialist, 18.5% of cases refer to the prescribing physician, 1.9% of cases carry out a rehabilitation treatment adapted to their assessment and refer the patient to the prescribing physician at the end of the treatment, 1% of cases fill the prescription without taking into account their assessment. "Initial report and adapted care" and "addressing a specialist" together represent approximately 80% of the total behaviours referenced in the surveyed FVP population (Fig. 4). Approximately 68% of the responding FVPs seem satisfied with their diagnosis assessment but they evoke different elements of constraints as follows: without opinion - 36.9%; lacks a more global assessment of the vestibular system, including oculomotor function the possibility of labelling before the specialist, indicators of developments, the possibility of establishing a decision tree

and a database - 22.3%; lack of instrumental standards - 17.5%; lack of vestibulometry examinations, a cross-cutting approach, the sharing of patient records - 9.7%; lack of time and financial means for investment in equipment - 6.8%; professional acts not valued financially - 3.9%; lack of balance sheet and follow-up, including psychological, quality of life, mental state, spatial representation - 2.9% of the FVPs.



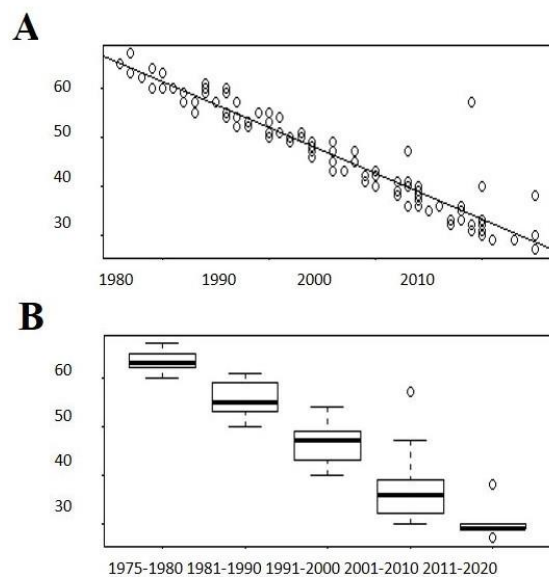
**Fig. 4: Representation of the frequency, in percentage, of the « therapeutic behaviour of the FVP » in VRT if the balance sheet does not conform to the initial prescription or if a differential diagnosis is evoked.** On the x-side of the various items proposed during the survey [ IRAC: Initial Report and Adapted Care /AS: Addressing a Specialist / RD: Redirect to the doctor / ACRPE: Adapted Care, Referring to the Physician at the end/ EP: Executes the Prescription]. On the y-axis: effect of the values « therapeutic behaviour of the FVP », in percentage. Pareto Diagram: Cumulative Percentage Representation of the headcount “Therapeutic Behaviour of the FVP”. Example IRAC and AS alone represent about 80% of the total behaviours referenced in the FVP population under study.

90.3% were satisfied with their rehabilitation procedure, and they provided remarks listing their criteria for stopping the VRT. The main criteria for discontinuing rehabilitation were achievement of the objectives previously fixed with the patient, according to 88.4% of the FVPs; successful rehabilitation according to instrumental assessment, per 72.8% of the FVPS; limitations of initial prescription, according to 16.5% of the FVPs; and failed rehabilitation, according to 74.8% of the FVPs. A total of 20.4% of the respondents believe that there are gaps in the approach and the link between dizziness and maxillofacial, cervical, oculomotor and cognitive-behavioural, integrative. To come to a conclusion, 97.1% of the respondents believe that a

FVP must have a suitable level of knowledge; 92.2% are satisfied with their profession; 77.7% believe that FVPs are ready for the management of BPPV patients; 72.8% are in favour of changing the name “vestibular physiotherapist” to “vertigologist”, which better fits with the multimodal intervention of the FVP; and 54.4% of FVPs are willing to share their assessment data in the event of a clinical study.

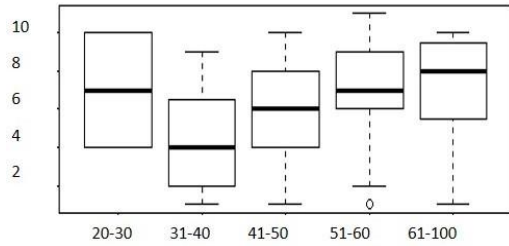
## FVP profile in 2019

Studying the specificities of our sample enabled us to draw the following observations. We were able to show a strong correlation (Fig. 5A) between the therapist’s age and the beginning of VRT use ( $p < 0.005$ ,  $R^2 = 0.90$ ; Fig. 5B).



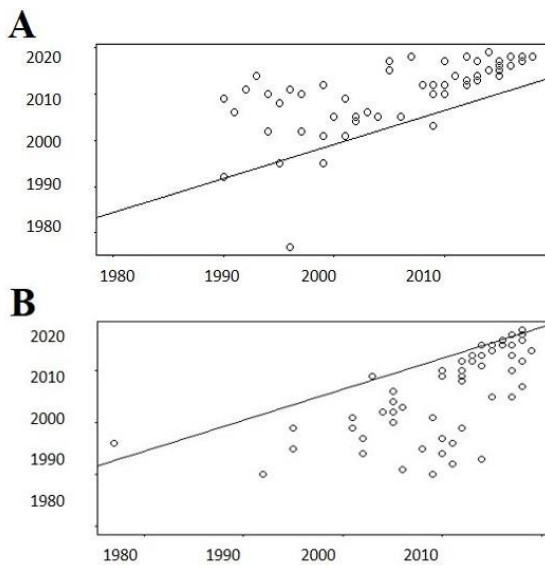
**Fig. 5: Profile of the FVP in 2019. (A)** Correlation between the VRT practice and the age of the FVP. X-axis: Year of practice beginning; Y-axis: Age of therapists. **(B)** Age of practice start. X-axis: Distribution by years; Y-axis: Age of therapists. Each box represents in its center the median age (thick black line) and the maximum age (quartiles). Distribution of the number by box from left to right: 9, 30, 29, 30, 5. Example for the period 2001-2010 year of practice start we have 30 FVP distributed from 30 to 48 years with a median at 38; one FVP exits the box for one value to 58 years of age.

The working time period according to the age of the therapist is maximal in the 20-30-year-old and over 60 years old age groups (Fig. 6).



**Fig. 6: Distribution of working time per age group.** Distribution by box from left to right: 5, 27, 30, 33, 8

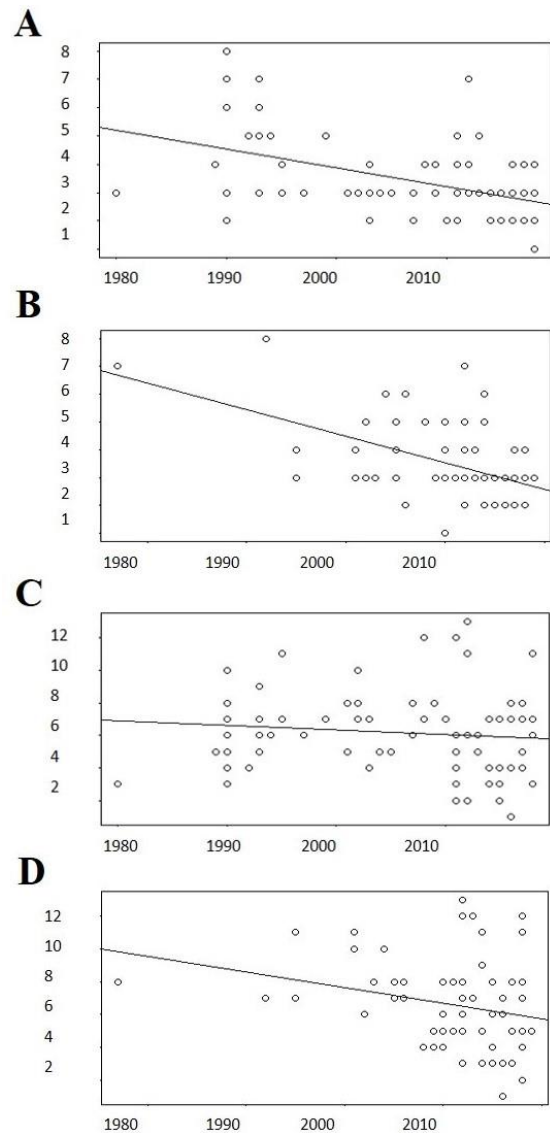
A mean correlation is observed (Fig.7A) between the starting year of professional practice and obtaining a university degree (UD) by the FVP ( $p < 0.05$ ,  $R^2 = 0.44$ ). This trend is also observed in the context of continuous training ( $p < 0.005$ ,  $R^2 = 0.44$ ), as the start of the training usually corresponds to the beginning of VRT practice (Fig. 7B).



**Fig. 7: Relationship between training and commencement of practice in VRT.** (A) Correlation between the start of the VRT year of practice and the year of graduation. X-axis: Beginning of VRT practice; Y-axis: Year of graduation from university. (B) Correlation between the year of beginning practice and the year of obtaining a diploma in continuing training. X-axis: Year of beginning of practice. Y-axis: Year of diploma obtention in continuing training.

With a low correlation ( $P < 0.05$ ,  $R^2 = 0.21$ ), we observed that a FVP tends to reduce over time the range of prescriptive medical specialties in his or her field of activity (Fig. 8A). This tendency is also accentuated with the specialization of

university education ( $P < 0.05$ ,  $R^2 = 0.26$ ), which is an observation also made by a weak correlation (Fig. 8B).

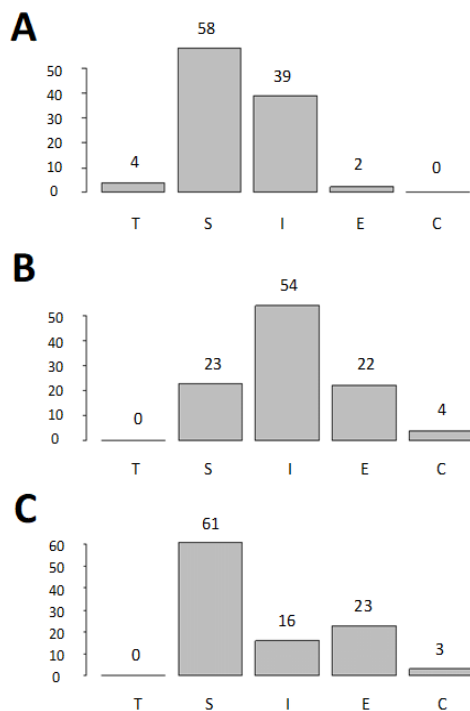


**Fig. 8: Impact of training on the FVP.** (A) Correlation between obtaining a diploma in continuing training in VRT and the number of prescribing medical specialties. X-axis: Year of obtaining a diploma in continuing education; Y-axis: Number of prescribing medical specialties. (B) Correlation obtained between the year of obtaining a university degree in VRT and number of medical specialties that prescribing. On the x-axis the year of graduation; on the y-axis the number of prescribed medical specialties. (C) Correlation between the year of obtaining a diploma in continuous training in VRT and the number of instrumental tools used for the assessment of the dizzying patient. X-axis: Year of obtaining a diploma in continuing training; Y-axis: Number of instrumental examinations performed by the FVP. (D) Correlation between the year of graduation in VRT and the number of instrumental tools used. X-axis: Year of obtaining a UD in VRT; Y-axis: Number of instrumental examinations performed by the FVP.

There was no correlation between the information received in continuing

education and the number of instrumental examinations used for the management of dizzy patients (Fig. 8C) ( $P > 0.05$ ,  $R^2 = 0.01$ ). Interestingly, we observed a weak correlation ( $P < 0.05$ ,  $R^2 = 0.07$ ) between education in UD and the decrease in the number of instrumental examinations practice. (Fig. 8D)

**The FVP between the technician's (IM score = T) and the clinician's (IM score = C) behaviour.**



**Fig. 9: The FVP between technician's (IM score = T) and clinician's (IM score = C) behaviour.** (A) Questioning Model: Technical Design / Clinical Design. X-axis: distribution of the headcount according to categories [T: technician / S: sensitized / I: Intermediate / E: Expert / C: Clinician]. On the y-axis the number of FVP. (B) Posture model: Technician design / Clinician design. X-axis: Distribution of the headcount according to categories [T: technician / S: sensitized / I: Intermediate / E: Expert / C: Clinician]. On the y-axis the number of FVP. (C) Health Model: Technical Design / Clinical Design. On the x-axis the distribution of the headcount according to categories [T: technician / S: sensitized / I: Intermediate / E: Expert / C: Clinician]. Y-axis: Number of FVP.

Using an evaluation model, we compared the so-called technician checklist-type evaluation with the clinician-type diagnostic procedure (IM score = S for 58 participants and IM score = I for 39 participants; Fig. 9A). Using a posture

model, we compared the so-called technician executive-type position with that of the clinician design type (IM score = I for 54 participants; Fig. 9B). For the health model, we compared models of organicist health (biomedical curative) with those conceived as the existence of an autonomous subject open to the world (global model of non-positivist health) (IM score = S for 61 participants; Fig. 9C).

**Discussion**

**Description of the population under study**

According to the data from different surveys carried out by the Directorate for Research, Studies, Evaluation and Statistics (DREES) in 2017 and the National Council of the Order of Physiotherapists (CNOMK) in 2019(18) we notice that the distribution in Liberal practice is made of 52% male and 48% female for French physiotherapists against 78.6% of men and 21.4% of women for French Vestibular Physiotherapist (FVPs). The breakdown by mode of practice is 85.4% in private practice compared to 14.6% in salaried practice for all physiotherapists, while 92.2% of FVPs are distributed among private practice and only 7.8% in salaried practice. These figures vary little for two reasons: the first is that the population of FVPs is in private practice before their specialization course and a fortiori remains in this mode of practice in the pursuit of their professional career. The second reason is that there is little practice of VRT (Vestibular Rehabilitation Training) in institutions: multidisciplinary vertigo centres are not well developed in France to date. The largest group of physiotherapists in France in 2018 is the 30-39-year-old age group with a median age of 54 years, while the median age of FVPs is 48 years, with the highest density



being the 45-55-year-old age group. This shift in median age is explained by the fact that VRT is more recent in the historical chronology of physiotherapy practice. On the other hand, the difference in slices and maximum density can certainly be explained by the need to acquire a "clinician" type of professional maturity (through the design of the patient's questioning and examination) in order to practice VRT. Indeed, during a "micro sidewalk" type audit, carried out during the "Assises de Nice" (an annual national meeting gathering the ENT and neurotology French community) in 2017, the FVPs described VRT as a complex practice in its learning, expensive, and imposing an increased responsibility, linked to the management of emergency situations, different from what they had previously experienced in their practice as a general physical therapist.

### Duration of sessions and mode of exercise of rehabilitation

In 2006, the report of the national

observatory of the demography of the health professions (35) took stock of the state of the profession by denouncing the differences between the legal texts and the practical application of practice in the field. In these texts, the physiotherapist is remunerated according to the act performed and the time of 30 min per patient (36); the session must be performed on a one-to-one basis.

This report (Fig 10) identified no less than 6 different practices in terms of session length (from 20 to 60 minutes) and modality (individual or group work). Therefore, it appears from the results of this question that the FVP also has a treatment strategy that is not tied to a time limit (although the majority of 43.6% of FVPs deliver a consultation within 30 minutes).

On the other hand, he differs from his generalist colleagues in that 93.2% of the FVPs favour supervised rehabilitation. Looking at all of these practices, it is understandable that in France, in the

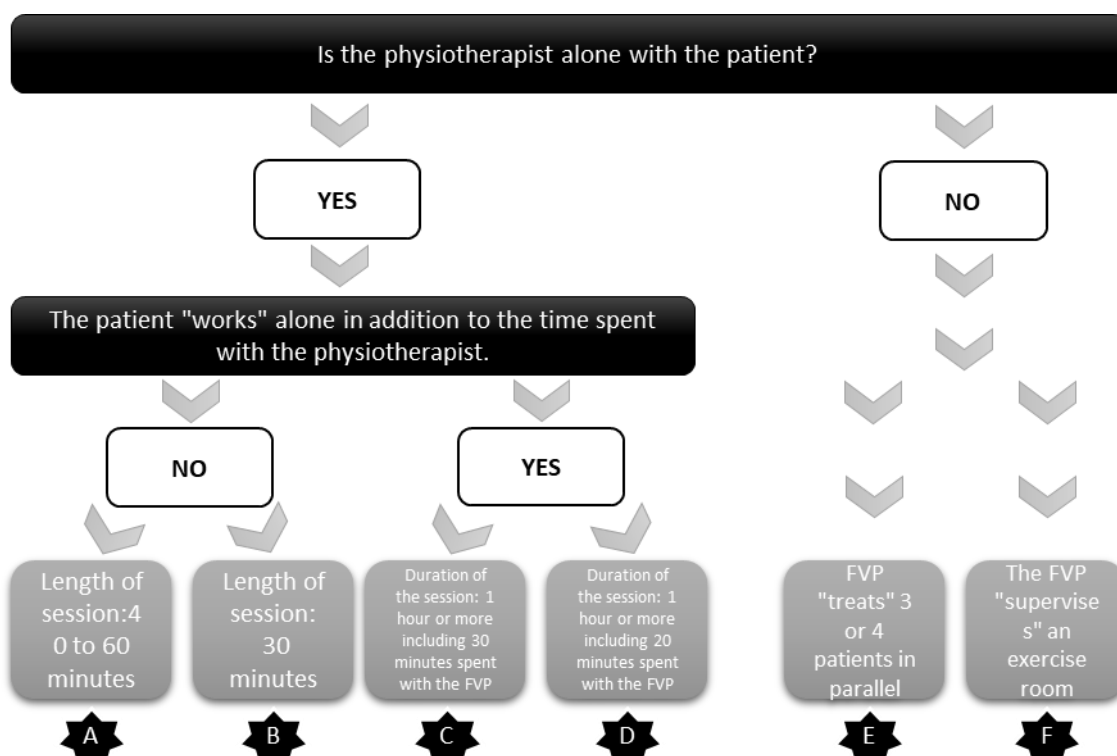


Fig. 10: Duration of sessions and mode of exercise of rehabilitation observed among physiotherapists in France (inspired by the report of the national observatory of the demography of the health professions of 2006). Identification of the different types of organisational behaviour in terms of time of sessions and number of patients



world of physiotherapy, without shared therapeutic references (protocol and level of evidence), time and one-to-one are considered to be the measure of the quality of care (both by physiotherapists and the medical world). Apart from studies on group work have also shown positive effects on the effectiveness of rehabilitation (37). The very wide range of the patient's conditions and the vertigo clinic should be a priority reason for the organization of the session in time and type of modality. Perhaps at this stage a working methodology must be proposed and validated according to the needs of the patients and not the organizational strategies of the physiotherapist.

### **Heterogeneity of FVPs training**

In France, the initial training proposes a very succinct approach to vestibular rehabilitation with an average of 3 hours of lectures, 3 hours of courses focusing on the physiotherapy assessment and 3 hours of practical rehabilitation courses. This point is very important because it explains the starting point of the heterogeneity of behaviours observed in our survey, as the FVP will seek to train itself essentially in so-called continuing education. The best known sector of continuing education is continuing vocational training (CVT), introduced in France since the law of July 16, 1971. It is provided by a multitude of organizations with varied statutes. It is co-financed by employer contributions and by the State and local authorities. Continuing professional training in physiotherapy is subject to the DPC (Continuing Professional Development) and the FIFPL (Interprofessional Training Fund for Liberal Professionals). The National Agency for DPC (ANDPC) for healthcare professionals, which manages DCP, was created by the Law on the Modernization of our Health System of

January 26, 2016. Every three years, every health professional must certify that he or she has been trained, has assessed his or her practice and has managed his or her professional risks. The ANDPC provides a search engine that brings together the training courses that make up the official DPC offer and that are provided by organizations or training structures recognized by the Agency.

Financed by health insurance, the ANDPC accredits the organizations and pays for the training courses, which allows the practitioner to close his practice to train. The (FIF-PL) is financed by liberal professionals who pay the contribution to professional training (CFP). Each year, the trade unions study and decide on the criteria to pay for specific training to their profession. They determine the themes and amounts allocated. These criteria can be consulted on the FIF PL website: [www.fifpl.fr](http://www.fifpl.fr) (38).

The University Diploma (UD), also known as a university degree, is off the beaten track. Indeed, it belongs to the category of establishment diplomas. It differs from the Bachelor, Master and Doctorate which are national diplomas also called "state" diplomas, delivered in the name of the Ministry. The UD is delivered by a French university or a large public institution in order to meet a specific need in a given territory. This means that this diploma is taught in one university but will not be taught in others. Thus, it is not recognized at the national level. Each university is autonomous in the choice of the teaching of its UD. It is free to choose the modalities of access to the diploma, the duration of the training, the teaching it wishes to provide as well as the methods of evaluation. The university diploma allows above all to stand out from the competition by its added value. Indeed, it

brings additional skills to the classic courses and allows you to specialize in a particular field.

There is a disparity in the type of training chosen (63.1% have a UD, while 82.5% have continuing education). Moreover, a total of 29 training courses not standardized by their content remains surprising! At this time, trainers and managers of university courses remain free of the content of their courses without any recommendations from medical institutions and learned societies of ENT and FVPs. The winning DU is that of Paris 7 University (B Cohen) for 40.2% of the FVPs who graduated from university and the SISMED training (A Sémont) for 40% of the FVPs belonging to the 82.5% who have completed continuing education.

### **Equipment of FVPs offices**

The three VNS, FR and OKN equipment account for 50% of the overall FVP's equipment. This observation seems to correlate with the teaching initiated by A Sémont who formatted the VRT around these 3 tools in France in the 80's. On the Parieto graph (Fig 2) it can be seen that 80% of the equipment of FVPs is represented by VNS, RC, OKN, RV, VVS, and PFM. This widening of the equipment towards a more multi-sensorial approach seems to be observed with the development of the UDs, which we will discuss later in our discussion.

### **Addressing vertigo patients to the FVP**

Addressing, which means "the act of addressing", is commonly used in computer jargon. It designates the presence of a multitude of equipments which, in order to differentiate between them, requires a coherent identification

system to be defined within a network. This notion can be transposed to the place of physiotherapy in the French health care network: it is the doctor who carries out the first triage and, if a condition requiring rehabilitation care is identified, refers it to the competent professional. Three main prescribing physicians (GPs, ENTs and Neurologists) emerged from the survey. ENTs and GPs represent 55% of all these prescribers (Fig.3).

They are the necessary basis of the pyramid-type network instituted by the physician's prescribing role in France. At this stage a surprising observation is that the GP is the first VRT prescriber (99%) ahead of the ENT. This is partly due to medical demographics and waiting times for an ENT consultation which can be as long as 6 months (39).

In addition to this observation, the general practitioner has, in France, a role of triage, classification and orientation (either primary care or preventive care). He or she refers the patient through the healthcare system and, if necessary, to a corresponding specialist doctor, to whom access is thus subject by the prior recognition of a need. Although this role is no longer mandatory since the law of 12 January 2005, it is strongly encouraged by a financial facilitation for the doctor and a financial sanction for the patient (40). This law instituted a "French-style" Gatekeeper freely inspired by the British scheme where the GP is an obligatory passage before the specialist. The GP is also undergoing a demographic change with a very unequal distribution in France (21).

These observations explain, in part, the feedback from the FVPs discussed above on the difficulty experienced with regard to the notion of responsibility for the care provided in the VRT and on the

observation of a growing evolution of the notion of second intention sorting. Another observation is the emergence of a cross-cutting network, defining a parallel orientation of the vertigo patient to FVPs that is non-institutional and non-conventional! This network includes general physiotherapists, informal patient networks, and allied health professionals. This observation is not innocuous and calls for urgent solutions to be found regarding the place of FVP. The SIO (International Society of Otoneurology), questioned by this observation, gave its agreement for an extensive reflection on this observation at the SFKV congress in March 2020. We questioned the FVPs about possible areas of intervention in which they could apply VRT. We note from the responses obtained that a large proportion of the FVPs transpose VRT to areas other than ENT. This is made possible by several factors. The first is the free choice of tools and technical used by the physiotherapist (20). The second is in the possibility given to the French physiotherapists, according to the type of prescription (see Supplementary Table11) to develop their own expertise (41). The third is the use of VRT outside the field of ENT, which is promoted, in literature, by works published in physical and rehabilitation medicine (42, 43).

It should be noted that the declaration made by the FVPs to receive the vertigo patient as a first line of care for 91.3% of them strengthens the argument made previously on the existence of this transversal orientation network specific to this practice and is unheard of in France.

### **Clinical examination**

This section provides a general discussion of markers that may influence the management of VRT patients. It should be

noted that several authors, such as de Yardley (44), advocate the psycho-emotional aspect as one of the factors that may contribute to a transition to chronicity of vertigo (environmental and quality of life factors -CIF; 45). Observation made in the first 3 lines of Supplementary Table 7 that a majority of FVPs have a rather holistic approach to the patient, integrating these notions which seem to us to be unavoidable.

The medical history and the personal history of the patient are part of the learning of the interview in initial training. Previous markers are less likely to be addressed or questioned due to a lack of initial education on the topic and a lack of training in the use of screening tools, yet still accessible to physiotherapists (20, 46).

One of the results that may seem controversial is that of the 39.8% of FDPs who consider that the medical prescription is insufficient to draw up a rehabilitation protocol. It appears from the various field interviews that the FVPs would like the medical prescription to contain more details on the type of vestibular damage in order to propose a more appropriate protocol. We can explain this phenomenon by the fact that as the primary prescriber is the GP, he cannot provide with the prescription a complete vestibular assessment and therefore argue for the requested rehabilitation act. It is therefore understandable that the FVP adapts its initial assessment according to the prescriber and the clinical data made available to him/her. This is reinforced by the fact that only 10.7% of the FVPs use the same VRT protocol regardless of the type of prescriber in a systematic manner. In France, the ENT filter in addition to the GP filter allows a more optimal approach to rehabilitation.

We note that all the physiotherapists read all the exams at their disposal (96.1%). The purpose of this section was to specify the interest of the FVP in either vestibulometry or imaging reports or reports outside the ENT sphere. While 99.3% of the FVP's were interested in ENT reports, only 89.3% of them read this type of document. This 10% gap is probably representative of a bias in the understanding of the questionnaire between the notions of medical mail (diagnostic conclusion of ENT) and the vestibulometry report (all clinical and paraclinical examinations).

It is interesting to note from the data that examination of vestibulocochlear function is considered by 88% of FVPs in their clinical evaluation. In view of the conclusions concerning transverse and longitudinal addressing, it is therefore not surprising to observe in the results, that FVPs are of major interest not only in vestibular clinic, but also in eye-tracking and visual function. The search for a variety of markers will surely enable them to approach the patient's problem in a more targeted manner. However, only 20% of FVPs evaluate gait: have they forgotten their prerogatives with regard to general function and focused too much on the vestibular approach? Here again, our survey has reached its limits and cannot analyse the cause of the observed behaviours.

All these questions about evaluation have been taken up by the FVP community and discussions began at the SFKV congress in March 2020, involving ENT and FVP. Among them, the definition of a framework on the presence of visual and oculomotor function assessment, for FVP, which seems unavoidable to date in the symptomatic approach to the vertiginous patient (47).

Moreover, we observe that other functions are either under-evaluated or not evaluated (maxillofacial function, psychic state, psychomotor function especially in children) even though the decree of competence of the FVPs allows them to do so and knowing that these evaluations may be important in the clinical approach and rehabilitation treatment (48). This phenomenon can be explained on the one hand by the impact of the FVP's VRT training and on the other hand by practice habits in France. Let's take the example of psychomotricity re-education: this activity in a private physiotherapy practice is, like vestibulometry, not very frequent because the majority of physiotherapists who practise it generally work in hospital structures or in private re-education centres. In liberal practice, doctors more easily refer psychomotricity treatments to the liberal psychomotrician, for their knowledge of evaluation and treatment which is different from the working habits of the French liberal physiotherapists. And as very few ENTs in France specialise in the vestibular care of children, the bulk of medical assessments concerning child development disorders are carried out by paediatricians, paediatric neurologists and rehabilitation doctors. The assessment of the impact of vestibular function and its disorders on child development is still underestimated, poorly known (49) and therefore poorly addressed in terms of rehabilitation.

There is also a heterogeneity of FVP behaviour in the patient's psychological approach. At the first reading we note the following data (Supplementary Table 9): 59.2% of FVPs replied that they never assess psychic function and 6.8% do so systematically. Let us remind the readers that the decree of training in physiotherapy provides for the notion of

psychic evaluation of the patient which the physiotherapist can exploit by using measurement scales. These are either specific to the pathology concerned, exploring a particular aspect of clinical psychology such as anxiety or depression (e.g. the DHI scale for the patient suffering from vertigo and instability) or global with a notion of screening through dialogue and orientation towards a competent health professional with the aim of defining multidisciplinary work (e.g. the GAD 7 scale; 50)

### **Measurement scales**

Beyond the psychological sphere, the systematic use of measurement scales in a more general way is only noted for 14.6% of respondents (21.4% never use them) despite the qualities (economic, self-questionnaire) and performance (validity, transfer) of the tool. This is a paradox and probably a lack of understanding of the usefulness of the tool. Indeed, the FVPs expressed a need for measurement scales covering, among other things, items that are very detailed by clinical examination and, for the most part, can be explored by instrumentalization. It should be noted that in the category of non-instrumental assessments with recognised and validated metric qualities for the treatment of balance and instability disorders, test batteries and performance tests are available for the FVPs (e.g. SPPB, BESTest, etc; 51,52). They should be considered even before the instrumental exploration of the patient because they allow: a standardised and reproducible evaluation at the beginning and end of care, a dialogue with the prescriber, and a good starting point for the manufacture of the rehabilitation plan and the development of therapeutic education. The latter should involve explanations to

the patient and determination of precise and coherent objectives for each clinical situation. Finally, it emerges from the questionnaire that the FVPs find the scales in the fields of motivation, psychology and disability relevant. (53, 54). As we have seen above, they can be used in the detection of a psychological disorder, but also as a working tool in the framework of therapeutic education if the FVP is not trained in motivational interviewing. General quality of life evaluation scales exists, such as the SF 36, and other more specific scales (55). They include disability assessment tools that make it possible to optimise care according to a patient's specific profile and to assess the impact of his or her rehabilitation treatment in the more or less long term on the activities of daily living. However, it is true that there is no specific tool for the evaluation of the vertiginous patient, only several published scales which are among them specific to some pathologies or symptoms encountered (e.g. VVAS, VDS, VAP, etc; 56) while other more generalist scales are applicable either because they allow a comparison with the general population or because they have been evaluated in the context of disorders affecting the vestibular patient. A major disadvantage appears when using this tool: it becomes time-consuming as soon as one wants to evaluate several criteria for the same patient (dizziness, handicap, motivation). A tool that integrates all of the above-mentioned modalities therefore seems to be legitimate in the field of VRT. It also seems that the questionnaires are not correlated with the results of instrumental assessments such as those of the VNG (57). The measurement scale as a decision tree was suggested by FVPs. To this end, we have proposed a synthesis of the behaviours observed in Fig. 11.

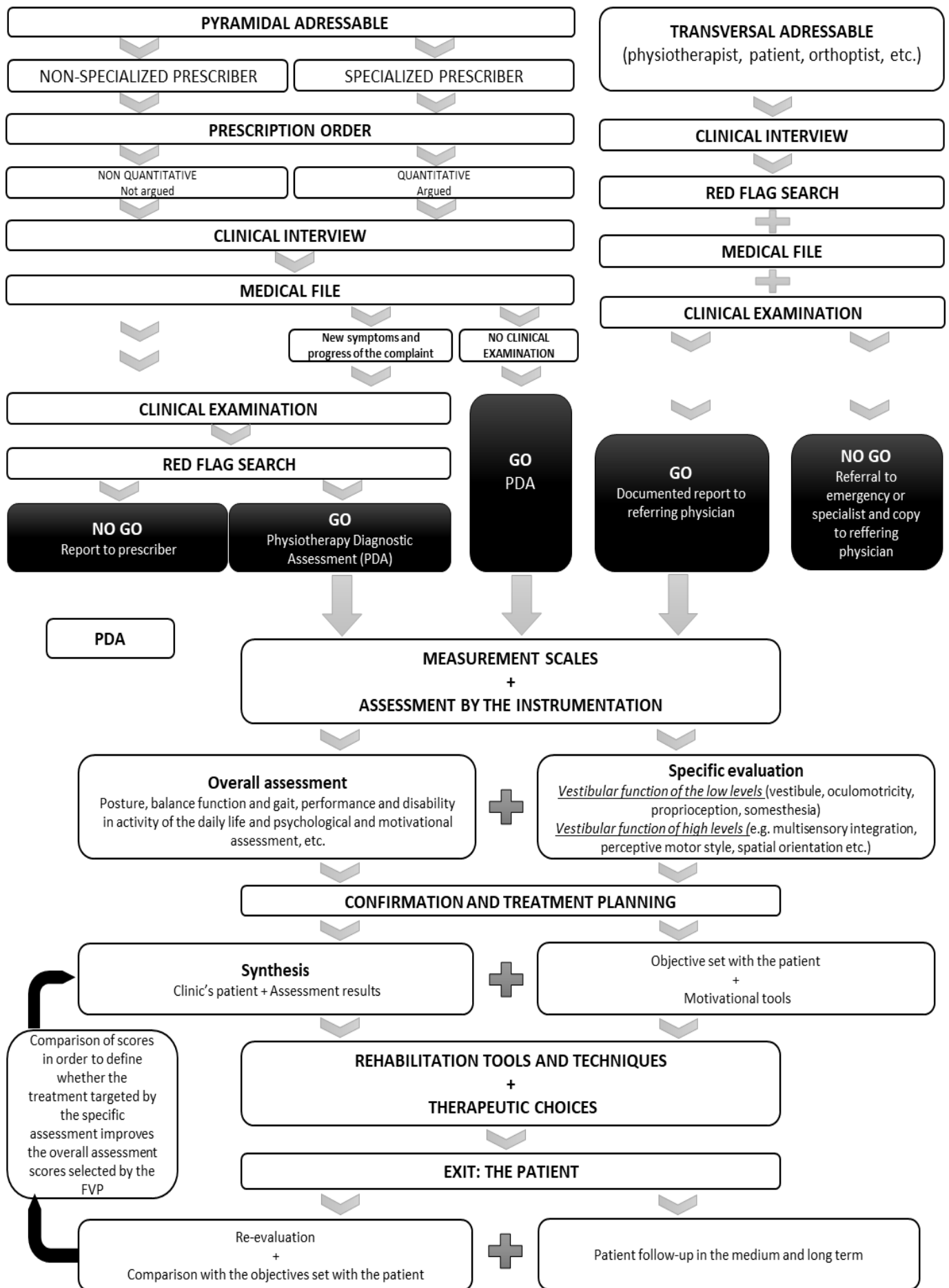


Fig. 11. Decision tree: from the inclusion phase to the therapeutic engagement phase resulting from the work of this survey.

## Assessment by the instrumentation

The FVP has access, through the evaluation carried out by the ENT, to a very wide range of instrumental data, which is summarised in Supplementary Table 12. In practice, the FVP cannot carry out audiology examinations, or those requiring an invasive approach to the ear by high pressure or loud sound, and in any case when the integrity of the outer and middle ear is not preserved. Thus, he can theoretically perform a complete vestibulometry assessment. Apart from the fact that kinetic and VHIT type examinations have become routine for FVP, the bi-thermal examination is not routinely performed. Since 2016, the CNOM has authorised the practice of vestibulometry check-ups for FVP, while its diagnostic interpretation remains reserved for the ENT doctor. The transmission of the medical file by the ENT therefore remains essential to the practice of VRT and an ENT/FVP affinity allows the ENT to benefit from professionals showing a real interest in functional exploration. There has also been an evolution in the participation in explorations by FVPs in hospital centers and ENT services. The standardised evaluations performed by

the FVP are therefore many, but the answers given by the sample show that the indication for the practice of these examinations by the FVP remains unclear (no consensus, no decision tree) and has not correlation with the therapeutic decision in VRT. In addition to the heterogeneity of the answers given to the questions on therapeutic strategies according to the following situations: establishing an initial rehabilitation protocol, modifying the VRT protocol, stopping the rehabilitation and communicating with the other participants (Doctor and non-doctor), the

answers given by the FVPs show that 2/3 are aware of the difficulties in establishing a link between the instrumental markers taken from the examinations and the establishment of a rehabilitation protocol.

## Rehabilitation tools and techniques

Simply listing the various techniques used by the FVP without assessing their application remains methodologically questionable, although this could have been interpreted as an assessment of their practice that could have threatened voluntary participation in the survey. FVPs could rightly feel judged. However, there is a difference between the orientation of the French treatment extrapolated from the responses given (Rotary Chair and Optokinetic stimulation ball) and that given by the Anglo-Saxon based on VOR\*1 VOR\*2 type exercises (11,58). Both approaches seem to be standard gold treatment methods in VRT in their respective countries. It should be noticed that the Anglo-Saxon rehabilitation methodology and approach started with Cawthome and Cooksey in the 1940s and has been widely published both on the effect obtained, compared to standard rehabilitation and on the objective and expected effect according to the aetiology (unilateral vestibular hypo function (UVH) acute or chronic, BPPV, etc. (59). Guides Line have even been established (15) and tools such as the Locomotor sensory organisation test (60) and the gauze stabilisation exercises with the "incremental velocity error" are being developed.

In France, two recommendations were published by the HAS (61, 62), one in 1997 on vestibular rehabilitation and the other in 2017 on the BPPV. Recently, Lacour has published a book on the rotating beaker (63). As this type of publication is very

recent, it is our opinion that work towards a grade II or even I recommendation will be possible if the craze for French-style VRT arouses renewed interest among researchers and clinicians. As for the concept of equipment, this should not be considered as a guarantee of quality and efficiency. We will take the example of virtual reality (70.9% of respondents are equipped with it), a very young tool compared to the original methods, whose superiority over the more conventional VRT has not been established in the short and long term in the peripheral UVH (64). The satisfaction expressed by the FVP (90.3%) is somewhat surprising, as it is connoted with a "but": the FVP claims to be aware of its shortcomings in terms of oculomotor function, multi-sensory integration, motivational and cognitive-behavioural approach (20.4%). It seems that this satisfaction is essentially linked only to the image of effectiveness because it is based neither on short and long term clinical data nor on the effectiveness of the re-educational procedures used compared to procedures on the other side of the Atlantic.

### **Therapeutic choices**

Whitney et al (59) remind us that there are five types of treatment which can be summarised as follows: adaptation exercises, habituation exercises, substitution exercises, postural control exercises and exercises under optokinetic. Dunlap et al (65) show that the recommendation levels are: saccadic exercises, smooth pursuit exercises with a grade A; targeted exercises and supervised exercises which have a grade B and Gaze stability exercise for 12-20 min/days which have a grade D (66). In France, only positional manoeuvres have been defined with a high grade recommendation level, the rest of the tools and protocols used to

have only a grade IV and V, recommendation level D. As the main diagnosis is made by the ENT and the intervention on prescription from the FVP is carried out logically after the diagnosis, the answers provided for the construction of the rehabilitation protocol are not so odd. Indeed, the teaching of physiotherapy is based on the evaluation of the functional consequences of a diagnosed disease and on the application of protocols based on the principles of the 3 R: re-education, rehabilitation and reinsertion. The French physiotherapist is not supposed to carry out a clinical investigation, which corroborates the 57.3% who build their rehabilitation protocol according to the diagnosis of the prescriber. Nevertheless, it is surprising that 2% of FVPs do not build a protocol based on the prescription but carry out standardised acts (such as training and/or workshops). The 40.8% of FVPs who build their protocol on symptoms tend to support the idea that the physiotherapist adapts to the new constraints in the field, i.e. longitudinal addressing and non-quantitative prescription. There is still a heterogeneity of behaviour with regard to prescriptions.

In addition, it seems that some FVPs work closely, in their approach to the patient, with instrumental assessment, which supports the idea that FVP is still anchored in the "technician" field. When more than 54% of the patients express the wish to establish a clinical profile based on all the information they collect, it is very worrying that almost 13% are not able to establish a useful clinical profile for their rehabilitation practice, whereas numerous national and international publications and recommendations allow them to orient themselves in a context of physiotherapy diagnosis such as UVH, BPPV, Meniere's disease (67-70).



Another inconsistency in figures emerges from the results collected on the detection and evaluation of psychogenic disorders: many say they detect them but few evaluate them. In this field, the idea of the audit was to find out how the FVP, within the framework of its competence, approached the patient's psychological approach. To this end, we distinguished two notions: the identification of a disorder through clinical questioning and the use of a measurement scale. In view of the inconsistency that emerged from the results, we asked ourselves two questions: 1) Was there a bias in understanding between the notions of psychogenic and psychiatric disorders? 2) What part should be given to training in the field of psychological evaluation for the physiotherapist, given that a quarter of them do not take this into account? The understanding bias remains surprising for us when we know that this point was not raised during the pre-test phase of the questionnaire. It therefore seems more consistent that, here again, initial and in-service training plays a non-homogeneous role in the holistic approach to the patient.

If we take a closer look at the answers given on this theme: psychogenic disorders are identified by 43.7% of FVPs and psychological disorders by 31.1%; psychological evaluation by questionnaire would be practised by 6.8% of them and 26.11% would adapt the practice of VRT according to the psychological context. All in all, the psychological profile is not identified and is not involved in VRT for 56.3% of the FVP for psychological disorders and 68.9% of them for psychiatric disorders!

These results, compared to the literature data in this field, leave us perplexed. To understand, let us remind the basic

principles of the notion of Coping (= moderating the processes involved in interactions related to a stressful situation).

Paulhan (71) explains that these processes are conscious and intentional with one coping focused on the problem and another focused on the emotion. They are of four types (reactive, anticipatory, preventive and proactive) and provide a singular response that is part of the relationship between a stressful event and the resources available to an individual to deal with it. The model of the common sense representations of illness (MSC) (72) which includes cognitive, emotional and behavioural processes involved in the individual's adaptation to physical and psychological disturbances such as illness, shows the direct implication of this notion of coping in the solutions adopted by the MSC in three stages: elaboration of cognitive representations and emotional reaction, adjustment or coping behaviour, evaluation and self-evaluation which can lead to a new adjustment of coping representations and responses, (73) Explicitly, when in a situation of illness, the individual develops cognitive and emotional representations specific to his illness which can be modulated according to three sources: lay beliefs, external environment (health professional, experts, relatives), and the experience of the illness through present or past symptoms. Excluding simple listening to the patient during clinical questioning can lead to real unresolved disruption of the MSC and lead to several consequences on therapeutic management, ranging from a shift to chronification to total treatment failure. This was demonstrated by Yardley (74) when he explained that the negative beliefs about vertigo and autonomic symptomatology reported were significantly linked to disability, that

negative perceptions of physical symptoms and psychosocial difficulties can lead to increased perception and negative interpretation of potential threat signals and that somatisation has been shown to be the main predictor of disability and distress suggesting that increased concern for physical symptoms may contribute to the psychosocial problems of people suffering from vertigo.

Hence the importance of good quality listening and good evaluation of the psychological and motivational state! For this last point again, we can make the same observations, 64.1% of respondents do not use motivational interviewing tools even though it is useful and effective in a good number of chronic pathologies (75, 76)

### **Exit: the patient, the physiotherapist, the profession**

A majority of FVPs do not give an opinion and criticism on their evaluation and rehabilitation treatment; only 1/5 feels that they have gaps in their knowledge (indirectly in their training). 1/3 of the respondents have constructive criticism of what they do and use it, since just over half have proposals for the development of their instrumental evaluation. 2/3 of the FVPs are satisfied but we don't know with which feedback loop the effectiveness of the Made in France therapy is being monitored. One of the means would be the use of the evaluation of professional practices (EPP) set up in application of the health insurance reform law of 13 August 2004 and the decree of 14 April 2005 (article D.4133-23; 77). French learned societies could be interested in this (such as the APTA for the USA). Another means of verification would be to set up a prospective study on patient satisfaction.

The FVP seems to associate the quality and success of its work with the number of equipment in its possession, whereas on the other side of the Atlantic the VRT is carried out with protocols combining supervision and prescription of home exercise. It would be interesting to make a rigorous comparison (using the same markers) of the results obtained with a management in VRT made in the USA and with a French-style treatment, short, medium and long-term.

### **FVP profile in 2019**

With regard to the metrological data collected from our sample, we have highlighted that the FVP seems to be a therapist who has acquired professional experience before engaging in this type of exercise: this is perhaps also one of the bases for the use of the term "specialisation" which is often used in the answers to the semi-open questions. In addition to the fact that the practice of VRT is carried out by a majority of practitioners who already have a specific approach to rehabilitation, there is a strong heterogeneity of professional paths among FVPs.

The latter was not explored in depth in our survey, but it would have been interesting to ask the therapists about their motivations for embarking on this path. Indeed, we have observed that FVPs reserve a maximum amount of time for VRT in the 20/30 and over 60 age groups. This may be explained by the greater availability of FVP at the beginning and end of their career. We are talking here about availability in the broadest sense of the term: financial availability, as VRT is not one of the most highly paid physiotherapy procedures despite the high cost of installation and equipment, availability of time for training but also of

time spent with the patient during treatment. All this makes this practice less profitable than other branches of physiotherapy. As a result, a young person with no financial obligation and a person at the end of his or her career would be more easily attracted to this practice.

With regard to training and despite the heterogeneity of its contents, we were able to correlate some of the effects of training on FVP. Firstly, the more experienced the FVP is, the less diverse its prescribers, with DU-type training seeming to play a role in reducing prescribers heterogeneity.

Secondly, it is noted that the type of training could have an impact on the practice of instrumental evaluations as follows: the new continuing training sessions available do not seem to influence the practice of instrumental evaluation while UD training seems to reduce and therefore target the instrumental evaluation used by the FVP. This would suggest that UD-formed FVPs would improve their sensitivity to search for more specific and/or more useful markers for VRT. The low correlation on the latter point could be explained by a recent expansion of university courses in this field and their subsequent impact. This observation should be re-evaluated in the coming years to see if this correlation will be strengthened.

Finally, the evaluation of the FVP through a maturity index, allowed a graphic representation of the evolution of this branch of French physiotherapy, which remains a professional niche among nearly 87,000 general physiotherapists in 2019 (0.6% of the profession) by defining the so-called "technician" profile (carrying out an intervention prescribed on prescription) and the so-called "clinician"

profile (having a reflection linking interrogation - clinical examination - instrumental examination - rehabilitation diagnosis; Complementary Table 1).

The evaluation model presents 3 concepts: - normative evaluation - (e.g. the patient presents a spontaneous nystagmus greater than  $2^{\circ}/\text{sec}$  which does not return to the norm. Here the FVP considers the rehabilitation to be a failure and stops treatment); - management evaluation - rationalised by objectives, it helps in decision-making (e.g. the patient has a spontaneous nystagmus greater than  $2^{\circ}/\text{sec}$  which does not return to the norm. Here the FVP considers the rehabilitation to be a failure and stops treatment); - evaluation of management - rationalised by the objectives, it helps in decision-making (e.g. the objective of instrumental norms: "a spontaneous nystagmus to be reduced below  $2^{\circ}/\text{sec}$ " associated with an objective verbalised by the patient "wish to resume a sport activity requiring agility". Here the primary objective will not stop at the reduction of spontaneous nystagmus, the FVP will modulate its management according to these two data); - evaluation according to the "questioning" or problematisation of the evaluation - (e.g. the objective of reducing spontaneous nystagmus associated with the patient's desire to become agile and quick again for his or her sports practice, conditioned by the FVP's demonstration of a secondary benefit slowing down professional reintegration. Here the FVP will modulate the order of objectives, the success of its management will result from a fair balance between the achievement of the patient's objectives, those of the therapist and the health care team).

The posture model: we define posture as a situated 'temporary mode of action'

played by an individual in relation to a project or task. The posture can change during the course of the task depending on the objectives assigned to it. It is an ability to act according to five typologies: the "impostor" type posture (give an order: do it like that!), the "organiser" type (try it first!), the "co-constructor" type (let's do it together!), the "facilitator" type (I'm there when needed!) and the "emancipator" type (empowering the patient).

In the health model, there are three conceptions: health is defined as the absence of disease according to a linear and mechanistic concept: disease is organic. (For example: the FVP considers the end of treatment after the disappearance of certain clinical signs: disappearance of a positional or spontaneous nystagmus), health as a biopsychosocial approach according to the 1946 WHO definition, it corresponds to a global pyramidal concept (the typical example being that of the Maslow pyramid) where the basic needs of human beings (nutritional, health, educational, social and emotional) are the main lines. In this second conception of health, the FVP considers that there is a hierarchy of cause and effect in illness (for example, the FVP identifies a patient's recovery when there is normalisation of the activities of everyday life). The third conception of the health model is the ability of a person to manage his or her life and environment according to the concept of "autonomous subject open to the world", which is based on the ICF (International Classification of Functioning, Disability and Health). The FVP considers the person as a whole, both in his or her complaints and in his or her actions within his or her environment. It is a holistic approach that puts the patient at the centre of therapeutic decisions (for

example, normalisation is considered effective by the FVP-patient couple when the treatment achieves the objectives of resolving the aetiology, eliminating the symptomatology and restoring the individual to his or her psychosocial and professional environment). Within this framework, the objective is set in a reasonable and rational manner in relation to the examination, the disease and the interaction of the patient with his or her environment (complementary table: 13). All of this is aimed at acting effectively in the prevention of disease towards chronicity.

The evolution of knowledge and know-how throughout working life has given rise in France to complete restructuring through the reengineering of professions, including health, with the advent of LMD, VAE and VEP (78). On the other hand, the implementation and recognition of its practices in the medical sector is somewhat slower than in other professional sectors. In France, aptitude is recognized by the diploma above all. The title of French Physiotherapist freezes its holder to a fixed knowledge, not evolving in the eyes of other disciplines and the legislator, even after 40 years of career. Our study highlights a progressive transformation of the field of competence of the FVP which tends to lead this profession in a new paradigm almost independent of that created by the legislator for the general physiotherapist. This progression of maturity may have been achieved both by the acquisition of clinical expertise transmitted by medical specialists but also by a need for field work linked to the evolution of patient behaviour, health care providers and shortages in medical demography (21).

## Conclusion

The profile of the FVP is ultimately that of a health professional who works mainly as a freelance practitioner, in a supervisory (one-to-one) format, which he or she claims as a quality label. His practice seems to be stereotyped with a heterogeneous decision-making strategy based on instrumentalized work. The recent interest shown by FVPs in DUs seems to meet the needs of a professional in the process of evolving practice and recognition. The change in behaviour of FVPs in the conflict between initial training and a regulatory institution, which trains them for an executive function without the possibility of being an actor in the evolution of the techniques and protocols they use, is an important point of this survey. This prescribed function and the position of third intention are called into question by the change in behaviour observed both in the medical world (addressing by the attending physician and disadvantaged demographic areas) and in that of non-physician practitioners (transversal addressing) and patient requests.

The picture of the "French Gatekeeper" partially justifies the position of the FVP in the ecosystem of the care of the vertiginous patient. The general practitioner, at the centre of patient orientation, has put the FVP in a role of "quasi second intention" by referring the vertiginous patient via prescriptions without ENT evaluation. Thus the FVP had to adapt in order to ensure this notion of secondary triage. However, the FVP's position with regard to the inclusion criteria for vertiginous patients has for a long time been based on the evaluation standards inherited from Sémont. The evolution of practices was then prioritised towards even more technological tools

(VR, Plateforme, AVD). The massive use of technology must not give the illusion of relevance in triage and treatment performance. The heterogeneity of behaviours in the choice of tool application shows that FVP tends to opt for an inherited concept of "efficiency tools" and has only been using the essential principle of the decision tree for a few years now. The highlighting of transversal addressing should lead the clinical and institutional community to find a framework for this new form of recourse to FVPs that changes patient inclusion and access to care. An improvement in training and the implementation of GOs, NoGOs, in close collaboration with clinicians in the field has been proposed in this respect.

All these observations have been submitted in recent months to learned societies of FVPs (SIRV, SFKV) and ENTs (SFORL and SIO), which have begun workshops for brain storming and inter-professional rapprochement. The latter was initiated in France by the Vertigo Research Group (<http://gdrvertige.com>), a CNRS Research Unit of the INSB (National Institute of Biological Sciences) consisting of 50 founding partners (25 ENT departments of the main French University Hospitals; 15 research teams of the French EPST, 10 biotech companies).

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## Supplementary Table

<b>Table 1 : Conceptual matrices</b>			
<b>Theories and models</b>	<b>Criteria</b>	<b>Behaviours indicators</b>	<b>index</b>
<b>Posture Models: Technician design</b> (posture is considered a mental state shaped by beliefs, values and intentions that give meaning to a person's actions (Lameul, 2006))	1) « Executing » Agent	1) Applies techniques and/or protocols. 2) Conformity, Technical Standards. 3) The error is fault.	1) It is an executing technician. 2) Consistent with recommendations and limitation, without amendment, no decision, no opinion. 3) No questioning of the failure of therapy.
<b>Posture Models : clinical design</b>	2/ Author "product of meaning"	1) It is in the questioning: the authorization illustrates the fact of the creator. 2) It is autonomous. 3) It is reflexive: (co-decider). 4) Scholarly knowledge is relativized! 5) gap/expected.	1) It conceptualizes, creates, and produces programming in care. 2) Regulates or modifies the program. 3) Taking into account the experiential knowledge of the trained and cared for. 4) Consideration of the trained person and the patient as a whole. 5) Then uses his knowledge, experience and listening. He is autonomous.
<b>Health Model : Technical Design</b>	1) The disease is organic. The organ is disturbed. 2) Mechanistic approach. 3) Cause/effect relationship.	1) Health = no disease. 2) Subject "Demountable". 3) Action on biological, organic causes.	1) Care is referred to recommendations of good practice. Adherence to prescription is sought. 2) Little consideration is given to psychological concerns. 3) Implementation of rehabilitation treatment around medical diagnosis.
<b>Health Model: Clinical Design Application of ICF Criteria</b>	1) The disease results from several factors: organic, psychic, social, environmental. 2) Interaction of different internal and external factors with the subject. 3) Subjectivity is taken into account.	1) Health is a positive state based on physical, social and mental well-being. 2) The disease may be an adaptation of the subject to a dislocation of his environment or his experience. 3) Nothing is frozen. The discourse is not dogmatic.	1) Prevention and health promotion are a priority. The goal is patient autonomy. 2) Determinants of health are taken into account Patient support takes into account both patient and therapist subjectivity. 3) The patient co-participates in the choice and programming of preventive and therapeutic actions.
<b>Evaluation Model: Evaluation Control This is the measurement of skills acquired: Technical Design</b>	1) Checking, certification validation. 2) Repository (scientific knowledge). 3) Fixed evaluation. 4) The error.	1) Measurement evaluation (normative). 2) Quantitative Evaluation: Knowledge Control (Retrieval). 3) Certification of learning (reproduction). 4) Deviation/Standard.	1) Use of Shim Grid. 2) Measurement of the gap between the student's "rendering" and the teacher's expectation, at the end of the course or treatment! 3) Summative evaluation: notes, reviews, physical therapy diagnosis. 4) The error is a fault, it must be corrected.
<b>Evaluation Model: Evaluation Questioning Clinical Design</b>	1) Evaluation questioning. 2) Evaluation of speech, attitude. 3) The error. 4) Application of recommendations.	1) Finding meaning for the trainee and the patient. 2) Evaluation that promotes exchange, interaction and education. 3) It is not a fault, but it allows the path. 4/ Recommendations are co-written by peers and in interdisciplinary.	1) Assessment centred on the learner, or the patient in his biopsychosocial reality. 2) Evaluation is ongoing: evaluation –regulation. 3) The gap is expected, rich of teaching, allows to discuss and to reorient. 4/ The recommendations evolve according to the knowledge, know-how...
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<b>Table 2 : Representation of different learned societies in our sample</b>	<b>Number of FVPs</b>
SFKV: French Society of Vestibular Physiotherapy	46
SIRV: International Society for Vestibular Rehabilitation	26
SFKV/SIRV	28
SFKV/SIRV/SIO (International Society of Otoneurology)	1
SFKV/SIRV/SOPPEL (French Society Posture Balance and Locomotion)	2

<b>Table 3: University education</b>	
<b>Entitled</b>	<b>University</b>
UD Exploration and Rehabilitation in Otoneurology	University of Lyon 1
UD. Exploration and Rehabilitation of Balance Disorders	
UD. Clinical Exploration of Vertigo	
UD. Exploration and Rehabilitation of Balance Disorders	University of Lyon; St Etienne & Grenoble.
UD. Clinical Posturology	University of Marseille, Toulouse, Paris & Grenoble.
UD. Vestibular Rehabilitation	UPMC Paris 7.
UD. Vestibular Rehabilitation	Medicine's Faculty of Reims (Robert Debré Hospital).
UD. Clinical, paraclinic and therapeutic treatment of dizziness	
UD. Rehabilitation of Balance and Vertigo Disorders	University of Nantes.
UD. Sensory disabilities and rehabilitation of balance disorders	University of Paris7.
UD. Therapeutic hypnosis	University of Nantes.
UD. Basics of motor and psychomotor rehabilitation	AMU
Graduat in Orthoptists	High school of Gand
DO Osteopathy / Manual Therapy	Great school
Master MPSI	Grenoble 1 University
DES of sophrology	French school of Sophrology

<b>Table 4 : Continuing Training Agencies</b>	
<b>Entitled</b>	<b>Agency</b>
Vestibular rehabilitation Advanced 1 Explorations & reviews	SISMA
<ul style="list-style-type: none"> <li>Vestibular rehabilitation</li> <li>Vestibular rehabilitation Advanced 2 : Rehabilitation techniques</li> <li>Development</li> <li>Vestibular rehabilitation after surgery</li> <li>Balance disorders of the elderly subject</li> <li>Vestibular rehabilitation Advanced 3</li> <li>E-learning: Enhanced vestibular rehabilitation 1 and 2</li> <li>Posturography</li> </ul>	APF
Vestibular Rehabilitation	MTM
Rehabilitation of vertigo and instability	VIRE
<ul style="list-style-type: none"> <li>Explorations</li> <li>Vestibular balance</li> <li>High Hz exploration and rehabilitation</li> </ul>	Exalab Synapsis (Exalab) Exalab
Vestibular rehabilitation and further training 1 2 3 4 5 6 7	SISMED
Training outside France	Belgique USA
Vestibular Physiotherapy /Vestibular Physiotherapy Enhancement	Fc santé
Orthopractie-posturology and vestibular module	GRETM
Vestibular Rehabilitation	Assas
Rehabilitation of balance and vestibular system	CEVAK
<ul style="list-style-type: none"> <li>Rehabilitation after neurotomy</li> <li>Post-operative vestibular rehabilitation</li> </ul>	Coapte Formation
Advanced vestibular rehabilitation by clinical case study	CEFIPS
Vertigo Days: training about vertigo for adult and child	Physiotherapy congress
TIPi: Technique for identifying unconscious fears	formation@tipi.pro
Vestibular Rehabilitation	Alister
Balance in elderly people	KIVALA
Advanced course	Sœurs Augustines Paris
Vestibular Rehabilitation	Strasbourg hospital university

<b>Table 5 : Equipment used by the physiotherapist</b>	<b>Part of FVP Population</b>
VNS: Video Nystagmoscopy. Bezel with infrared camera that allow visualization of ocular movement in the dark.	99,03%
RC: Rotatory Chair. Associated with software to visualize the positions, speeds of rotation, accelerations, and number of turns of the chair the physiotherapist uses for his balance sheets and his rehabilitation.	91,26%
OKN: Optokinetic (Ball off).The direction and frequency of optokinetic nystagmus can be modulated by varying the direction and speed of rotation of the ball.	87,38%
VR: Virtual reality. It's use for the evaluation and treatment of Balance Disorders, Vertigo, Motion Sickness, Scrolling Syndrome, Visual vertigo....	70,87%
SVV: Subjective Visual Vertical. It's a fundamental component of the construction of space and an excellent tool for the evaluation of the utricular function.	66,99%
PF: Multi-sensory posturography platform. They allow to evaluate the Static Postural Equilibrium and in 6 conditions.	61,17%
DVA: Dynamic Visual Acuity. It measures the difference between visual acuity when the head is stationary and when it is in motion or when the visual target is moving. It is used in assessment and rehabilitation.	40,78%
F VNS: Fluoroscopic Video Nystagmoscopy System including a VNS and a computerised tracking allowing the physiotherapist to perform assessment and rehabilitation work.	34,95%
VNG: Videonystagmography System including VNS and tracking software with a precise calibration allowing to carry out the main balance of vestibulometry notably with the study of the VOR (thermal and rotating chair).	33,01%
VHIT: Video Head Impulse Test. It's a diagnostic device that, in clinical practice, allows to evaluate the function of the vestibule during rapid movement, in a fast and objective way via the registration of eye and head movements.	24,27%
SVINT: Skull Vibration Induced Nystagmus Test. It explores the vestibular function by applying a vibrator to a sitting subject on the right and then left mastoid with a frequency of 100 Hz for ten seconds.	20,39%
OTHER: foam tray, instability tray, diode bar, treadmill, Hubert 360 (LPG system).	13,59%
VCOR: Fluoroscopic Video of the Cervical Ocular Reflex. This system uses a VNS associated with an accelerometer and software. This tool allows to explore the VOR, VCOR, VVOR horizontal or vertical, passive or active, sitting or standing, small or large amplitude, for speeds from 50 to 250°/s.	11,65%
EIT: Electronic Instability Tray. Assimilated to electronic Freeman trays, they are generally used as rehabilitation supplements not specific to vestibular disorders but which can find their place for certain specificities in paediatrics and geriatrics for example.	5,83%

<b>Table 6 : multi-sensory posturography platform used by FVPs</b>	<b>% of the FVP population</b>
<b>Brand-name products</b>	
Framiral	12,40%
Synapsys	10,30%
Techno concept	7,20%
RMI Bio Rescue	4,10%
Cybersabot	2,10%
Satel	1%
Médicapteurs	1%

<b>Table 7: Search for general markers (from the literature) and adaptation behaviour of the FVP during the first consultation.</b>	<b>Always</b>	<b>Often</b>	<b>Little</b>	<b>Never</b>
The Psychic context before/after vertigo changes your Rehabilitation Management.	26,2%	54,4%	18,5%	1%
The Patient Environment changes the Rehabilitation Management.	19,4%	46,6%	30,1%	3,9%
The Pay Lifestyle changes your Rehabilitation Management.	20,4%	58,3%	20,4%	1%
Patient History changes Management.	30,1%	61,2%	8,7%	0%
The Medical History can modify the Rehabilitation Management.	19,4%	66%	14,6%	0%
Medical Diagnosis is sufficient to establish a Rehabilitation Management.	2,9%	12,6%	59,2%	25,2%
The Prescriber is of Different Specialties but the Rehabilitation Management remains identical.	10,7%	25,2%	38,8%	25,2%
Prescription Suffices.	1%	10,7%	48,5%	39,8%

<b>Table 8 : List of exams available to physiotherapists and percentage of physiotherapists who use them</b>	<b>YES</b>
Physician's reports are accessible, as a general rule, by a summary letter which the generalist established at the time of the transfer of care jointly to the prescription.	69,90%
ENT makes the most accurate assessment of the rehabilitation activity. It is often communicated to the physiotherapist with all vestibulometry examinations (VNG, Audiometry, etc.) It's the main diagnostician with the neurologist for the management of patients suffering from dizziness.	99,03%
Neurologist in the same way as general practitioners, it usually communicates a written summary in a liaison letter.	84,47%
Geriatrician in France, he works a very few in liberal institution, which explains why physiotherapists can have access to this type of balance sheet only in certain practice areas. It usually consists of a complete balance sheet with: <ul style="list-style-type: none"> <li>- a functional assessment: loss of autonomy, addictions, pain,</li> <li>- a mobility assessment: walking disorders, balance disorders, falls,</li> <li>- an assessment of mental function: cognitive and mood disorders,</li> <li>- an assessment of sensory disorders: vision and hearing,</li> <li>- an evaluation of poly medication: re-evaluation of current treatments,</li> <li>- an assessment of the environment and socio-economic resources.</li> </ul>	38,83%
Physical Medicine Assessment (PMA). PMA's doctor is the third most important practitioner which is involved in the management of the vertigo patient. It works mainly in the context of rehabilitation monitoring and prescription in VRT to help patients suffering from balance disorders, instability and dizziness whose etiologies get out of the field of ENT (e.g. Multiple sclerosis, Stroke, Cranial Trauma, etc.). He takes second place in development and data's production of vestibular rehabilitation behind the ENT and the neurologist, for his part, makes little in these two fields in France. His expertise is valuable because it gives a wider field to vestibular rehabilitation than that of the ENT sphere. The PMA's doctor is a specialist in charge of care related to physical disability. He is therefore at the interface of 3 specialities: rheumatology, orthopaedics and neurology in the global and functional approach to the after-effects of the various pathologies of these specialities. An initial assessment assesses the functional consequences of the disorders on the basis of a clinical examination and additional tests, or even sophisticated techniques for recording movements and impaired functions. Appropriate treatment will contribute to the recovery of the deficits or avoid their aggravation with the help of medication, rehabilitation and equipment.	18,45%
Pneumologists and cardiologists do not manage patients with vertigo but have expertise in the field of stress decompensation and may consult with patients who experience dizziness and instability in conjunction with their lung or heart condition. The prescription of exercise rehabilitation for certain patients with vestibular disease may also be useful after prolonged inactivity.	25,24%
Pediatrician and the pediatric neurologist intervene in the expertise of children and baby with gait, balance or psychomotor latter disorders in order to eliminate certain diagnoses and to orientate on the vestibular sphere.	15,53%
Psychologist will either rule out a purely psychic attack or allow a multidisciplinary treatment and thus with its evaluation give tools and advice necessary for the treatment of certain vertigo associated with psychogenic components. The psychological assessment includes a phase of interview with the establishment of the anamnesis, the observation of behaviour, the performance of specific tests, a clinical interview, a feedback and a therapeutic proposal recorded in the report of the psychological examination.	27,18%
Orthoptist check-up can be added to vestibular rehabilitation when patient decompensates some visual skills such as stereoscopy, binocular vision especially when the patient has a history at risk (strabismus, amblyopia...).	62,14%
Psychomotor Assessment is a very useful tool for FVP working with children with vestibular disorders. It is also useful for the patient to work in a multidisciplinary team. These may include a delay in psychomotor development, tonic difficulties (muscular tension), difficulties with physical investment, perception or self-representation, clumsiness, difficulties in the organization of laterality or in spatio-temporal location, problems with graphic gesture, attachment or behaviour and a lack of self-confidence.	17,48%
Report general physiotherapist. In France, the assessment of the general physiotherapist is based on a summary report of his examination: joint, muscular, neurological, cutaneous, functional and the repercussions on the Activities of Daily Living.	61,17%
Audiologist It generally includes the auditory assessment tonal, vocal, evoked auditory potentials.	0,97%

**Table 9: Clinical examinations performed by the FVP. Representative table of clinical examinations and adaptation behaviour of the FVP during the first consultation (systematization or not of an examination)**

Items	Always	Often	Little	Never
Musculoskeletal System: - Pelvic joints, lower limbs - Spine (cervical+++ mobility, compression, decompression).	11,65%	40,78%	39,81%	7,77%
Muscular Function: - Muscle strength (global and/or segmental) - Muscle tone (passive resistance, moving distal joints (hypertonia, hypotonia).	0,97%	31,07%	44,66%	23,30%
Neuro-Peripheral: - Examination of osteo-tendinous reflexes (Jandrossik test) - Examination of cutaneous reflexes - Superficial sensitivity examination (filament test, stick, thermal test, two-point discrimination, light touch test) - Deep sensitivity examination (tuning fork, joint position perception, percussion test) - Examination of cranial pairs.	24,27%	32,04%	35,92%	7,77%
Neuro-Central: - Examination of upper and lower limb motor coordination (finger-nose test, leg heel test). - Examination of position changes, lying down - Crouching - Rapid Alternate Motion Review - Examination of involuntary movements (dystonia, athetosis, chorea, ballism).	32,04%	50,49%	16,50%	0,97%
Cognitive Functions: - Alertness (tendency to fall asleep). - Cognitive functions: • Body diagram, visuo-spatial capabilities • Spatial memory, spatial orientation • Executive functions and attention.	14,56%	31,07%	41,75%	12,62%
Balancing Function: - Standing station (Romberg's position) - Monopodal support (duration) Vellas and Wayne test - Blind Stomping Test (Unterberger-Fukuda) - APA (push resistance), Latéral Reach-test.	62,14%	33,01%	4,85%	0,00%
Cardio-Respiratory Function: - Blood Pressure (seeking hypotension or orthostatic hypertension) - 6 Minute Walking Test - Test of sub-maximum effort - Neck torsion test (cervical artery) - Hyperventilation test.	3,88%	9,71%	41,75%	44,66%
Walking: - Speed - Amplitude - Regularity of step - Orientation (straight or not) - The U-turn - The automatic step limbing - Walking in a straight line - Tandem Walking - Star Walking (Babinski Test) - The Blind March.	20,39%	47,57%	28,16%	3,88%
Cochlea and Vestibular Function: - Otoscopy - Acoummetry (aerial or phonic and bone: Weber test, Rinne test) - Clinical examination of tubal function (Valsalva and Toynbee maneuver) - Fixed eyes - Gaze nystagmus - Ocular counter rotation - Head Impulse Test - Looking in the dark - Head Shaking Test - Vibrator Test - Positional manoeuvres (finding a positional or nystagmus) - Pressure maneuvers.	88,35%	8,74%	1,94%	0,97%
Visual Function: - Distance Visual Acuity - Near Visual Acuity - Visual fields (finger). - Dynamic visual acuity (near and distance).	60,19%	30,10%	4,85%	4,85%
Oculomotor function and optometry: Comparative Corneal Reflex Examination (Hirschberg), Screening Test (Near and Far Vision), Cover test / Uncover test, Light Reflex, Palpebral Ptosis Search, External Oculomotor Muscle Paralysis Screening Test, Motility Test: Pursuit / Saccades / Fixation, Binocular and Stereoscopic Vision: Maddox test, Worth test, Wirt test.	68,93%	25,24%	3,88%	1,94%
Posturology: - Podoscopy examination - Examination of postural tone (muscle chain, response to stretching) - Vertical of Barré face and profile - Foam Trampling Test - Short Push Postural Strategy Test - Foam and Dome test. - Functional reach test.	17,48%	34,95%	27,18%	20,39%
Maxillofacial Function: - Clinical examination of the manducatory apparatus - Clinical examination of the occlusion - Examination of the motor skills tongue.	0,00%	13,59%	28,16%	58,25%
Psychomotor Function: ▪ 0 to 3 years - Archaic reflexes - Spontaneous motor skills - Directed motor skills (anti-gravity, support, righting and balancing reactions, postural reactions) - Locomotion: NEM. - Voluntary and automatic motricity (taking control of the higher centres: activity with a functional purpose). ▪ From 3 years' old - Tone (spasticity, hypertonia, hypotonia, rigidity) - Global motor skills (dynamic and statistic) - Laterality (spontaneous, usual, psychosocial gestures) - Manual Praxies - Digital touch gnosies - Oculo-manual skills - Spatial orientation (on oneself, on others, in relation to objects and a plane) - Rhythm (tempo, auditory kinesthetic, auditory perceptual motor) - Hearing attention.	4,85%	6,80%	15,53%	72,82%
Psychic Function: - The nuanced practice of tests/scale of measurement - Highlighting elementary dysfunctions - Analysis of interactions and feedbacks in the anamnesis - Search for secondary psychopathology (ex: link between trauma and emotion).	6,80%	14,56%	19,42%	59,22%



<b>Table 10 : Rehabilitation tools and techniques</b>	
<b>Material</b>	<b>FVP user</b>
OKN : Optokinetic Ball	97,1%
RC : Rotatory Chair	94,2%
VNS / F VNS	87,4%
FP : Foam Plate	80,6%
IT: Instability Tray	71,8%
VR: Virtual Reality: In rehabilitation it allows to work on visual perceptions until then impossible to work in the office such as agoraphobia, vertigo of heights, claustrophobia and allows to develop a field of activity on visual streams that were not allowed with the optokinetic generator. An evaluation of this tool should nevertheless be continued.	67,8%
WP : Walking Path is used for stimulate proprioception, balance, double task.	60,2%
OCR: Oculocephalogyre Rehabilitation	56,3%
PT: Posturology Technique it's used essentially for suppression or saturation of one or more sensory inputs.	49,5%
TE: Therapeutic education with motivational maintenance, living space planning, prescription of adapted physical activity, prescription of exercises for the home, etc.	49,5%
HP: Helmet Pointer is used for exercises like double task exercises and OCR.	47,6%
MGym: Medical Gymnastics include balance exercises but not vestibular specific (e.g. walking course, obstacle clearance, fall work, specific task training, biofeedback, postural gymnastics, inter-segment coordination).	47,6%
SMIR: Sensory-Motor Integration Rehabilitation (orientation in space, perceptive motor exercises...) is used for are used to put in an ecological situation the patient who has received a specific treatment of type adaptation, substitution or sensory habituation (e.g. Gaze stabilization exercise VOR*1 VOR*2).	46,6%
DVA: Dynamic Visual Acuity	40,8%
MTO : Manual Therapy/Osteopathy	37%
RD: Diode Bar is use is modified with the different evaluations to be used only in double task exercises including pursuits, saccades, RVO 1 and RVO 2 exercises.	33%
ER: Exercise rehabilitation is the optimised protocol for effort reconditioning, directly inspired by that of cardiac rehabilitation and intended for patients either in polypathology or in physical decompensation.	26,2%
RRT : Respiratory Relaxation Technique	22,3%
TT : Tilt Table	15,5%
MTR :Maxillary and Tubal Rehabilitation	14,6%
NPR: Neuropsychological exercises (optimization of attentional resources, rhythmicity, etc.)	11,7%
PR : Psychomotor rehabilitation (child)	10,7%
MIT : Mental Imaging Technique	10,7%
H : Hypnosis	7,8%
CTRV: TRV Chair is used for positional manoeuvre in 3 axes.	6,8%
S: Sophrology	3,9%
PPR: Psycho-physical rehabilitation understands the set of techniques to reduce stress and excess emotions by refocusing on the body.	3,9%

<b>Table 11 : Type of prescription</b>	
<b>Quantitative prescription</b>	<b>Non-quantitative prescription</b>
Number of sessions limited by the doctor.	No imposed number of sessions.
The title of the type of rehabilitation is defined by the doctor.	The act is subject to an entry and exit rehabilitation assessment, mandatory by the physiotherapist.
The diagnosis or medical conclusion leading to rehabilitative treatment is given by the doctor.	The physiotherapy diagnosis leads to rehabilitative treatment unless the prescribing physician advises otherwise.

<b>Table 12</b>	<b>Protocol</b>	<b>Collected data</b>
<b>Hearing measurement</b>		
Tonal audiometry	Average loss over frequencies 500, 1000, 2000, 4000HZ.	Absolute thresholds for the perception of tonal sounds.
Vocal audiometry	Intelligibility threshold: lowest level for which the subject had 50% corrects answers. Maximum intelligibility: % intelligibility at the highest point of the curve (normally = 100%). Specify at what intensity it is obtained.	Absolute thresholds of perception of vocal sounds (intelligibility).
<b>Global tests of vestibular function</b>		
Static and dynamic VVS	The subject must vertically fix a light bar on a black background or on an optokinetic background.	Angle of deviation between the actual vertical angular value and the patient's perception.
Static and dynamic postural balance on a multi-sensory platform	Evaluation made under 6 conditions: stable ground/open eyes, stable ground/closed eyes, stable ground / misleading vision, unstable ground/open eyes, unstable ground/closed eyes, unstable ground/ misleading vision.	Index of postural instability, Romberg quotient, displacement of the centre of pressure, visual dependency index, etc.
<b>Clinical and measurement tests of the vestibular organ</b>		
Head Impulse Test	Clinical test to evaluate the presence of a high-speed RVO deficit on horizontal canals.	Positive if the gaze is out of phase with the target.
Head Shaking Test	Rotation of the patient's head in the horizontal plane (Up and Down) and in the vertical plane (Right and Left) for 20 sec.	Recording of pathological nystagmus.
Bone vibration test	Mechanical vibration at 100Hz on 3 zones: mastoids and apex of the cranium.	Positive if nystagmus triggered on 2 of the 3 zones.
Positional maneuvers	Maneuvers for the positional evaluation of semicircular canals and the triggering of positional vertigo.	Positive if nystagmus specific to the canal questioned or non-spécific.
Videonystagmography: Video oculography	Tests carried out to evaluate oculomotor function (pursuit, saccades, optokinetic, and gaze in the dark).	Speed, latency, precision, gain.
Videonystagmography: Kinetic tests	Tests carried out on an electronic rotating chair with different speed and angulation modalities.	Gain, directional preponderance.
Caloric tests	Injection of cold air at 24° and hot air at 50° for 50s	Recording of nystagmus induced.
Video Head Impulse Test	Fast mobilization of the patient's head (around 200°/sec) in the plane of the semicircular canal being questioned (5 to 10 repetitions per canal).	Evaluation of RVO (especially saccades of refocusing) at high stimulation speed.
<b>Exploration of otolithic organs</b>		
PEOc (cVEMPS)	Acoustic stimulation from 85 to 100dB and recording of the ipsilateral sternocleidomastoid muscle.	Recording of the sacculo-collic reflex.
oVEMPS	Acoustic stimulation from 85 to 95 dB and recording of the contralateral lower oblique muscle.	Recording of the utriculo-ocular reflex.

**Table 13 : Point of view of the FVP**

<b>Patient's point of view</b>		Clinical examination, instrument and measurement scale: normal	Clinical, instrumental examination, scale of measurement: abnormal
	Does not feel sick (clinical risk profile determined by the physician during a routine consultation)	Primary prevention: prevent the onset of symptomatology and/or the transition to chronicity (e.g., identify avoidance, substitution and early anticipation strategies to prevent falls in the elderly).	Secondary prevention: early detection (e.g. measurement scale, instrumental, clinical assessment) in order to redirect or start a prescription rehabilitation ("assessment and rehabilitation if necessary" since 2002). Triptych general practitioner-FVP-ENT.
	Feels sick (established medical diagnosis)	Quaternary prevention: avoiding over medicalization and the transition to chronicity (e.g. complaint oversized in relation to the results of the examination).	Tertiary prevention: avoiding complications of the disease from a holistic point of view (physiological, psycho-emotional, cognitive-behavioural).

## The questionnaire

### I/ The therapist

1/Age

2/Sex

3/Year of graduation

4/Mode of practice:                    *liberal*                    *salaried*                    *mixed*

5/Place of exercise (department)

6/Year of beginning of exercise in vestibular rehabilitation

7/Time allotted to the specialty in your practice (half-day per week)

8/Time granted on average to vestibular rehabilitation treatment during a session

9/ Are you in contact (networking) with a care centre (medical, medical-surgical or rehabilitation) for vertigo patients in your city of practice? Yes/No

10/Management of the patient: this question concerns the totality of the management (series of X sessions); *only one possible answer by yes/no.*

*Individual management (supervision: one to one)* Yes/No

*Combined care (supervision + home prescription)* Yes/No

*Multistep management (circuit training session at the practice)* Yes/No

*Group management (group therapy treatment with gymnastic practitioner)* Yes/No

11/Types of training courses followed which are part of vestibular rehabilitation: Diploma universities (DU), Graduate Certificate (GC), Continuing Education (CE) (Name of the organisations, the title, the year of obtaining the diploma) or which you use in this context (for example manual therapy, osteopathy, mental imagery, hypnosis...).

DU / GC / CE	Name of the organisation	Title	Year	Training Provider

12/ Do you belong to a learned society? If so, which one? Yes/No

Name of company (ies) :

13/Equipment that you use (model, brand)

Name of equipment	Yes / No	Brand
VNS : Nystagmoscopy Video		
D VNS : Fluoroscopic Nystagmoscopy Video		

VNG : VideoNystaGmography		
DVA: Dynamic Visual Acuity		
VVS: Vertical Visual Subjective		
VHIT: Video Head Impulse Test		
SVINT: Skull Vibration Induced Nystagmus Test		
Optokinetics (ball of)		
V COR : Fluoroscopic Video of the Cervical Oculo Reflex		
Rotatory Chair		
Posturography platform		
Virtual Reality		
Electronic instability tray		
Other (Specify)		

## **II/ Prescription and addressing**

14/ Check the order headings that you encountered that required the use of vestibular rehabilitation?

Rehabilitation for balance disorders in central neurological pathology. Yes/No

Rehabilitation for balance disorders outside neurological pathology, including aging (elderly). Yes/No

Rehabilitation for posture disorders, sensory integration system disorders, sensory conflict. Yes/No

Rehabilitation for gait disorders, rehabilitation of lower limbs. Yes/No

Rehabilitation in paediatrics with psychomotor aim, for developmental disorders, gait disorders, disorders of intrinsic and/or extrinsic perception. Yes/No

15/ Have you had recourse to vestibular rehabilitation (check-up and/or therapy) without the patient initially being referred to you for this treatment? Yes/No

16/ Did you have patients who consult in acute phase (VPPB, neuritis...) in first line? Yes/No

17/ Which doctors refer patients to you for vestibular rehabilitation? (Tick the corresponding box/several possible choices)

General Practitioner	
ENT	
Neurologist	
Geriatrician	
Physical Medicine Physician (PMP)	
Ophthalmologist	
Psychiatrist	
Cardiologist	
Paediatrician, paediatric neurologist	
Other Specify	

18/ Which health (or other) professionals have referred patients to you for vestibular rehabilitation? (Tick the corresponding box/several possible choices)

Psychologist	
Orthoptist	
Psychometrician	
Osteopaths, chiropractors, etc.	
Confere	
Patient	
Other (specify)	

### **III/ Clinical examination**

19/Do you perform a clinical examination focused on balance function, statics, walking?  
*Circle one answer*

Clinical examination of the musculoskeletal system: limbs, spine.

*Always, Usually, Sometimes, Never*

Clinical examination of muscle function: Muscle strength, muscle tone.

*Always, Usually, Sometimes, Never*

Peripheral neurological clinical examination: Reflexes, sensitivity, cranial pairs.

*Always, Usually, Sometimes, Never*

Central neurological clinical examination: motor coordination, alternative and voluntary movements, transfers.

*Always, Usually, Sometimes, Never*

Clinical Examination of Higher Functions: Vigilance and Cognitive Functions.

*Always, Usually, Sometimes, Never*

Clinical examination of the balancing function: bipodal, unipodal, trampling, anticipatory postural adjustment (APA), etc.

*Always, Usually, Sometimes, Never*

Cardio-respiratory and vascular clinical examinations: blood pressure, CT scan6, hyperventilation test.

*Always, Usually, Sometimes, Never*

Clinical examinations of walking: speed, amplitudes, regularity, etc.

*Always, Usually, Sometimes, Never*

Clinical examinations specific to cochleovestibular function: HIT, HST, looking in the dark, etc.

*Always, Usually, Sometimes, Never*

Clinical examinations specific to visual function: visual pathways and fields, oculomotricity, etc.

*Always, Usually, Sometimes, Never*

Examinations specific to the orthoptic function: pursuits, jerks, fixation, etc.

Always, Usually, Sometimes, Never

Examination specific to posturology: podoscopy, vertical of Barré, postural strategy, etc.

Always, Usually, Sometimes, Never

Specific examination of the maxillofacial function: clinical examination of the manducation, the occlusion, the Eustachian tube, etc.

Always, Usually, Sometimes, Never

Examination specific to psychomotor function (child): spontaneous, voluntary, directed motor skills.

Always, Usually, Sometimes, Never

Examination specific to the psychic field: support interview, nuanced application of measurement scales.

Always, Usually, Sometimes, Never

#### **IV/ Inclusion of the patient in your rehabilitation protocol:**

##### **1- The clinical interview. (circle one proposal for each question)**

20/ The prescription (title) is enough for me to draw up my rehabilitation plan.

Always, Usually, Sometimes, Never

For the same prescription title (example BPPV) referred either by a doctor specialising in vertigo (ENT) or by a non-specialist doctor (general practitioner), you develop the same rehabilitation protocol.

Always, Usually, Sometimes, Never

Anamnesis: Is the medical diagnosis enough to develop your rehabilitation protocol?

Always, Usually, Sometimes, Never

Anamnesis: Can medical history change your management?

Always, Usually, Sometimes, Never

Anamnesis: Can the history of the patient's illness change your management?

Always, Usually, Sometimes, Never

Anamnesis: Can the patient's lifestyle (socio-professional activities) modify your management?

Always, Usually, Sometimes, Never

Anamnesis: Can the patient's environment (family, leisure activities...) modify your care?

Always, Usually, Sometimes, Never

Anamnesis: The psychological context before and/or during the vertiginous event can modify your treatment?

Always, Usually, Sometimes, Never

**2- The medical file**

21/ What are the examinations/reports that you read before starting your clinical examination? (Tick the corresponding box/multiple choices)

Medical imaging (MRI, CT scan...)	
Vestibulometry assessment reports	
Mainly medical transmission all specialties combined (attending physician, ENT, geriatrician, PRM,...)	
Assessment reports carried out by the medical specialties or the otoneurological sphere (cardiology, pneumology...)	
Reports from paramedics (Orthoptist, psychologist, ...)	
Others:	

22/Which examinations/reports do you think are important in establishing your rehabilitation work protocol (tick the corresponding box/multiple choices)

Physician's report	
ENT balance sheet	
Neurologist	
Geriatrician B	
Physical Medicine Assessment (PMA)	
Respiratory / Cardiology check-up	
Pediatrics assessment	
Assessment Psychologist	
Orthoptist check-up	
Psychomotor Assessment	
Report general physiotherapist	
Others (specify) :	

**3- Evaluation by measurement scale**

23/ Do you use a measurement scale?

*Always, Usually, Sometimes, Never\**

\*If answer "never" (check one box, only one choice)

- Not useful for evaluation*
- No interest in rehabilitation*
- Not enough time*
- Not yet known*
- Other (specify)*

24/ Measurement and evaluation scales are adapted to your needs

*Always, Usually, Sometimes, Never*

\*If answer "never" (check one box, only one choice)

- Because are not relevant in my daily practice*
- Because it doesn't match the patient profiles I'm seeing...*



*Because too many scales to know to adapt efficiently to the patient's profile  
 Because does not allow me to come up with useful conclusions for my treatment...  
 Other (specify)*

25/ In your opinion, what indicators should a scale of measurement adapted to your practice explore? (Check the corresponding box/multiple choices)

Locomotion	
Balance	
Psychological profiles	
Motivational profiles	
Functional profiles	
Other (specify)	

26/What do you think are the needs and uses of a measurement scale for the profession of vestibular physiotherapist? (Tick the corresponding box/several possible choices)

Decision tree	
Patient follow-up before, during and after surgery	
The medical report (passing, interest for the doctor)	
Intra and inter-professional statistical evolution (data base)	
Other (specify)	

**4- Evaluation by instrumentation**

27/Which of the following are the vestibulometry evaluations you use to set up your rehabilitation program (check the corresponding box/multiple choices)

Exploring Hearing		
Tonal audiometry, vocal audiometry, impedancemetry, stapedial reflex, PEA, etc.		
Exploration of the otolithic system		
Evoked cervical otolithic potentials		
ECHODIA		
Evoked ocular otolithic potentials		
Exploration of the canal system		
	VHIT	
	DVA	
	V COR	
	VOG VNG	
	Oculomotor tests : Saccades , Pursuits, Optokinetics	
	Kinetic tests :ERI, Sinus, pendulum test, EVAR, OVAR, etc.	
	Vibrator 100Hz (bone vibration test on mastoids)	
	Pressure maneuvers	
	Caloric tests	
Global vestibular system examination		
Static and dynamic subjective visual vertical		
Multi-sensory posturography		
Quantified instrumental analysis of walking		
Other Explorations (specify)		

28/Which of the following are the instrumental assessments you perform (Check the boxes; several choices are possible)

VNS (look in the dark, positional ...)	
100Hz vibrator (bone vibration test on mastoids)	
VCOR	
Static and dynamic subjective visual vertical	
Horizontal visual subjective static and dynamic	
Subjective haptic vertical	
Subjective postural vertical	
D VNS/VNG (chair kinetic tests)	
DVA	
VHIT	
Multi-sensory posturography	
Quantified instrumental analysis of walking	

29/ Which of the instrumental assessments listed above (in questions 27 and 28) are those that allow you to:

Establish your initial rehabilitation protocol	
If necessary, modify your current rehabilitation protocol.	
Stopping your rehabilitation	
Communicating with other practitioners (physician and non-physician)	

30/Are the data obtained by the instrumentalization of the examinations suitable, sufficient, optimal for the rehabilitation worker? Would you need further instrumental data?

Yes/No  
Explain

31/What answers do you expect from an instrumental examination? (Other clinical, functional, reproducible, validated data, passing, recognition...). Develop

Yes/No  
Suggestions

**5- Therapeutic choices: based on your assessment, your current knowledge and professional experience you are sure to be able to: (only one choice)**

32/Construct your rehabilitation protocol targeted at:

*Diagnosis present in the prescription,  
Non-qualitative and non-quantitative doctor's prescription,  
Admit to failing to build a targeted protocol...*

33/Make a request for an additional examination based on your physiological assessment:

*To refute or confirm a clinical hypothesis,  
To target rehabilitation work,  
I can't make a targeted request for further review at this time...*

34/Define a clinical profile (with otoneurological impairment, with a vestibular syndrome combined with other pathology, with normal vestibular function but with sensory integration conflict, with a psychic disorder):

*To define a specific clinical profile from an instrumental assessment,  
To establish an overall clinical profile,  
I can't define a targeted clinical profile at this time...*

35/Define/Recognize in a patient:

*To identify a psychogenic disorder (anxiety, stress, anguish) in a patient,  
To identify a psychiatric disorder (phobia, mood disorder and post-traumatic shock) in a patient,  
I can't do any psychic profiling right now...*

36/ Undertaking in Therapeutic Education:

*To define a motivational state subjectively (e.g. family support, willingness to comply with therapy, state of dissonance...),  
A motivational interview (collaboration, evocation, autonomy),  
I can't define a motivational project at this time...*

37/In case you observe that the addressing in rehabilitation is not in accordance with your assessment (tick the box, only one answer possible):

You carry out the treatment in accordance with the procedure requested.	
You refer to the doctor for a thorough investigation without starting the treatment.	
You evaluate and set up an adapted treatment plan; the referral to the doctor is only made at the end of the treatment.	
You assess, make an initial report to the doctor and put in place an appropriate treatment plan.	
Based on your assessment, you will directly refer to the specialist who can provide an important element for the smooth running of your treatment.	

38/In your experience, is your assessment satisfactory?

*Yes/No In your opinion, how could it be improved?*

*Suggestions*

### **V/ The rehabilitation protocol**

39/What are the tools/techniques you use in vestibular rehabilitation? several choices

VNS	
Rotating chair (manual with or without accelerometer, electronic) specify	
TRV Chair (it allows to carry out the positional maneuvers on 3 axes)	
Optokinetics	
Diode ruler	
Pointer helmet	
Virtual Reality	
Mousse	
Balancing plate	

WP : Walking Path (for stimulate proprioception, balance, walk with simple and double task)	
Exercise rehabilitation	
MG : Medical Gymnastics include balance exercises but not vestibular specific.(e.g. walking course, obstacle clearance, fall work, specific task training, biofeedback, postural gymnastics, inter-segment coordination)	
Psychomotor rehabilitation	
Oculo-cephalogyre rehabilitation	
Manual therapy / Osteopathy	
Hypnosis	
Sophrology	
Relaxation/breathing technique	
Mental Imaging Technique	
Maxillo-Facial/Tubic Rehabilitation	
Posturology Technique (suppression or saturation of one or more sensory inputs)	
Neuropsychological exercises (optimization of attentional resources, rhythmicity, etc.).	
Tilting table	
Sensory-Motor Integration Rehabilitation (orientation in space, perceptive motor exercises ...) is used for are used to put in an ecological situation the patient who has received a specific treatment of type adaptation, substitution or sensory habituation. (e.g. Gaze stabilization exercise VOR*1 VOR*2)	
Psycho-physical rehabilitation understands the set of techniques to reduce stress and excess emotions by refocusing on the body	
Therapeutic education: motivational maintenance, living space planning, prescription of adapted physical activity, prescription of exercises for the home, etc.	
Other: specify	

40/Are you satisfied with your rehabilitation work? What parameters would be likely to improve it?

Yes/No

Suggestions

**VI/ Discharge: The patient, The physiotherapist, The profession**

41/What are the reasons for discontinuing your care? Several possible choices

Successful rehabilitation	
Objectives Achieved	
Coverage limited by prescription	
Rehabilitation in failure (bad addressing, abandonment, difficulty in the relationship between practitioner and patient ...)	
Suggestions	

42/Do you think it is necessary to obtain a level of knowledge adapted to this care: for what reason? By what means?

Yes/No

Suggestions

43/Do you have the possibility of re-evaluating your patients from 6 months to 1 year of your care? Would it be relevant in your opinion to evaluate the future of your patients?

Yes/No  
Suggestions

44/ Are you generally satisfied with your overall care (from examination to rehabilitation)?

Yes/No  
*What are its strong points? What would be the weak points? Suggestions*

45/ The term vestibular rehabilitation seems to lose, as knowledge in basic and biomedical sciences advances, its legitimacy, which seems to be restricted and incomplete in its definition and approach, as it has been constructed. Moreover, some diplomas confer to the physiotherapist a title giving a specificity of practice in a framework of increased competence. This is the case of the osteopathic physiotherapist, the ergonomic physiotherapist. Would you be ready for a new name for our specialty? What do you think of the name Physiotherapist Vertigologist? What would it evoke for you? Would you suggest another name?

Yes/No  
Suggestion

46/ Do you think the vestibular physiotherapist is ready for direct access? What do you expect in the future (innovation, interdisciplinarity, evolution of the profession, bio-medical knowledge, etc.)?

Yes/No  
Suggestion

47/ Would you agree to participate in a study based on your patient databases that would take about 8 hours of work using a questionnaire (publication of an article as a co-author)? If YES, please enter your MAIL.

Yes/No  
Email address