ORIGINAL ARTICLE

Blood pressure telemonitoring and telemedicine for hypertension management—positions, expectations and feasibility of Latin–American practitioners. SURVEY carried out by several cardiology and hypertension societies of the Americas

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ABSTRACT

Purpose: To assess the opinion of Latin–American physicians on remote blood pressure monitoring and telehealth for hypertension management.

Material and methods: Cross-sectional survey of physicians residing in Latin–America. The study was conducted by the Mexico Hypertension Experts Group, Interamerican Society of Hypertension, Interamerican Society of Cardiology Epidemiology and Cardiovascular Prevention Council, and National Cardiologist Association of Mexico. An online survey composed of 40 questions using Google Forms was distributed from 7 December 2021, to 3 February 2022. The survey was approved by the GREHTA Ethics Committee and participation was voluntary and anonymous. Multiple logistic regression models were constructed to identify the challenges of telehealth.

Results: 1,753 physicians’ responses were gathered. The responses came from physicians from different Latin–American countries, as follows: 24% from Mexico, 20.6% from Argentina, 14.7% from Colombia, 10.9% from Brazil, 8.7% from Venezuela, 8.2% from Guatemala and 3.2% from Paraguay. Responders with a high interest in carrying out their assistance task through remote telemonitoring reached 48.9% (821), while 43.6% are already currently conducting telemonitoring. A high number, 62%, claimed to need telemonitoring training. There is a direct relation between higher interest in telemonitoring and age, medical specialty, team working, residence in the biggest cities, expectations regarding telemedicine and reimbursement.

Conclusions: Remote monitoring is feasible in Latin–America. General practitioners and specialists from bigger cities seem eager and are self-perceived as well-trained and experienced. Facilities and resources do not seem to be a challenge but training reinforcement and telemedicine promotion is necessary for those physicians less motivated.

PLAIN LANGUAGE SUMMARY

What is the context?
- Hypertension is one of the leading worldwide modifiable risk factors for premature death.

Strong evidence supports that effective treatment of this condition results in a significant reduction of hard outcomes.

Facilities and resources do not seem to be a challenge but training reinforcement and telemedicine promotion is necessary for those physicians less motivated.
Only 20%–30% of hypertensive patients are within the blood pressure targets recommended by guidelines in Latin–America. There is an urgent need to implement innovative strategies to reverse this alarming health situation.

What is new?
- Latin–American physicians were highly predisposed to telemonitoring practice. This high motivation was not influenced by hardware or software availability, technological knowledge or experience, by volume of monthly consultations, or by area (private–public) where the care activity is carried out.
- This high motivation may be supported by the conviction that this practice could be very useful as a complement to face–to–face assistance and a highly effective tool to improve adherence even though respondents considered that just 10% of the patients would prefer telemonitoring over office consultation.

What is the impact?
- Facilities and resources do not seem to be a challenge but training reinforcement and telemedicine promotion is necessary for those physicians less motivated. The general perception is that it is necessary to move forward to resolve legal gaps and financial aspects.
- Physicians must adapt to changes and develop new communication strategies in a world where the unrestricted access to teleinformation makes patients self-perceived as experts.

**Introduction**

Hypertension is one of the leading worldwide modifiable risk factors for premature death [1]. Strong evidence supports that effective treatment of this condition results in a significant reduction of hard outcomes [2]. Paradoxically, the majority of patients living with hypertension do not achieve blood pressure targets enough for prolonging their life-time and life quality. The May Measurement Month (MMM) initiative of the International Society of Hypertension, as well as epidemiological studies such as PURE had concluded that at least a quarter of Latin–American population suffers from hypertension. However, only 20%–30% of them are within the blood pressure targets recommended by current guidelines [3,4]. These data are in line with the Global Blood Pressure Screening Campaign of the International Society of Hypertension (MMM 2019). Of 1,508,130 screened 32% had never had a blood pressure measurement before and of those who had hypertension 58.7% were aware and 54.7% were on antihypertensive medication. Of those on medication 57.8% were controlled to <140/90 mm Hg, and 28.9% to <130/80 mm Hg. These mean that of all those with hypertension 58.7% were controlled to <140/90 mm Hg, and 23.3% participants had untreated or inadequately treated hypertension [5].

These meager worldwide results are due to low patient not complying with recommendations, high clinical inertia, lack of long-term health policies, inadequate delivery of resources with an excessive allocation of care providers in large cities, low levels of economic income of the population and health providers, large geographical extensions with limited access, poor communications infrastructure, lack of access to quality health care and socio-cultural aspects of the population, among many others [6,7].

With this context, it is clear the urgent need to implement innovative strategies to reverse this alarming health situation. In the last years, physicians has noticed that an increase of out-of-office BP measurement is a useful tool to keep patients and physicians in contact and promote better pharmacological adherence and BP control [8]. Currently, a huge number of systematic reviews and meta-analyses are available confirming the validity of self-measured blood pressure data that can be shared by patients and physicians by telemedicine [9–11]. The concept of health parameters and biological signals acquisition and remote management by health care providers is the basis of telemedicine. Internet is the most common way to deliver these services. A secure e-health system used by trained professionals is essential to guarantee privacy [12]. Treatment affordability, compliance and persistence are well-known challenges to achieve blood pressure targets in hypertension. Forty-four prospective studies comprising 1,978,919 patients were included in a systematic review and meta-analysis, which demonstrated that 60% of the patients had compliance of ≥80% to cardiovascular medications. Patients with good adherence to antihypertensive treatment had a 19% reduction in the risk of cardiovascular disease risk, and 29% in all-cause mortality [13]. In this scenario, the response of a primary care team was evaluated when patients submitted at least three readings of elevated blood pressure to the electronic health record. The clinicians acted in 62.1% of alerts following the issues: 21.7% reconciling medication and assessing adherence, 11.5% verifying BP measurement technique, 21.7% requesting...
appointments and 17.4% resulting in medication changes which in 50% of the cases were remote. The authors concluded that electronic health record alerts for elevated BP during remote monitoring could be effective in prompting a mix of remote and office-based management [14].

The place of telehealth in the delivery of care at the COVID-19 pandemic was well established. Ambulatory encounters, both in-person and telehealth were evaluated in a cohort of patients enrolled in US health plans from March to June in 2019 and 2020. During 2020, 0.04 telehealth visit per person (26.4%) with primary diagnosis of hypertension accounted for all interactions compared to 0.05 contacts (0.1%) in 2019. COVID-19 prevalence in an area was associated with higher use of telehealth [15].

However, to be considered an effective tool to achieve therapeutic goals in hypertension treatment, telemedicine must be supported by efficient and manageable systems and algorithms. Findings from a retrospective outpatient cohort evaluated at the Columbia University Irving Medical Centre confirm this notion. The researchers found that BP is less likely to be recorded during telemedicine visits in primary care and cardiology settings, but when blood pressure was recorded telemedicine use was found to be associated with similar or slightly improved blood pressure control [16]. The potential benefits of a well-organized telemedicine program in cardiovascular prevention, and particularly in hypertension treatment, can be visualized from a remote, algorithmically driven, disease management program that utilizes navigators and pharmacists, supported by specialists, to initiate and titrate medications within the Mass General Brigham health system. Compared to baseline LDL-C reduction were 24 mg/dl in all patients enrolled and 52 mg/dl in those who achieved maintenance after completed titration. Mean home systolic/diastolic blood pressure reduction compared to program entry was 14/6 mm Hg. The proportion of patients on 1, 2, 3 or 4 antihypertensive medications changed from 42%, 25%, 7% and 2% at baseline to 31%, 35%, 19% and 5% in maintenance while the increase of patients on statins was 25% and on high-intensity statins 36% [17].

With this context, telehealth could be considered a valuable tool to improve treatment adherence, persistence, clinical inertia and achievement of blood pressure targets.

The aim of this study was to assess the opinion of Latin–American physicians on remote blood pressure monitoring and telehealth as a tool for the assistance of hypertensive patients, telemonitoring implementation challenges, resources availability and financial support needs. This information could be of help for healthcare decision makers and health policies improvement.

**Material and methods**

The study population included physicians residing in Latin–American identified through national leaders from GREHTA (Mexico Hypertension Experts Group), IASH (Interamerican Society of Hypertension), SIACPREVENT (Inter-American Society of Cardiology Epidemiology and Cardiovascular Prevention Council) and ANCAM (National Cardiologist Association of Mexico), which decided to participate in the poll. The study was reviewed and approved by GREHTA Ethics Committee informed consent for participants were not considered a requirement.

A cross-sectional online survey consisting of 40 questions was developed using Google Forms (Mountain View, CA, USA). Questions examined participant demographics, scientific and academic activities, perceptions on remote blood pressure monitoring and telehealth, training needs and knowledge, attitudes toward blood pressure telemonitoring, potential feasibility barriers, confidentiality, privacy and security of patient’s data threats and financial and legal issues. Questions contained dichotomous and multiple choice responses, Likert-type, rank-order and open-ended response choices. Questions were not forced and respondents were permitted to select multiple response choices.

The poll was available online in Spanish. The English version of the form is provided as Supplementary Material.

Potential participants were invited by national leaders from Latin–American countries, all members of the four societies organizing the study, or individual or groups invitations sent by electronic mail. Reminders were periodically emailed to maximize the response rate. The survey link was available on the Internet from 7 December 2021 to 3 February 2022. Survey participation was voluntary and anonymous. The goal of the study was to achieve at least a sample of 1500 surveys with a confidence level of 99%, a margin of error of 2.53% and at least 50% of the surveys with all data completed to detect meaningful information with statistically significant power to describe Latin–American physicians’ position, expectations and feasibility of telemedicine practice.

Statistical analysis: The statistical analysis was performed with SPSS (version 24.0; IBM). The study
population was arbitrarily stratified according to how likely were physicians to use remote monitoring as part of their medical practice on a scale from 1 to 10, 1 being unlikely and 10 being highly probable, less likely: 1 to 5, intermediate likelihood: 6 to 8, and more likely: 9 to 10. Continuous variables were reported as means with their standard deviations for normally distributed variables or median (interquartile range) for non-normally distributed variables, and discrete variables as absolute values and percentages. For normally distributed variables the analysis was performed using unpaired one-way ANOVA. For non-normally distributed variables, the Kruskal-Wallis test was used. Differences in proportions were evaluated by Chi-square test. Multiple logistic regression models were constructed for telemonitoring challenges identification, and odds ratios and 95% confidence intervals were provided. The goodness of fit of the model was evaluated with the Hosmer-Lemeshow test. A 2-tail p-value < 0.05 was considered statistically significant.

**Results**

One thousand seven hundred fifty-three physicians completed the survey. The responses came from physicians from different Latin–American countries, as follows: 24% from Mexico, 20.6% from Argentina, 14.7% from Colombia, 10.9% from Brazil, 8.7% from Venezuela, 8.2% from Guatemala and 3.2% from Paraguay. Physicians who answered were predominately male (62.4%); 42.5% were cardiologists, with more than 10 years of practice (83.8%), 81.6% of them practice in multidisciplinary teams; 58.6% perform at least 100 medical consultations per month. The majority of respondents are interested and active in training: the majority carried out academic activities (73.4%); 82.5% responders had access to scientific journals and most of them reported having read at least one scientific paper in the last 30 days (90.1%). Moreover, a significant number of doctors acknowledged experience in telemonitoring (43.6%). Almost half of the responders answered positively to being interested (level 9–10 out of 10) in carrying their assistance task through remote telemonitoring (n = 821, 48.9%). Interest in telemonitoring practice by physicians ranked as follows: Peru (70.8%), Dominican Republic and Chile (60%), Colombia (56.5%), Mexico (55.2%) and Argentina (46.9%; Table 1).

More than 40% of respondents are currently conducting telemonitoring as a complement to face-to-face consultations; two thirds of them, considered themselves well trained to perform this task and one third answered they were very experienced. However, 62% referred to need telemonitoring training. At least half of the physicians considered telemonitoring highly important as consultation complement and valuable to improve compliance. Despite previous answers, according to the perspectives of the respondents only 10.8% of the patients would prefer telemonitoring over office visits. Two thirds of medical doctors considered security confidentiality highly important in telemonitoring. Some responses are very interesting from a pragmatic point of view since around half of the health providers do not know if health care financiers pay telemonitoring assistance or if there is a current legislation in the country.

**Table 1. Baseline characteristics of the sample.**

| Variable                              | Total n = 1753 | Low-moderate telemonitoring probable n = 858 | High telemonitoring probable n = 821 |
|--------------------------------------|---------------|---------------------------------------------|-------------------------------------|
| Mean age (years ± SD)                | 50.8 ± 12.2   | 52 ± 13.6                                   | 49.5 ± 12.6                        |
| Male gender (n %)                    | 1084–62.4     | 530–61.6                                    | 554–63.2                           |
| >10 years clinical practice (n %)    | 1453–83.2     | 720–84.1                                    | 733–83.6                           |
| >100 consults/month (n %)            | 992–58.6      | 481–57.3                                    | 511–59.8                           |
| Private practice (n %)               | 1010–37.4     | 514–38.8                                    | 496–36                             |
| Public Hospital setting (n %)        | 744–27.5      | 379–28.6                                    | 399–29                             |
| Practice city > 500,000 inhabitants (n %) | 1135–65.7     | 518–60.7                                    | 616–70.5                           |
| Member of a working team (n %)       | 1420–81.6     | 664–71.2                                    | 756–85.8                           |
| Specialty (n %)                      |               |                                             |                                    |
| Cardiology                           | 714–40.7      | 356–41.5                                    | 358–43.6                           |
| Internal medicine                    | 245–14        | 116–13.5                                    | 129–15.7                           |
| General practitioner                 | 197–11.2      | 108–12.6                                    | 89–10.8                            |
| Other                                | 523–29.8      | 278–32.4                                    | 245–29.9                           |
| Active member scientific society (n %) | 1275–73.4     | 595–69.3                                    | 680–77.5                           |
| Receive scientific journals (n %)    | 1406–82.5     | 704–81.9                                    | 732–83.1                           |
| Read at least 1 paper in the last 30 days (n %) | 1567–90.1     | 755–87.9                                    | 812–92.1                           |
| Internet access (n %)                | 1703–98       | 838–97.6                                    | 865–98.5                           |
| Hardware availability (n %)          | 1680–90.5     | 810–94.1                                    | 870–98.9                           |
| Platforms knowledge (n %)            | 1407–81       | 157–88.1                                    | 600–74                             |

1–5 means low; 6–8 means intermediate; 9–10 equals to high.
Regarding telemonitoring. Almost 90% of doctors would require informed consent from the patient before starting telemonitoring (Table 2).

The bivariate logistic regression analysis showed a relation between a higher interest in telemonitoring and younger age, years of clinical practice, country of residence, multidisciplinary team working, practicing in big cities and positive assessment of telemedicine as a support for office assistance or a tool to improve adherence were found. Surprisingly, the availability of internet connection was not a reason of higher telemonitoring practice (Table 3).

There is a direct relation between higher interest in telemonitoring and age, medical specialty, residence in biggest cities, expectations on telemedicine and reimbursement, as can be seen in the multivariate analysis (Table 4).

The prediction capacity of the model showed an area under the curve of 0.81. The goodness of fit of the model evaluated with the Hosmer-Lemeshow test was \( p \)-value = 0.446.

**Discussion**

In this Latin–American telehealth survey, conducted by GREHTA, IASH, SIACPREVENT and ANCAM that included 1753 physicians, 48.9% of them were highly predisposed to telemonitoring practice. This high motivation was not influenced by hardware or software availability, technological knowledge or experience, by volume of monthly consultations, or by area (private–public) where the care activity is carried out. Younger physicians living in cities with more than 100,000 inhabitants are more prone to telemonitoring. In fact, those medical doctors that are already applying remote telemonitoring in their care activity are the most motivated to continue doing so. This may be supported by the conviction that this practice could be very useful as a complement to face–to–face assistance and a highly effective tool to improve adherence even though respondents considered that just 10% of the patients would prefer telemonitoring over office consultation.

Latin–American physicians answered that they have good quality internet access in 98% of the cases, 90.5% had mHealth technology, 81% knew about telemonitoring platforms and in 70% of the cases, they are willing to request call-center support. In addition, there are 440 million personal subscriptions to cellular plans in the region, representing 70% of the total population. In this region, 67% of the population is connected to the Internet, while most countries record penetration of more than 60% in urban areas. In countries with greater connectivity, penetration in rural areas reaches 40% of the population while in those with less digital development penetration reaches only 10% of the population. Latin–America and the Caribbean belong to the group of countries in the emerging world that present a moderate annual growth rate of digitalization (49.9%) [18]. In this context, remote monitoring of hypertension could be a valuable and feasible option to solve the present limitations of the non-efficient Latin–American management model of chronic disease, which are high economic expense burden, large facilities and high need of resources.

The results of this survey are similar to those of a secondary analysis to the one performed on the 2017 and 2018 Health Information National Trends Survey (HINTS) 5, Cycles 1 and 2 data. This survey evaluated if mHealth technology such as smartphones and tablets for remote blood pressure monitoring could improve communication between healthcare providers and hypertensive patients through text messaging. Almost three-quarters of patients with hypertension have communicated via internet, 36.1% had used smartphones or tablets to achieve health-related targets and 30% communicated via text messaging with

### Table 2. Telemonitoring experience and attitudes.

| Variable                                                   | Total n = 1753 | Low-moderate telemonitoring probable n = 858 | High telemonitoring probable n = 821 |
|------------------------------------------------------------|----------------|---------------------------------------------|-------------------------------------|
| Currently conducting telemonitoring (n %)                  | 759–43.6       | 259–30.1                                    | 500–56.2                            |
| Considers herself/himself very apt to conduct telemonitoring (n %) | 1140–65.7      | 395–29.1                                    | 745–84.8                            |
| High telemonitoring experience (n %)                       | 584–33.7       | 117–13.6                                    | 467–53.2                            |
| Need telemonitoring training (n %)                         | 1070–62        | 595–69.5                                    | 475–54.5                            |
| Considers telemonitoring highly important as consultation complement (n %) | 882–50.9       | 232–27                                      | 653–74.4                            |
| Convinced telemonitoring is highly valuable to improve compliance (n %) | 1114–64.1      | 385–44.6                                    | 729–83.3                            |
| Thinks that patients will highly prefer telemonitoring to face-to-face consultation (n %) | 188–10.8       | 50–5.7                                      | 140–16                              |
| Consider confidentiality security is highly important in telemonitoring (n %) | 1186–68.5      | 496–57.7                                    | 690–79.1                            |
| Do not know if healthcare financiers pay telemonitoring (n %) | 763–43.1       | 402–48.6                                    | 331–37.7                            |
| Do not know if there is country legislation about telemonitoring (n %) | 882–50.6       | 499–57.9                                    | 388–43.8                            |
| Consider to request informed consent (n %)                 | 1537–88.6      | 763–88.6                                    | 774–88.5                            |

1–5 means low; 6–8 means intermediate; 9–10 equals to high.
Table 3. Bivariate analysis showing association with high probability on telemonitoring.

| Variable                                                                 | OR   | 95% CI        | p Value |
|--------------------------------------------------------------------------|------|---------------|---------|
| **Age in years compared to > 60**                                         |      |               |         |
| 40 to 60                                                                 | 1.26 | 0.99–1.59     | 0.055   |
| <40                                                                      | 1.39 | 1.05–1.84     | 0.02    |
| **Gender**                                                               | 1.06 | 0.87–1.29     | 0.56    |
| **Years of clinical practice compared to > 30**                          |      |               |         |
| 15 to 30                                                                 | 1.18 | 0.93–1.48     | 0.17    |
| <15                                                                      | 1.30 | 1.01–1.70     | 0.04    |
| **Country residence compared to others**                                 |      |               |         |
| Mexico                                                                   | 1.44 | 1.12–1.87     | 0.005   |
| Argentina                                                                | 1.04 | 0.79–1.36     | 0.79    |
| Colombia                                                                 | 1.57 | 1.16–2.12     | 0.004   |
| Brazil                                                                   | 1.27 | 0.91–1.77     | 0.17    |
| **N consultations per month compared to <100**                           |      |               |         |
| 100 to 299                                                               | 1.04 | 0.83–1.30     | 0.75    |
| > 300                                                                    | 0.96 | 0.74–1.24     | 0.76    |
| **Specialty compared to others**                                         |      |               |         |
| Cardiology                                                               | 1.13 | 0.91–1.42     | 0.27    |
| General practitioner                                                     | 0.93 | 0.67–1.28     | 0.65    |
| Internal medicine                                                        | 1.25 | 0.93–1.69     | 0.14    |
| **Type of work compared to lonely**                                      |      |               |         |
| Multidisciplinary team                                                   | 1.82 | 1.42–2.35     | <0.001  |
| Speciality team                                                          | 1.61 | 1.15–2.26     | 0.005   |
| **Working city compared to <100,000 inhabitants**                        |      |               |         |
| 15 to 30                                                                 | 1.66 | 1.27–2.17     | <0.001  |
| **Academic activities**                                                 | 1.53 | 1.23–1.89     | <0.001  |
| **Receiving journals compared to not receiving**                        |      |               |         |
| Yes online                                                               | 0.99 | 0.76–1.28     | 0.92    |
| Yes print                                                                | 1.31 | 0.71–2.42     | 0.39    |
| Yes both                                                                 | 1.29 | 0.95–1.76     | 0.11    |
| **Read scientific manuscript in last 30 days**                          |      |               |         |
| Yes                                                                      | 1.61 | 1.17–2.22     | 0.003   |
| **Knowledge telemonitoring platform**                                    | 2.62 | 2.03–3.39     | <0.001  |
| **Availability telemonitoring hardware**                                 | 5.52 | 2.78–10.9     | <0.001  |
| **Internet availability**                                               | 1.70 | 0.84–3.38     | 0.15    |
| **Willingness to request specialized ‘call center’ support**            | 1.06 | 0.87–1.30     | 0.57    |
| **Judgment positive relevance of telemonitoring on own-practice compared to 1–5 out of 10** | | | |
| 6 to 8 out of 10                                                         | 4.45 | 3.33–5.96     | <0.001  |
| 9 to 10 out of 10                                                        | 20.6 | 14.7–28.8     | <0.001  |
| **How helpful could be telemonitoring to facilitate adherence to face-to-face recommendations compared to 1 to 5 out of 10** | | | |
| 6 to 8 out of 10                                                         | 4.91 | 3.40–7.10     | <0.001  |
| 9 to 10 out of 10                                                        | 17.5 | 12.1–25.5     | <0.001  |
| **How many recommendations can be done by telemonitoring compared to 1 to 5 out of 10** | | | |
| 6 to 8 out of 10                                                         | 3.29 | 2.57–4.22     | <0.001  |
| 9 to 10 out of 10                                                        | 6.93 | 5.21–9.21     | <0.001  |
| **Better way to connect to patients in telemedicine compared to phone-calls** | | | |
| hospital platform                                                        | 1.01 | 0.72–1.42     | 0.98    |
| professional platform                                                    | 1.59 | 1.27–2.00     | <0.001  |
| videoconference                                                          | 1.11 | 0.86–1.43     | 0.44    |
| **Paid telemonitoring by insurance companies in your country compared to ‘no’** | | | |
| yes                                                                      | 1.57 | 1.14–2.16     | 0.006   |
| unknown                                                                  | 0.80 | 0.61–1.06     | 0.12    |
| some of them                                                             | 1.26 | 0.92–1.72     | 0.15    |
| **Telemedicine laws available in your country compared to ‘no’**         |      |               |         |
| yes                                                                      | 1.48 | 1.13–1.94     | 0.005   |
| unknown                                                                  | 0.69 | 0.55–0.87     | 0.002   |
| **Payers accept electronic prescription in your country compared to ‘no’** | | | |
| yes                                                                      | 1.28 | 0.95–1.71     | 0.10    |
| unknown                                                                  | 0.78 | 0.58–1.06     | 0.11    |
| **Informed consent request**                                            | 0.99 | 0.74–1.34     | 0.97    |
| **Expectations about patients telemedicine preferences compared to 1 to 5 out of 10** | | | |
| 6 to 8 out of 10                                                         | 3.66 | 2.88–4.64     | <0.001  |
| 9 to 10 out of 10                                                        | 4.25 | 2.50–7.23     | <0.001  |
| **Relevance of confidentiality compared to 1 to 5 out of 10**            |      |               |         |
| 6 to 8 out of 10                                                         | 3.36 | 2.43–4.65     | <0.001  |
| 9 to 10 out of 10                                                        | 4.93 | 3.68–6.60     | <0.001  |
| **Who should be part of telemonitoring comparing to ‘just the patient’** | | | |
| Patient and family member                                                | 1.46 | 1.16–1.84     | 0.001   |
| Other members of the health team                                         | 1.50 | 1.03–2.16     | 0.036   |
| **How you would like to charge telemonitoring fees compared to no charges** | | | |
| Patient payment                                                          | 2.63 | 1.46–4.75     | 0.001   |
| Insurance company or third party                                         | 2.82 | 1.53–5.20     | 0.001   |
| Private insurance                                                        | 2.5  | 1.22–5.12     | 0.012   |
| Government insurance                                                     | 2.21 | 0.89–5.45     | 0.086   |
| **How much would you like to charge for telemonitoring?**               |      |               |         |
| 26–75 USD                                                                | 1.45 | 1.13–1.86     | 0.003   |
| > 76 USD                                                                 | 1.57 | 1.18–2.10     | 0.002   |

1–5 means low; 6–8 means intermediate; 9–10 equals to high.
their healthcare professionals. Electronic communication with the doctor or doctor’s office through email or internet and having a wellness App were significant predictors of using text message communication with a healthcare professional, while the odds of achieving health-related goals increased significantly having a wellness App, using other devices apart from smartphones or tablets to monitor health, and making health treatment decisions and discussing with a provider with the help of a tablet or smartphone [19].

The TASMINH4 trial assessed the effectiveness of self-monitored blood pressure for hypertension treatment in primary care, with or without telemonitoring, compared to usual care in 142 general practices in the UK in patients with blood pressure higher than 140–90 mm Hg. After 12 months, systolic blood pressure was lower in self-monitoring group (137 ± 16.7 mm Hg) and telemonitoring group (136 ± 16.1 mm Hg) compared to usual care group (140.4 ± 16.5 mm Hg), with an adjusted mean difference of self-monitoring group versus usual care group of −3.5 mm Hg (95% CI −5.8 to −1.2), and telemonitoring group versus usual care group −4.7 mm Hg (95% CI −7.0 to −2.4), and without a significant difference between the self-monitoring and telemonitoring groups [7].

Remote blood pressure treatment monitoring requires, beyond technical aspects, specific training and skills. Almost two thirds of the respondents indicated that they need some kind of training. What is more, 70% of physicians less prone to carry out their assistance task through remote telemonitoring reported that they need to be trained. Accordingly, it is necessary for physicians specialized in any area of health care, teaching or research to receive proper training to be able to apply the information and communication technologies in a correct way.

There is currently a growing demand for the use of electronic health records, remote monitoring care services, participation in social networks or e-learning for both health providers and users. All of these tools require general and specific training. Technology should be used in an integrated manner with the resources and capabilities available so that organizations can consider telemedicine as a sustainable competitive advantage [20].

Telehealth is a complex technology that is proposed as an alternative to the more traditional known provision of health services. It can affect all stages of health care and the interaction between doctors and doctor-patient, as well as modify the role of health providers. At the same time, telehealth poses significant ethical and legal implications such as responsibility for making decisions, data privacy, information security, informed consent and legal aspects [21]. The survey showed that almost 90% of the respondents are convinced to request the patient informed consent prior to remote monitoring implementation no matter how motivated the physicians are. On the other hand, 50% of the interviewed doctors were not informed about the existence of country legal regulations on the practice of telemonitoring, and 40% did not know if healthcare financiers pay for telemonitoring. The health provider must adapt to changes and develop new communication strategies in a world where the unrestricted access to teleinformation makes patients self-perceived as experts.

The multivariate model shows that Latin–American doctors most likely to use telemedicine are middle-aged or younger, live in medium or large cities, see

| Table 4. Multivariate analysis showing association with high probability on telemonitoring. |
|-------------------------------------------------------------|
| Variable | OR   | 95% CI     | p Value |
| Age <60 years | 1.39 | 1.04–1.86  | 0.025   |
| Speciality |   |   |   |
| Cardiology | 1.51 | 1.11–2.04  | 0.008   |
| General practitioners and internal medicine | 1.47 | 1.04–2.07  | 0.029   |
| Team working | 1.39 | 0.99–1.94  | 0.051   |
| Working city (compared to <100,000 inhabitants) | 1.96 | 1.35–2.82  | <0.001  |
| Academic activities | 1.31 | 0.99–1.75  | 0.063   |
| Relevance perception of telemonitoring as complement of face-to-face practice |   |   |   |
| 6 to 8 out of 10 | 3.71 | 2.65–5.20  | <0.001  |
| 9 to 10 out of 10 | 15.5 | 10.4–23.1  | <0.001  |
| Knowledge or use of a professional remote monitoring platform | 2.35 | 1.70–3.26  | <0.001  |
| Currently using a professional platform | 1.36 | 1.04–1.78  | 0.025   |
| No need training to practice telemonitoring | 2.04 | 1.52–2.72  | <0.001  |
| Expectations about patients telemedicine preferences |   |   |   |
| 6 to 8 out of 10 | 2.69 | 1.98–3.65  | <0.001  |
| 9 to 10 out of 10 | 2.21 | 1.09–4.45  | 0.027   |
| How much would you like to charge for telemonitoring? |   |   |   |
| 26–75 USD | 1.67 | 1.22–2.28  | 0.001   |
| 76 to más USD | 1.74 | 1.21–2.49  | 0.003   |

1–5 means low; 6–8 means intermediate; 9–10 equals to high.
this tool as a complement to their face-to-face practice and already carry out remote monitoring, think they do not need any training to practice telemedicine and that it will be well accepted by their patients. They also believe they should be paid for this additional practice. In addition, being able to access a professional platform to perform telemedicine would increase their willingness to do it. Likewise, working as a team and carrying out academic activities showed a strong tendency toward greater predisposition for telemedicine practice. Finally, general practitioners or specialized physicians seem to have similar attitude to adopting telemedicine for improving hypertension management and control.

**Limitations**

This is an open anonymous and voluntary survey, and as a consequence most of the respondents were physicians linked to scientific societies with a high level of continuous education. This raises in some way a certain degree of concern regarding potential bias in the characteristics of the collected samples. For example, there may be an underrepresentation of rural or small cities practitioners, despite the fact that Latin–America is one of the most intensely urbanized regions in the world (with few exceptions, ~80%–90% of the population lives in cities). In this context, 4% of those surveyed lived in towns with <10,000 inhabitants and 12% in cities between 10,000 and 100,000 inhabitants, showing a consistency with the demographics of the continent. On the other hand, the reported data are based on the responses to the survey, and does not necessarily mean that the ones responding the survey implemented telemonitoring in real world. Finally, the sample size exceeded the expectations planned to achieve meaningful information about positions, expectations and feasibility of Latin–American physicians on telemonitoring.

**Conclusion**

Telemedicine is a tool aimed at facing emerging challenges in health systems, adapting to the contemporary requirements of health service consumers, overcoming mobility, cost or financing barriers, among others. In this context, it is necessary to prepare professional teams with clear leadership, properly define functions and facilitate adequate training. Latin–America faces this new challenge, in a context of limited resources and budget reductions. Remote monitoring is feasible in the region, and urban doctors, both general practitioners and specialist, seem prone and self-perceived as well-trained and experienced. Facilities and resources do not seem to be a challenge but training reinforcement and telemedicine promotion is necessary for those physicians less motivated. Finally, the general perception is that it is necessary to move forward to resolve legal gaps and financial aspects.

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